

3.5.1. 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 the last five years.

HEI Input:

37

DVV suggested Input:

11

Change Input: (Optional)

23

Query: Values have been updated excluding the MOUs signed beyond the assessment period and also excluding the MOUs where the activity done beyond the assessment period has not been considered; Also excluding the collaboration done without the MOUs has not been considered; Also excluding the MOUs signed for activity like seminar, awareness campaign , field visit has not been considered as only collaboration activities of research /Faculty exchange/ students exchange/ project work / on-the job training shall be considered as per NAAC SOP.

RESPONSE: In response to the NAAC query, we have updated the values as follows:

- Excluded MOUs signed beyond the assessment period.
- Excluded MOUs where activities conducted beyond the assessment period were not considered.
- Excluded collaborations done without MOUs.
- Excluded MOUs signed for activities such as seminars, awareness campaigns, and field visits, as per the guidelines.
- Included only collaboration activities that involve research, faculty exchange, and student exchange, project work, or on-the-job training, as per the NAAC SOP.
- **MOUs that were previously accepted in the submitted SSR have not been repeated in this list.**



3.5.1: Details of MoU / Collaboration/ Linkage

Supporting documents were provided for previously claimed MoUs (SI No. 2,3,4,5, 6,7,11 and 12) and Few MoUs/ Collaborations (SI No 1,8,9,10) were also included in the modified list. We have **Two international MoU's** and **10 National MoUs** .

Kindly Note that the accepted MoU's in previously submitted list of SSR were not repeated in this list

Sl. No.	Name of the MoU / linkage	Name of the institution / industry with whom the MoU / linkage is made, with contact details	Year of signing MoU / linkage	Purpose of the MoU/Linkage (Internship, on-the-job training, project work, student / faculty exchange and collaborative research)	Duration of MoU / linkage	List the actual activities under each MOU/ Linkage and web -links year-wise	Page number in this document
1	Research Collaboration	Prof. Mirza Hasanurumman, Dept of Agronomy, Sher-e-Bangla University, Bangladesh	2021	Collaboration for plant science research	5 years	Papers were published in elsvier journal	Documents were attached (Page No- 4-6)
2	Online Education	Bluecast Technologies Inc, Dubai, UAE	2021	Service provider to MOODLE for blended mode of education	1 year	Online classes from 15-11-2020 onwards	Documents were attached (Page No 7-15)
3	Online Education	Mohammed Anas, Wayanad	2020	Service provider to MOODLE for blended mode of education	1 year	Online classes from 15-11-2021 onwards	Documents were attached (Page No 16-25)



4	LoU to conduct International Seminar	Dr K N Ajoy Kumar, Course Director, Dept of Botany Kannur University	2022	Erudite Lecture Grant was applied for KSCSTE, Trivandrum	1 year	II International Conference of Plant Functional Biology on 25 to 26 Oct 2022	Documents were attached (Page No 26-29)
5	Linkage for research	Dr Anoop A, Associate Professor, Dept of Chemistry, Indian Institute of Technology Kharagpur	2020 onwards	Collaboration for Computational Chemistry Research	2023	Collaboration resulted in Reputed international Publications with JCR IMPACT FACTOR more than 1.5	Documents were attached (Page No 30-34)
6	Linkage for research	Dr Vinod TP, Department of Chemistry, CHRIST (Deemed to be University), Bangalore	2021	Collaboration for Computational Chemistry Research	2 years	Collaboration resulted in Reputed international Publications with JCR IMPACT FACTOR more than 1.5	Documents were attached (Page No 35-38)
7	Linkage for research	Dr GS Vinod Kumar, Scientist EII, Rajiv Gandhi Centre for Biotechnology, Trivandrum	2019	Collaboration for Drug Delivery Research in Brain Cancer Treatment	5 years	Collaboration resulted in Reputed international Publications with JCR IMPACT FACTOR more than 5	Documents were attached (Page No 39-41)
8	Linkage for research	Dr Divya M S, Scientist-C, SCTIMST, Trivandrum	2021	Collaboration for Drug Delivery Research	3 years	Submission of a research project for funding to Kerala State Council for Science, Technology and Environment	Documents were attached (Page No 42-47)



9	Linkage for research	Dr Manoj K, Associate Professor, Dept of Env Studies, Kannur University	2021	Collaboration for plant science research	5 years	Collaboration resulted in Reputed international Publications with JCR IMPACT FACTOR	Documents were attached (Page No 48-50)
10	Linkage for research	Dr Saravanamoorthy MD, Associate Professor, Dept of Botany, AAGA Colloeege Musiri, Tamil Nadu	2022	Collaboration for plant science research	5 years	Joint Supervision of a Ph D Student with Bharathidasan University	Documents were attached (Page No 51-55)
11	Linkage for Outreach programme	Indian Institute for Remote Sensing	2023	IIRS-ISRO Outreach Programme	1 year	Conducted a certificate course	Documents were attached (Page No 56-60)
12	Mou for academic cooperation	Payyannur College	2021	Supervising PG and UG students for project work	3 years	Collaboration resulted in Reputed international Publications with JCR IMPACT FACTOR more than 1.5	Documents were attached (Page No 61-62)

Letter of Understanding (LoU)

This Letter of Understanding ("LoU") is made on this 15th September 2021 between:

Prof. Mirza Hasanuzzaman

Professor

Department of Agronomy

Faculty of Agriculture

Sher-e-Bangla Agricultural University

Bangladesh

Email: mhzsauag@yahoo.com

AND

Dr. Shackira AM

Assistant Professor

Department of Botany

Sir Syed College

Taliparamba

Email: shackira@sirsyedcollege.ac.in.

Purpose

This Letter of Understanding outlines the terms and mutual understanding between Prof. Mirza Hasanuzzaman and Dr. Shackira AM to collaborate by,

Recognising the mutual interest in the fields of research, development, education, training, transfer of technology and dissemination of knowledge on long term non-commercial basis, and also

Recognising the importance of institutes of higher education's role in promoting international collaboration and increased contribution of social development.

Scope of Collaboration

1. Plant Science Research

Both parties agree to collaborate on joint research activities in the field of Plant Science. This includes, but is not limited to, sharing of research data, methodologies, and resources, as well as organizing joint workshops, seminars, and conferences in areas of mutual interest.

2. Student/Faculty Exchange

The parties agree to facilitate student/Faculty exchanges between their institutions. The exchange will allow students to participate in joint research projects, laboratory work, and academic courses related to plant science. Details regarding the duration, academic credits, and financial responsibilities will be discussed and agreed upon on a case-by-case basis.

3. Data Publication

Both parties agree to jointly publish research outcomes in recognized scientific journals. Co-authorship will be determined by mutual consent and based on each party's contribution to the research work. Both parties will seek opportunities to submit joint research papers to high-impact journals and engage in peer review processes.

Roles and Responsibilities

- Both professors will actively contribute to the collaboration by sharing expertise, resources, and facilitating research work.
- Both parties agree to maintain open and continuous communication through periodic meetings to assess progress, discuss challenges, and plan future work.
- The professors will also mentor and supervise students participating in the exchange program.

Duration

This LoU shall remain in effect for a period of five years (2021-2026) from the date of signing, unless extended by mutual written agreement. Either party may terminate the collaboration with 30 days' notice in writing.

Confidentiality

Both parties agree to keep confidential all proprietary information shared during the course of this collaboration. Any data or findings resulting from joint research will not be disclosed to third parties without prior consent from both parties.

Intellectual Property

The intellectual property rights arising from the collaboration shall be jointly owned by both parties, unless otherwise agreed in writing. Specific terms regarding intellectual property will be addressed in separate agreements as necessary.

Amendments

Any amendments or modifications to this LoU must be agreed upon in writing and signed by both parties.

Signatures

By signing below, both parties agree to the terms outlined in this Letter of Understanding.

Prof. Mirza Hasanuzzaman

Department of Agronomy, Faculty of Agriculture
Sher-e-Bangla Agricultural University, Dhaka, Bangladesh

Date: 15-09-2021

Signature: _____

[Signature]
Dr. Mirza Hasanuzzaman
Professor
Department of Agronomy
Sher-e-Bangla Agricultural University
Dhaka-1207, Bangladesh

[Signature]
Dr. Shackira AM
Department of Botany
Sir Syed College

[Signature]
Dr. Shackira AM
Assistant Professor
Department of Botany
Sir Syed College, Taliparamba
Kannur, Kerala - 670 142



Potassium in plants: Growth regulation, signaling, and environmental stress tolerance

Riya Johnson^a, Kanchan Vishwakarma^b, Md. Shahadat Hossen^c, Vinod Kumar^d, A. M. Shackira^e, Jos T. Puthur^a, Gholamreza Abdi^f, Mohammad Sarraf^{g,*}, Mirza Hasanuzzaman^{h,**}

^a Plant Physiology and Biochemistry Division, Department of Botany, University of Calicut, C.U. Campus P.O., Kerala, 673635, India

^b Amity Institute of Microbial Technology, Amity University, Noida, India

^c Independent Researcher, C/O: Prof. Mirza Hasanuzzaman, Department of Agronomy, Sher-e-Bangla Agricultural University, Dhaka-1207, Bangladesh

^d Department of Botany, Government Degree College, Ramban, 182144, Jammu and Kashmir, India

^e Department of Botany, Sir Syed College, Taliparamba, Kannur, Kerala, 670142, India

^f Department of Biotechnology, Persian Gulf Research Institute, Persian Gulf University, Bushehr 75169, Iran

^g Department of Horticulture Science, Shiraz Branch, Islamic Azad University, Shiraz, Iran

^h Department of Agronomy, Faculty of Agriculture, Sher-e-Bangla Agricultural University, Dhaka, 1207, Bangladesh

ARTICLE INFO

Keywords:

Potassium
Abiotic stress tolerance
Plant growth regulation
Potassium signaling
Essential elements
Potassium in plants

ABSTRACT

Potassium (K) is an essential element for the growth and development of plants; however, its scarcity or excessive level leads to distortion of numerous functions in plants. It takes part in the control of various significant functions in plant advancement. Because of the importance index, K is regarded second after nitrogen for whole plant growth. Approximately, higher than 60 enzymes are reliant on K for activation within the plant system, in which K plays a vital function as a regulator. Potassium provides assistance in plants against abiotic stress conditions in the environment. With this background, the present paper reviews the physiological functions of K in plants like stomatal regulation, photosynthesis and water uptake. The article also focuses upon the uptake and transport mechanisms of K along with its role in detoxification of reactive oxygen species and in conferring tolerance to plants against abiotic stresses. It also highlights the research progress made in the direction of K mediated signaling cascades.

1. Introduction

Potassium (K) is a vital macronutrient and has significant roles in plants like osmoregulation, membrane potential regulation, cotransport of sugars, stress adaption and growth (Sanyal et al., 2020; Sardans and Peñuelas, 2021). Multiple types of transport occur for the transport of potassium ion (K^+), but their regulation under low and high content in external medium remains generally uncertain. Researchers have recognized calcium (Ca^{2+}) signaling route in its control (Assaha et al., 2017). K performs regulatory roles in diverse biochemical processes related to protein synthesis, carbohydrate metabolism and enzyme activation (Hasanuzzaman et al., 2018). Multiple physiological processes are based upon K^+ like photosynthesis and stomatal control. It also provides abiotic stress lenience, and under salinity conditions, K^+ sustains ion

homeostasis and controls the osmotic balance (Assaha et al., 2017; Kumar et al., 2020). It controls stomatal opening under drought conditions and assist plants to acclimate under water stress conditions (Aksu and Altay, 2020; Pathak et al., 2020). Abiotic stress conditions like salt, drought, high and low temperature and chilling produces reactive oxygen species (ROS). Growing indications recommend that augmenting K^+ nutrition status of the plant can significantly accord to abiotic stress tolerance by reducing ROS level of the plants (Pandey and Mahiwal, 2020).

Potassium plays imperative function in upregulation of K^+ , which reduces ROS production in plants, declines the nicotinamide adenine dinucleotide phosphate (NADPH) oxidases activity, and maintains the photosynthetic electron transport activity that provides assistance in reducing the ROS level (Foyer, 2018). The scarcity of K reduces

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CY 240165

SERVER LEASE/RENT AGREEMENT

This Server Lease/Rent Agreement is made and entered into **November 20th 2021**, by and between Sir Syed College whose address is Sir Syed College, Karimbam PO, Sir Syed College, Taliparamba, Kannur, 670142, (hereinafter referred to as "SSC"), and M/s. **BLUECAST TECHNOLOGIES** their address is PO BOX: 128274, DUBAI, U.A.E along with their offshore support division **ZOFTCARES SOLUTIONS LLP** their address is 26/122/B Green Olive Business Suites, Tirur, Kerala, India, Pin 676 101 (hereinafter referred as "ServiceProvider").

These Terms and conditions govern the access and use of the Moodle Cloud hosting services and any customization or related services made available to SSC (Moodle Cloud Services). The terms and conditions of this agreement will be effective and valid with effect from **November 20th 2021 to November 12th 2022**. The terms and conditions of the services to be performed by the Service provider to SSC includes the following;

Approved

[Signature]
28-11-2021

15432 Taliparamba
Principal Sir Syed College
12-11-2021
തദ്ദേശീയ
എ. സഹകാരായണൻ



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- Ensuring the working condition of the MOODLE software throughout the period of agreement validity
- Technical support for the software throughout the period of agreement validity
- Ensuring network bandwidth for 3000 users at the same time
- Install additional plugins (Eg-Embed YouTube in MOODLE website, BigBlue Button etc) according to the requirement
- Design MOODLE roles (eg- Head of the department, Class tutor) according to the requirement with the existing options available in opensource moodle.
- Design/ Customize MOODLE home page as per requirement with the existing provision in opensource moodle.
- Add new members to MOODLE according to the given data after the admission procedure of the new students

The Payment terms include either the fixed price amount of **Rs 26,000 per annum** (Not inclusive of 18% GST) to Service provider from SSC

For Bluecast Technologies


28-11-2021

Mohamed Navas, Director of Operations

For ZOFTCARES SOLUTIONS LLP.

Designated Partner


28-11-2021

For SSC (Sir Syed College)



Dr. Ismail Olayikkara MA., Ph.D.
Associate Professor
in charge of the Principal
Sir Syed College
Taliparamba-670 142

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


























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First name / Surname ^		Email address	Roles	Groups	Last access to course	Status
<input type="checkbox"/>	 che1210 FATHIMA E	che1210@sirsyedcollege.ac.in	Student 	No groups	2 years 152 days	<div>Active </div> <div> </div>
<input type="checkbox"/>	 che1173 FATHIMA RAFA T K	che1173@sirsyedcollege.ac.in	Student 	No groups	2 years 39 days	<div>Active </div> <div> </div>
<input type="checkbox"/>	 che1196 FATHIMATH SAFA.V.K	che1196@sirsyedcollege.ac.in	Student 	No groups	1 year 302 days	<div>Active </div> <div> </div>
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<input type="checkbox"/>	 che1176 FATHIMATHU RIZA V	che1176@sirsyedcollege.ac.in	Student 	No groups	2 years 74 days	<div>Active </div> <div> </div>
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<input type="checkbox"/>	 che1211 FATHIMATHUL SANA	che1211@sirsyedcollege.ac.in	Student 	No groups	1 year 104 days	<div>Active </div> <div> </div>
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<input type="checkbox"/>	 che1213 HISANA PARVEEN P P	che1213@sirsyedcollege.ac.in	Student 	No groups	1 year 260 days	<div>Active </div> <div> </div>
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<input type="checkbox"/>	 che1214 HUDA IQBAL K	che1214@sirsyedcollege.ac.in	Student 	No groups	2 years 133 days	<div>Active </div> <div> </div>
<input type="checkbox"/>	 che1215 JABEERA P	che1215@sirsyedcollege.ac.in	Student 	No groups	2 years 78 days	<div>Active </div> <div> </div>
<input type="checkbox"/>	 che1198 KEERTHANA P V	che1198@sirsyedcollege.ac.in	Student 	No groups	1 year 98 days	<div>Active </div> <div> </div>
<input type="checkbox"/>	 che1199 MALAVIKA UNNIKRISHNAN K	che1199@sirsyedcollege.ac.in	Student 	No groups	1 year 98 days	<div>Active </div> <div> </div>
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<input type="checkbox"/>	 che1200 NANDANA K	che1200@sirsyedcollege.ac.in	Student 	No groups	142 days 22 hours	<div>Active </div> <div> </div>
<input type="checkbox"/>	 Rajeena Pathoor	rajeenapathoor@gmail.com	Teacher 	No groups	2 years 56 days	<div>Active </div> <div> </div>
<input type="checkbox"/>	 che1218 REJA K K P	che1218@sirsyedcollege.ac.in	Student 	No groups	2 years 77 days	<div>Active </div> <div> </div>
<input type="checkbox"/>	 che1219 SAFVANA M C	che1219@sirsyedcollege.ac.in	Student 	No groups	2 years 78 days	<div>Active </div> <div> </div>
<input type="checkbox"/>	 che1201 SHADA SHAFRI K P C	che1201@sirsyedcollege.ac.in	Student 	No groups	2 years 37 days	<div>Active </div> <div> </div>

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<input type="checkbox"/>  che1202 SHAFNA C	che1202@sirsyedcollege.ac.in	Student 	No groups	2 years 8 days	<div>Active </div> <div> </div>
<input type="checkbox"/>  che1183 SHAHANA SHIRIN VK	che1183@sirsyedcollege.ac.in	Student 	No groups	2 years 63 days	<div>Active </div> <div> </div>
<input type="checkbox"/>  Dr Ashwani Kumar N SIRSYED	ashwani272@gmail.com	Teacher, Manager, Course creator 	No groups	8 mins 37 secs	<div>Active </div> <div> </div>
<input type="checkbox"/>  che1220 SURYA VISWANATH	che1220@sirsyedcollege.ac.in	Student 	No groups	1 year 171 days	<div>Active </div> <div> </div>
<input type="checkbox"/>  che1203 SUSMITHA M A	che1203@sirsyedcollege.ac.in	Student 	No groups	2 years 88 days	<div>Active </div> <div> </div>
<input type="checkbox"/>  che1184 SWALIHA A	che1184@sirsyedcollege.ac.in	Student 	No groups	2 years 37 days	<div>Active </div> <div> </div>
<input type="checkbox"/>  che1205 YASIR M	che1205@sirsyedcollege.ac.in	Student 	No groups	2 years 72 days	<div>Active </div> <div> </div>
<input type="checkbox"/>  che1206 YUSRA SAINUDHEEN M	che1206@sirsyedcollege.ac.in	Student 	No groups	2 years 71 days	<div>Active </div> <div> </div>
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SERVER LEASE/RENT AGREEMENT

This Server lease/rent agreement is by and between Sir Syed College and Muhammed Anas PA S/O Asees Pallithodi House Krishnagin PO Wayanad. Subject to the renewal of the agreement after 365 days.

Start Date: November 6th, 2020

End Date: November 6th, 2021

Services to Be Performed by Server owner (Muhammed Anas P.A):

- Taking care of the daily backup.
- Responsible for data safety and security
- Ensuring Working condition of the software
- Technical support for the software
- Ensuring network bandwidth for 2500 Users.
- Install additional plugins according to requirements. (Eg. Attendance BigBlueButton, Embed youtube in moodle site etc.).
- Design moodle roles (like HoD, Parent, Class Tutor, etc.) according to the requirements.
- Design/Customize moodle home page according to requirements.
- Add new members to moodle according to the given data after the admission procedure of new students.

Payment Terms:

1. Fixed Price Amount: Rs 3,500 Per Month or 36,000 per annum

Muhammed Anas PA

For Sir Syed College

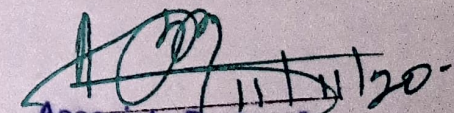


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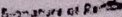
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 [Reactions of Alkanes](#)

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<input type="checkbox"/>	 Profile pic Sarayu Jayadevan SIRSIED	sarayujaydev@gmail.com	Teacher 	No groups	2 years 162 days	<div>Active </div> <div> </div>
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DEPARTMENT OF BOTANY

MANANTHAVADY CAMPUS Edavaka P.O., Wayanad, 670645

DR. K.N. AJOYKUMAR
Course Co Ordinator

9447320321

ccplantscience@kannuruniv.ac.in

Letter of Understanding (LoU)

This Letter of Understanding ("LoU") is made on this 16th August 2022, between:

Dr. K.N Ajoykumar
Course Director, Dept. of Botany, Kannur University
Email: [knajoykumar@gmail.com].

AND

Dr. Shackira A.M
Asst. Professor,
Dept. of Botany,
Sir Syed College,
Email: [shackimajeed@gmail.com].

Purpose

This Letter of Understanding outlines the terms and mutual understanding between Dr. K.N.Ajoykumar and Dr. Shackira A.M to collaborate in the fields of Plant Science Research, Student Exchange, and Journal Publication.

Scope of Collaboration

1. Plant Science Research

Both parties agree to collaborate on joint research activities in the field of Plant Science. This includes, but is not limited to, sharing of research data, methodologies, and resources, as well as organizing joint workshops, seminars, and conferences in areas of mutual interest.

2. Student Exchange

The parties agree to facilitate student exchanges between their institutions. The exchange will allow students to participate in joint research projects, laboratory work, and academic courses related to plant science. Details regarding the duration, academic credits, and financial responsibilities will be discussed and agreed upon on a case-by-case basis.

3. Journal Publication

Both parties agree to jointly publish research outcomes in recognized scientific journals. Co-authorship will be determined by mutual consent and based on each party's contribution to the research work. Both parties will seek opportunities to submit joint research papers to high-impact journals and engage in peer review processes.

Roles and Responsibilities

- Both professors will actively contribute to the collaboration by sharing expertise, resources, and facilitating research work.




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KANNUR UNIVERSITY

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MANANTHAVADY CAMPUS Edavaka P.O., Wayanad, 670645

DR. K.N. AJOYKUMAR
Course Co-Ordinator

9447320321

ccplantscience@kannuruniv.ac.in

- Both parties agree to maintain open and continuous communication through periodic meetings to assess progress, discuss challenges, and plan future work
- The professors will also mentor and supervise students participating in the exchange program.

Duration

This LoU shall remain in effect for a period of Five years from the date of signing, unless extended by mutual written agreement. Either party may terminate the collaboration with 30 days' notice in writing.

Confidentiality

Both parties agree to keep confidential all proprietary information shared during the course of this collaboration. Any data or findings resulting from joint research will not be disclosed to third parties without prior consent from both parties.

Intellectual Property

The intellectual property rights arising from the collaboration shall be jointly owned by both parties, unless otherwise agreed in writing. Specific terms regarding intellectual property will be addressed in separate agreements as necessary.

Amendments

Any amendments or modifications to this LoU must be agreed upon in writing and signed by both parties.

Signatures

By signing below, both parties agree to the terms outlined in this Letter of Understanding.

Professor Dr. K.N. Ajoykumar

Dept. of Botany, Kannur University campus

Date: 16-08-2022

Signature: _____

Dr. K.N. Ajoykumar
Course Co-ordinator
Dept. of Botany, Kannur University
Edavaka P.O., Wayanad - 670 645

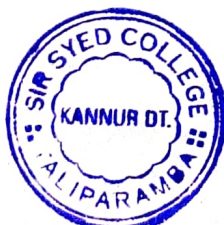
Professor Dr. Shackira.A.M

Dept. of Botany, Sir Syed College, Thaliparamba

Date: 16/08/2022

Signature: _____

Dr. Shackira AM
Assistant Professor
Department of Botany
Sir Syed College, Thaliparamba
Kannur, Kerala - 670 142



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SECOND INTERNATIONAL CONFERENCE ON PLANT FUNCTIONAL BIOLOGY

Jointly Organized by

Department of Botany, Kannur University and Sir Syed College

In association with **Kerala State Higher Education Council (KSHEC),
IQAC Kannur University and Sir Syed College**

25 & 26 October, 2022

Cherussery Auditorium, Kannur University

INAUGURATION



Prof. Gopinath Ravindran

Hon. Vice Chancellor,
Kannur University

ERUDITE LECTURE



Prof. Om Parkash Dhankher

College of Natural Sciences
Stockbridge School of Agriculture
University of Massachusetts, Amherst, USA.

INVITED LECTURES



Dr. Babu Valliyodan

Assistant Professor of Molecular
Biology and Genomics
Department of Agriculture and
Environmental Science
Lincoln University, USA.



Dr. Sujith Puthiyaveetil

Associate Professor
Dept. of Biochemistry & Purdue
Centre for Plant Biology
Purdue University, USA



Prof. (Dr) Manish Kumar P.R.

Former Head & Coordinator
Dept. of Biotechnology
University of Calicut
Malappuram, Kerala 673 635

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Taliparamba, Kannur, Kerala, India

DEPARTMENT OF BOTANY

Mananthavadi Campus,
Kannur University, Kannur, Kerala, India

ALL ARE INVITED



PROGRAMME

Day 1 - Inaugural Session

- Registration : 8.30-9.30 am
Inauguration : 9.30-10.45 am
Welcome speech : **Dr. K.N. Ajoykumar**, Course Coordinator, Department of Botany, Mananthavady Campus, Kannur University
Presidential Address : **Dr. Ismail Olayikkara**, Principal, Sir Syed College
Inauguration : **Prof. Gopinath Ravindran**, Hon. Vice Chancellor, Kannur University
*'Releasing of Conference Proceedings
Distribution of Prof. Govindjee Endowment Award-2022'*

- Felicitation : **Adv. P Mahamood**, Manager, Sir Syed College
: **Dr. Ashraf T.P.**, Syndicate Member, Kannur University
: **Dr. Nafeesa Baby T.P.**, DSS, Kannur University
Vote of Thanks : **Dr. Tajo Abraham**, IQAC Coordinator and HoD of Botany, Sir Syed College
Technical Session I (11.00-12.30pm)

- ERUDITE Lecture : **Prof. Om Parkash Dhankher**, College of Natural Sciences, Stockbridge School of Agriculture, University of Massachusetts, Amherst, USA.
*'Feeding and Fueling the Future: Climate Resilient Crops
for Enhanced Production of Food and Fuels'*
Technical Session II (1.30-3.00pm)

- Invited Talk 1 : **Dr. Babu Valliyodan**, Assistant Professor of Molecular Biology and Genomics, Department of Agriculture and Environmental Science, Lincoln University, USA.
'Genetic and Genomics Tools for Legume Crop Improvement'
Technical Session III (3.15-5.00pm)
Paper Presentations - OP01 to OP09
Technical Session IV (7.30pm-8.30pm)

- Invited Talk-2 : **Dr. Sujith Puthiyaveetil**, Associate Professor, Department of Biochemistry and Purdue Center for Plant Biology, Purdue University, USA
*'Ironing out diatom bloom and bust: physiological
and molecular mechanisms'*

Day 2

Technical Session V (9.30-11.00am)

- Invited Talk-3 : **Prof. (Dr) Manish Kumar P.R.**, Former Head & Coordinator, Dept. of Biotechnology, University of Calicut, Kerala
'Bio assay for Plant Drug Evaluation'
Technical Session VI (11.00-12.30pm)
Paper Presentations : OP10 to OP19
Valedictory Function: 2.00-3.00pm

- Welcome speech : **Dr. Sreeja P.**, Asst. Professor, Dept. of Botany, Sir Syed College
Valedictory Speech : **Dr. K.T. Chandramohan**, Syndicate Member, Kannur University
'Best Paper Award Distribution'

Feedback session

- Vote of thanks : **Dr. Gayatri R. Nambiar**, Asst. Professor, Department of Botany, Sir Syed College

Letter of Understanding (LoU)

This Letter of Understanding ("LoU") is made on **01-10-2019**, between:

Dr Biju A R

Assistant Professor of Chemistry
Sir Syed College Taliparamba
Kannur Kerala
Email: biju@sirsyedcollege.ac.in

AND

Dr Anoop A

Associate Professor
Indian Institute of Technology, Kharagpur
Email: anoop@chem.iitkgp.ernet.in

Purpose

This Letter of Understanding outlines the terms and mutual understanding between **Dr Biju A R** and **Dr Anoop A** to collaborate in the fields of Computational Chemistry Research and Journal Publication.

Scope of Collaboration

1. Computational Chemistry Research

Both parties agree to collaborate on joint research activities in the field of Computational Chemistry. This includes, but is not limited to, sharing of research data, methodologies, and resources, as well as organizing joint workshops, seminars, and conferences in areas of mutual interest.

2. Journal Publication

Both parties agree to jointly publish research outcomes in recognized scientific journals. Co-authorship will be determined by mutual consent and based on each party's contribution to the research work. Both parties will seek opportunities to submit joint research papers to high-impact journals and engage in peer review processes.

Roles and Responsibilities

- Both professors will actively contribute to the collaboration by sharing expertise, resources, and facilitating research work.
- Both parties agree to maintain open and continuous communication through periodic meetings to assess progress, discuss challenges, and plan future work.
- The professors will also mentor and supervise students participating in the exchange program.



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Duration

This LoU shall remain in effect for a period of **Five years** from the date of signing, unless extended by mutual written agreement. Either party may terminate the collaboration with **30 days'** notice in writing.

Confidentiality

Both parties agree to keep confidential all proprietary information shared during the course of this collaboration. Any data or findings resulting from joint research will not be disclosed to third parties without prior consent from both parties.

Intellectual Property

The intellectual property rights arising from the collaboration shall be jointly owned by both parties, unless otherwise agreed in writing. Specific terms regarding intellectual property will be addressed in separate agreements as necessary.

Amendments

Any amendments or modifications to this LoU must be agreed upon in writing and signed by both parties.

Signatures

By signing below, both parties agree to the terms outlined in this Letter of Understanding.

Dr Biju A R

Assistant Professor of Chemistry
Sir Syed College Taliparamba
Kannur Kerala
Email: biju@sirsyedcollege.ac.in



Dr. BIJU. A.R.
Assistant Professor
Department of Chemistry
Sir Syed College
Taliparamba, Kannur - 670142

Dr Anoop A

Associate Professor
Indian Institute of Technology, Kharagpur
Email: anoop@chem.iitkgp.ernet.in



Dr. Anoop Ayyappan
Associate Professor
Department of Chemistry
IIT Kharagpur
721302 West Bengal



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Binding energy analysis and molecular dynamic simulation studies of the designed orally active, non-toxic GABARAP modulators

Megha P. Nambiar, N. Ashwanikumar, Anakuthil Anoop & A. R. Biju

To cite this article: Megha P. Nambiar, N. Ashwanikumar, Anakuthil Anoop & A. R. Biju (2022): Binding energy analysis and molecular dynamic simulation studies of the designed orally active, non-toxic GABARAP modulators, Journal of Biomolecular Structure and Dynamics, DOI: [10.1080/07391102.2022.2107571](https://doi.org/10.1080/07391102.2022.2107571)

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Binding energy analysis and molecular dynamic simulation studies of the designed orally active, non-toxic GABARAP modulators

Megha P. Nambiar^a, N. Ashwanikumar^a, Anakuthil Anoop^b and A. R. Biju^a

^aDepartment of Chemistry, Sir Syed College, Kannur University, Kannur, India; ^bDepartment of Chemistry, IIT Kharagpur, Kharagpur, India

Communicated by Ramaswamy H. Sarma

ABSTRACT

Epilepsy is a severe neurological disorder that occurs when the communication between the neurons is disturbed. Gamma-amino butyric acid-associated protein (GABARAP) plays a key role in balancing Gamma-aminobutyric acid-A (GABA(A)) receptor functions of inhibiting the neurotransmission and controlling the seizure. In this study, we introduce the derivatives of the selected anti-epileptic drugs, namely Felbamate and Clobazam, by substituting different hydrophilic and hydrophobic groups at the specified positions. Molecular docking studies between the derivatives and GABARAP were carried out using PyRx software. The interacting residues were identified from LigPlot⁺. Drug-likeness, drug-related properties, and toxic endpoints of each derivative were analyzed using the SwissADME, Osiris property explorer, and ProTox-II servers. After analyzing the binding energy, drug-properties, and toxicity, the best five derivatives of Felbamate and Clobazam were selected. Molecular Dynamic simulation studies involving the target-ligand interaction were carried out for 100 nanoseconds using GROMACS 2018. The root mean square deviation, root mean square fluctuation, radius of gyration, Solvent accessible area, Energy plots and trajectories of the ten GABARAP complexes of the derivatives, and two GABARAP complexes of parent drugs were compared and critically analyzed. Among the five Felbamate derivatives, F7 formed the most stable complex with GABARAP. Among the five Clobazam derivatives, C27, C33 and C32 showed stable GABARAP interaction. In light of the above systematic computational analysis, we propose F7, C27, C33, and C32 as the potential anti-epileptic drug candidates for developing novel therapeutics. The substitution of hydrophobic groups at para position on benzene ring has promoted strong binding to GABARAP.

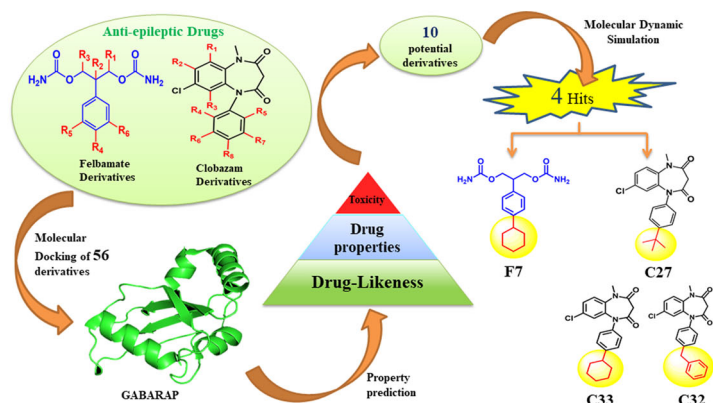
ARTICLE HISTORY

Received 26 January 2022

Accepted 24 July 2022

KEYWORDS

GABARAP; GABA(A); molecular docking; drug-likeness molecular dynamic simulation; trajectories



Abbreviations: B3LYP: Becke 3-parameter Lee Yang Parr; GABA: gamma-amino butyric acid; GABARAP: gamma-amino butyric acid receptor associated protein; LD₅₀: Lethal dose fifty percentage; MD: Molecular dynamics; PDB: Protein data bank; RCSB: Research Collaboratory for Structural Bioinformatics; RMSD: Root mean square deviation; RMSF: Root mean square fluctuation; Rg: Radius of gyration; SASA: Solvent accessible surface area; SDF: Spatial Data File; TPSA: topological polar surface area

Introduction

Epilepsy is a chronic neurological illness affecting around 1% of the human community irrespective of age, gender, and race (Kwan & Sander, 2004). The disease is characterized by deviations from the normal nerve cell activity in the brain, causing repeated seizures or periods of unusual behavior, sensations, and sometimes loss of awareness. The solution to this problem is anti-epileptic drugs that could stop the formation of seizures in the brain.

The increased amount of excitatory neurotransmitters and a decreased amount of inhibitory neurotransmitters play a major role in causing seizures. An excitatory neurotransmitter excites the postsynaptic neuron by generating an action potential, and an inhibitory neurotransmitter produces neurotransmitter that hinders the generation of this action potential (Karlsson et al., 1974; Smita, 2013). Gamma-aminobutyric acid-A (GABA(A)) is an important ligand-gated GABA receptor that inhibits neurotransmission. Gamma-aminobutyric acid receptor-associated protein (GABARAP) plays a valid part in balancing the functioning of GABA(A) receptors. In humans, the GABARAP gene encodes the protein GABARAP. The binding of the receptor GABA to the gamma subunit due to the mutation in GABARAP causes a decrease in the postsynaptic membrane's receptor concentration. Excitatory activity is thus increased as the inhibition is stopped, and this can cause epilepsy (Wang & Olsen, 2000). The binding of the drugs to GABA(A) receptors and regulating its function provides promising medical development in treating epilepsy (Krogsgaard, 1981; Smita, 2013).

The anti-epileptic drugs selected for the present study are Felbamate and Clobazam. In 1993, the drug Felbamate (anti-convulsant) was approved by US-FDA. Felbamate was accepted for the treatment of Lennox-Gastaut syndrome as well (Dulac & N'guyen, 1993). Clobazam (benzodiazepine) as a drug in clinical aspects was started in 1975 (Ng & Collins, 2007). Initially, the drug was used to treat anxiety, later as an anticonvulsant since 1984. It is a successful drug in the treatment of epilepsy and Lennox-Gastaut Syndrome (Giarratano et al., 2012). After the oral administration, Clobazam is readily absorbed in the gastrointestinal tract. Compared to common 1,4-benzodiazepines, sedation and other side effects are minimum for Clobazam (Kuch, 1979).

In general, the drug design aims to develop stable and safe drug molecules with good ADMET (Absorption, Distribution, Metabolism, Excretion, Toxicity) properties, limited side effects, and good selectivity and specificity to the binding target (Yu & MacKerell, 2017). A large amount of money is spent designing drugs, undergoing their preclinical and clinical trials, and marketing them for use. So it is very important that the beneficial effects of the marketed drug should meet the required standard (Macalino et al., 2015). So, the computer-based designing of drugs plays a very important role as it could effectively predict many biological properties quickly without much financial requirements (Baig et al., 2016). Computational studies help to omit the unfavorable derivatives with toxicity, poor absorption, and poor metabolism and help to carry out the required modification in the molecule to increase the ADME properties (Wang

et al., 2018; Waring et al., 2015). A crucial part of the structure-based drug designing method involves docking the drug molecule to their protein binding site and analyzing drug-receptor binding affinity (Sousa et al., 2006). Docking studies help to understand the strength of drug interactions with the target. The derivatives with the high free energy of binding (poor binding) can be omitted or modified to better derivatives. Molecular Dynamic simulation studies are gaining much attention because MD simulation studies help create body conditions and analyze the target-ligand interaction in detail. Thus the dependence of the medicinal field on computers for developing the drug is beneficial.

This drug designing work did not concentrate on eliminating any side effects of the drugs Clobazam and Felbamate. The aim was to design a better alternative of the existing marketed drug that has better target binding and drug-related properties. From these works, the compounds with better competence could be identified successfully.

Materials and methods

In the present work, two anti-epileptic drugs, Clobazam and Felbamate, and their derivatives with certain structural variations are considered to analyze their drug activity. The derivatives of each drug molecule are designed by substituting various hydrophilic and hydrophobic groups.

Optimization

Gaussview 5.0 was used to generate the structures of five selected anti-epileptic drugs and their derivatives and visualize the results (Frisch et al., 2009). Gaussian 09 (Frisch et al., 2009) is used for *ab initio* calculations. We employed the B3LYP/6-311G (d,p) (Becke, 1993; McLean & Chandler, 1980) level of theory for optimization.

In silico docking studies

The parent molecules and their derivatives are docked to the GABA(A) receptor-associated protein GABARAP. The crystal structure of GABA(A) receptor-associated protein GABARAP (PDB:1KJT) is downloaded from the RCSB protein data bank (Berman et al., 2000). The active binding sites of GABARAP are identified using meta server Metapocket (Zhang et al., 2011). Optimized structures of all the drug molecules and their derivatives, in SDF form, are docked to the GABARAP using the virtual screening software PYRX, which gives information about drug-protein binding free energies and the best conformers (Dallakyan & Olson, 2015). For each molecule, docking output provided nine different docked poses with the target. The best conformer is the docked pose with the lowest binding energy. The binding energy of all the proposed derivatives of drug molecules is compared to their respective drug molecules. The derivatives with binding energy more negative than respective parent drug molecules are considered as good derivatives.

Letter of Understanding (LoU)

This Letter of Understanding ("LoU") is made on 08.09.2021, between:

Dr. Vinod T. P.

Associate Professor, Department of Chemistry
CHRIST (Deemed to be University)
Dharmaram College Post, Hosur Road, Bangalore-560029, Karnataka, India
Email: vinod.tp@christuniversity.in

AND

Ms. Fasila PM

Asst. Professor
Dept. of Chemistry
Sir Syed College
Email: fasilapm@sirsyedcollege.ac.in

Purpose

This Memorandum of Understanding sets forth the terms and mutual agreement between **Dr. Vinod T. P.** and **Ms. Fasila PM** to collaborate in the areas of Computational Chemistry Research, Student Exchange, and Joint Journal Publications.

Scope of Collaboration

1. Computational Chemistry Research

Both parties agree to collaborate on joint research activities in the field of Computational Chemistry. This includes, but is not limited to, the exchange of laboratory facilities, sharing of computational resources, data, and methodologies, as well as organizing joint workshops, seminars, and conferences in areas of mutual interest.

2. Student Exchange

The parties agree to facilitate student exchanges between their institutions. The exchange will allow students to participate in joint research projects, laboratory work, and academic courses related to Chemical Science. Details regarding the duration, academic credits, and financial responsibilities will be discussed and agreed upon on a case-by-case basis.

3. Journal Publication

Both parties agree to jointly publish research outcomes in recognized scientific journals. Co-authorship will be determined by mutual consent and based on each party's contribution to the research work. Both parties will seek opportunities to submit joint research papers to high-impact journals and engage in peer review processes.



[Signature]
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Roles and Responsibilities

- Both professors will actively contribute to the collaboration by sharing expertise, resources, and facilitating research work.
- Both parties agree to maintain open and continuous communication through periodic meetings to assess progress, discuss challenges, and plan future work.
- The professors will also mentor and supervise students participating in the exchange program.

Duration

This LoU shall remain in effect for a period of two years from the date of signing, unless extended by mutual written agreement. Either party may terminate the collaboration with one month's notice in writing.

Confidentiality

Both parties agree to keep confidential all proprietary information shared during the course of this collaboration. Any data or findings resulting from joint research will not be disclosed to third parties without prior consent from both parties.

Intellectual Property

The intellectual property rights arising from the collaboration shall be jointly owned by both parties, unless otherwise agreed in writing. Specific terms regarding intellectual property will be addressed in separate agreements as necessary.

Amendments

Any amendments or modifications to this LoU must be agreed upon in writing and signed by both parties.

Signatures

By signing below, both parties agree to the terms outlined in this Letter of Understanding.

Dr. Vinod T. P

Associate Professor, Department of Chemistry ,CHRIST (Deemed to be University)

Date: 08.09.2021

Signature:

Ms. Fasila PM

Sir Syed College

Date: 08.09.2021

Signature:

FASILA. P.M
Assistant Professor
Dept. of Chemistry
Sir Syed College
Taliparamba



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PAPER

Carbon dots derived from frankincense soot for ratiometric and colorimetric detection of lead (II)

Varsha Lisa John¹ , Fasila P M² , Chaithra K P¹ and Vinod T P¹

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DOI 10.1088/1361-6528/ac8e76

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² Department of Chemistry, Sir Syed College, Taliparamba, Kannur, Kerala 670142, India

Varsha Lisa John <https://orcid.org/0000-0002-3843-4686>

Fasila P M <https://orcid.org/0000-0002-2613-1610>

Chaithra K P <https://orcid.org/0000-0002-0518-7578>

Vinod T P <https://orcid.org/0000-0001-5815-5230>

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Abstract

We report a simple one-pot hydrothermal synthesis of carbon dots from frankincense soot. Carbon dots prepared from frankincense (FI-CDs) have narrow size distribution with an average size of 1.80 nm. FI-CDs emit intense blue fluorescence without additional surface functionalization or modification. A negative surface charge was observed for FI-CDs, indicating the abundance of epoxy, carboxylic acid, and hydroxyl functionalities that accounts for their stability. A theoretical investigation of the FI-CDs attached to oxygen-rich functional groups is incorporated in this study. The characteristics of FI-CDs signify arm-chair orientation, which is confirmed by comparing the indirect bandgap of FI-CDs with the bandgap obtained from Tauc plots. Also, we demonstrate that the FI-CDs are promising fluoroprobes for the ratiometric detection of Pb^{2+} ions (detection limit of $0.12 \mu\text{M}$). The addition of Pb^{2+} to FI-CD solution quenched the fluorescence intensity, which is observable under illumination by UV light LED chips. We demonstrate a smartphone-assisted quantification of the fluorescence intensity change providing an efficient strategy for the colorimetric sensing of Pb^{2+} in real-life samples.

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Letter of Understanding (LoU)

This Letter of Understanding ("LoU") is made on this 12-01-2019, between:

Dr Ashwani Kumar N
Assistant Professor of Chemistry
Sir Syed College Taliparamba
Kannur Kerala
Email: ashwanikumar@sirsyedcollege.ac.in

AND

Dr G S Vinod Kumar
Scientist EII
Rajiv Gandhi Centre for Biotechnology, Trivandrum
Email: gsvinod@rgcb.res.in

Purpose

This Letter of Understanding outlines the terms and mutual understanding between **Dr Ashwani Kumar N** and **Dr G S Vinod Kumar** to collaborate in the fields of Nanomedicine Research and Journal Publication.

Scope of Collaboration

1. Nanomedicine Research


Both parties agree to collaborate on joint research activities in the field of Nanomedicine. This includes, but is not limited to, sharing of research data, methodologies, and resources, as well as organizing joint workshops, seminars, and conferences in areas of mutual interest.

2. Journal Publication

Both parties agree to jointly publish research outcomes in recognized scientific journals. Co-authorship will be determined by mutual consent and based on each party's contribution to the research work. Both parties will seek opportunities to submit joint research papers to high-impact journals and engage in peer review processes.

Roles and Responsibilities

- Both professors will actively contribute to the collaboration by sharing expertise, resources, and facilitating research work.
- Both parties agree to maintain open and continuous communication through periodic meetings to assess progress, discuss challenges, and plan future work.
- The professors will also mentor and supervise students participating in the exchange program.


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Duration

This LoU shall remain in effect for a period of **Three years** from the date of signing, unless extended by mutual written agreement. Either party may terminate the collaboration with **30 days'** notice in writing.

Confidentiality

Both parties agree to keep confidential all proprietary information shared during the course of this collaboration. Any data or findings resulting from joint research will not be disclosed to third parties without prior consent from both parties.

Intellectual Property

The intellectual property rights arising from the collaboration shall be jointly owned by both parties, unless otherwise agreed in writing. Specific terms regarding intellectual property will be addressed in separate agreements as necessary.

Amendments

Any amendments or modifications to this LoU must be agreed upon in writing and signed by both parties.

Signatures

By signing below, both parties agree to the terms outlined in this Letter of Understanding.


Dr Ashwani Kumar N

Assistant Professor of Chemistry

Sir Syed College Taliparamba

Kannur Kerala

Email: ashwanikumar@sirsyedcollege.ac.in


Dr. ASHWANI KUMAR. N
Assistant Professor
Department of Chemistry
Sir Syed College
Taliparamba, Kannur 670142

Dr G S Vinod Kumar

Scientist E II


Rajiv Gandhi Centre for Biotechnology, Trivandrum

Email: gsvinod@rgcb.res.in

Dr G S Vinod Kumar
Scientist E II
Rajiv Gandhi Centre For Biotechnology
Department of Biotechnology
Government of India
THIRUVANANTHAPURAM - 695 014






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rsc.li/biomaterials-science

Peptide decorated glycolipid nanomicelles for drug delivery across the blood–brain barrier (BBB)[†]

S. Meenu Vasudevan,^{a,b} N. Ashwanikumar^c and G. S. Vinod Kumar^{id} ^{*a}

This interdisciplinary research highlights the engineering of glycolipid nanomicelles with surface modification using a BBB crossing peptide for *in vivo* drug delivery especially for glioma therapy. We demonstrated an eco-friendly, green synthesis of a nanomicelle followed by felicitous characterization which substantiates the merits of the drug delivery system.

Despite the significant advances in the field of nano drug delivery systems (DDSs), the treatment of central nervous system (CNS) diseases like glioma, Parkinson's disease, Alzheimer's disease, epilepsy, stroke, brain trauma, *etc.* is limited due to the inefficiency of the cargo to cross the blood–brain barrier (BBB).^{1,2} The tight endothelial cell monolayer associated with pericytes and astrocytes in the BBB restricts the transport of 98–100% of the drug molecules to the brain.³ In the case of glioma, the BBB was found to be intact during the first stage which allows us to design a nanocarrier by exploiting the principle of active transport using targeting ligands on the surface of the nanocarrier. The DDS can be designed by engineering an apt amphiphilic polymeric nanocarrier surface-modified with a targeting ligand to breach the BBB.

Polymeric nanomicelles are regarded as promising carriers for small molecule hydrophobic drugs because of their good stability and biocompatibility *in vitro* and *in vivo*.⁴ Tailor-made amphiphilic polymers when exposed to an aqueous environment spontaneously form self-assembled nanomicelles having a core–shell architecture which serve as ideal hosts for hydrophobic drugs. Many natural and synthetic polymers have been used for the preparation of amphiphilic polymeric micelles.

Chitosan is one of the major biocompatible polymers with a glycosamine backbone and used as a hydrophilic part of the amphiphilic system.⁵ A major drawback of naive chitosan is its aqueous solubility and its tendency to precipitate at physiological pH.⁶ Glycol chitosan (GC) is a commercially available water-soluble, biocompatible and biodegradable derivative of chitosan,⁵ which is used as a drug delivery scaffold in the present work.^{7,8} To impart suitable amphiphilicity to GC, we have conjugated it to a biocompatible aliphatic long-chain fatty acid namely stearic acid (SA). The amine functionality of GC was selected as the binding site to retain the intact ethylene glycol moiety which is essential for the aqueous solubility of GC. The synthesized stearyl-g-glycol chitosan (SAGC) was used for surface modification with an apt targeting ligand.

Site-specific delivery of polymeric nanomicelles can be achieved by the use of suitable receptor targeting ligands. Over the years, several receptors like integrin, folate, transferrin, *etc.* have been employed by researchers for targeting nanomicelles.⁹ Unfortunately, the abundance of these receptors in the majority of tissues limited the brain-specific delivery and necessitated the development of highly specific brain targeting ligands. In addition to this, the BBB acts as a major hurdle for the aforementioned targeting ligands. To solve these problems, specific brain targeting short peptide sequences have been developed by the use of the *in vivo* phage display technique.¹⁰ One such peptide (TGN peptide-TGNYKALHPHNG) was identified by Li *et al.* using a filamentous M13-phage with the aid of a random 12 mer peptide library displayed on the capsid surface of this phage having BBB targeting ability.^{11,12} AS TGN peptide demonstrated superior brain targeting efficacy, we have used this peptide as the targeting moiety and conjugated it to our glycopolymer (SAGC) to produce a hybrid, peptide decorated nanomicelle named “TSAGC”. The development of nanomicelles of TSAGC, encapsulation of a model hydrophobic drug (Curcumin), and their efficacy in crossing the BBB for brain delivery were demonstrated in the present work by various physicochemical and biological analyses. As most of the drugs used in brain diseases are hydrophobic, we

^aNano Drug Delivery Systems Lab, Cancer Biology Division, Bio innovation Centre, Rajiv Gandhi Centre for Biotechnology, Trivandrum, Kerala, 695014, India.
E-mail: gsvinod@rgcb.res.in

^bResearch Scholar, Dept of Biotechnology, Faculty of Applied Sciences & Technology, University of Kerala, Trivandrum, Kerala, 695581, India

^cPost Graduate & Research Department of Chemistry, Sir Syed College (Affiliated to Kannur University), Taliparamba, Kannur, Kerala, 670142, India

[†]Electronic supplementary information (ESI) available. See DOI: 10.1039/c9bm00955h



श्री चित्रा तिरुनाल आयुर्विज्ञान और प्रौद्योगिकी संस्थान, त्रिवेन्द्रम
तिरुवनन्तपुरम - ६९५०११, केरल, इंडिया

SREE CHITRA TIRUNAL INSTITUTE FOR MEDICAL SCIENCES AND TECHNOLOGY, TRIVANDRUM

Thiruvananthapuram - 695 011, Kerala, India

(An Institute of National Importance under Govt. of India)

Grams : Chitramet, Phone : +91-471-2443152, Fax : +91-471-2550728 / 2446433, E-mail : sct@sctimst.ac.in, Website : www.sctimst.ac.in

Endorsement from the Head of Institution

Project Title: *Bioinspired Self-Assembling Peptide Nanodrills for Anti-Tubercular Drug Delivery.*

1. Certified that the Institute welcomes participation of Dr.ASHWANI KUMAR N, Assistant Professor, Department of Chemistry, Sir Syed College (Affiliated to Kannur University) as the Principal Investigator and Dr. DIVYA M S, Scientist-C, Department of Pathology, SCTIMST as the Co-Investigator(s) for the project and that in the unforeseen event of discontinuance by the Principal Investigator, Co-Investigator will assume the responsibility of the fruitful completion of the project.
2. Certified that the equipment and other basic facilities as enumerated and such other administrative facilities as per terms and conditions of the grant, will be extended to the investigator(s) throughout the duration of the project.
3. Institute assumes to undertake the financial and other management responsibilities of the project.

Name and Signature of Head of Institution

Date: 28th October 2021

Place: Thiruvananthapuram



(Office Seal)

निदेशक / DIRECTOR

श्री चित्रा तिरुनाल आयुर्विज्ञान और प्रौद्योगिकी संस्थान
Sree Chitra Tirunal Institute for
Medical Sciences and Technology
त्रिवेन्द्रम / Trivandrum-695011



SIR SYED COLLEGE

TALIPARAMBA

| Affiliated to Kannur University |
Re-accredited by NAAC with A Grade

Endorsement from the Head of Institution

Project Title: *Bioinspired Self-Assembling Peptide Nanodrills for Anti-Tubercular Drug Delivery*

1. Certified that the Institute welcomes participation of Dr.ASHWANI KUMAR N as the Principal Investigator and Dr DIVYA M S as the Co-Investigator(s) for the project and that in the unforeseen event of discontinuance by the Principal Investigator, Co-Investigator will assume the responsibility of the fruitful completion of the project.
2. Certified that the equipment and other basic facilities as enumerated and such other administrative facilities as per terms and conditions of the grant, will be extended to the investigator(s) through out the duration of the project.
3. Institute assumes to undertake the financial and other management responsibilities of the project.

Date : 28-10-2021

Place : TALIPARAMBA

Name and Signature of Head of Institution

Dr. Ismail Olayikkara M.A., Ph.D.

Associate Professor
in charge of the Principal
Sir Syed College
Taliparamba-670 142



Certificate from the Investigators

Project Title: *Bioinspired Self-Assembling Peptide Nanodrills for Anti-Tubercular Drug Delivery*

1. I/We agree to abide the terms and conditions of the research fund.
2. I/We did not submit the same project proposal elsewhere for financial support.
3. I/We have explored and ensured that equipment and basic facilities will actually be available as and when required for the purpose of the projects. I/We shall not request financial support under this project, for procurement of these items.
4. I/We undertake that spare time on permanent equipment will be made available to other users.

Dr Divya M S



Name and signature of Co- Investigator(s)

Date: 28-10-2021

Place: TALIPARAMBA

Dr Ashwani Kumar. N



Name and signature of Principal Investigator

Consent from the Co-Investigator(s)

(Attach separate Certificate for each Co-Investigator)

Project Title: *Bioinspired Self-Assembling Peptide Nanodrills for Anti-Tubercular Drug Delivery*

I, **Dr DIVYA M S** agree to work as the Co-Investigator of the above titled project and in the unforeseen event of discontinuance by the Principal Investigator, I will assume the responsibility of the fruitful completion of the project.

Dr Divya M S



Name and signature of Co- Investigator

Date: 28th October 2021

Place: Thiruvananthapuram

KERALA STATE COUNCIL FOR SCIENCE, TECHNOLOGY AND ENVIRONMENT

Date: 28-10-2021

Name and Address of the P.I: **Dr. Ashwani Kumar N**

*Assistant Professor
Department of Chemistry
Sir Syed College (Affiliated to Kannur University)
Karimbam Post, Taliparamba
Kannur District, Kerala, INDIA 670142*

Title of the Project Proposal: ***Bioinspired Self-Assembling Peptide Nanodrills for Anti-Tubercular Drug Delivery***

Science Research Scheme (SRS) - Terms and Conditions

1. The scheme is constituted for the purpose of providing assistance in the form of grants to regular faculty of an academic institution/scientist in research laboratory and R&D organizations in the Kerala State with particular relevance to the economic and industrial development of the State. Grants will be paid for specific projects to cover expenditure on manpower, equipment, consumables, contingencies and travel.
2. The project proposal will include the quantum of assistance required, competence of the scientist who is doing the project and the facilities at the institution where the work is to be carried out. Research proposals should be reviewed by a panel of reviewers (national level) prior to the selection by the Programme Advisory Committee (PAC).
3. The assistance for the project will be for a maximum period of **Three** years. Sanction will be given for the full period of investigation, but the funds will be released originally for only the first year and subsequently every year subject to satisfactory completion of the work and submission of Statement of Expenditure (SE) & Utilization Certificate (UC). Audited SE & UC by Local fund audit or Finance Head of the Govt. institution/Universities countersigned by Head of the Institution and Chartered Accountant for affiliated colleges countersigned by Head of the Institution should be submitted on an year to year basis.
 - a) The maximum amount that can be granted will be subject to a total of Rs.30 lakh (excluding the overhead cost) for 3 years. The implementing institution is eligible for an overhead @ 10% of total expenditure subject to a ceiling of Rs.1 lakh, which will be released on successful completion of the project and after settlement of the SE & UC. However, the quantum of funding shall be subject to the recommendations of PAC and approval of Council. Service tax, VAT, Annual Maintenance Contract (AMC), etc. should be included in the budget during project submission and the expenditure has to be met from the project heads itself.
 - b) Reallocation of funds within the total outlay and extension to the project period may be approved based on the specific recommendation of the Group Monitoring Workshop (GMW)/PAC. However re-appropriation from manpower and equipments will not be normally allowed. The PI should present the request for re-appropriation and extension before the GMW/PAC for approval. Extension of duration of project beyond 6 months will not be granted normally.

(Principal Investigator)

Dr. ASHWANI KUMAR. N
Assistant Professor
Department of Chemistry
Sir Syed College
Taliparamba, Kannur 670142



(Seal)

(Head of Institution)

Arund
28/10/21
Dr. Ismail Olayikkara MA., Ph.D.
Associate Professor
in charge of the Principal
Sir Syed College
Taliparamba-670 142

KSCSTE-DIGITAL PROJECT PROPOSAL SUBMISSION SYSTEM

Referene No. : SRS10000952

Scheme : Science Research Scheme

Submitted By: Dr ASHWANI KUMAR N

Dr. Ashwani Kumar N Assistant Professor Department
of Chemistry Sir Syed College (Affiliated to Kannur
University) Karimbam Post Taliparamba Kannur District
Kerala, INDIA 670142

Pre-Proposal Details

Title of Proposal	Bioinspired Self-Assembling Peptide Nanodrills for Anti-Tubercular Drug Delivery
Type of proposal	Product/Process Development
Domain Themes	Health Sector& Biotechnological Developments
Sub Themes	Development of Medical devices
Name of Institution	SIR SYED COLLEGE TALIPARAMBA
Name of Principal Investigator (PI)	Dr ASHWANI KUMAR N
Designation and Address of Principal Investigator (PI)	Dr. Ashwani Kumar N Assistant Professor Department of Chemistry Sir Syed College (Affiliated to Kannur University) Karimbam Post Taliparamba Kannur District Kerala, INDIA 670142
Email of Principal Investigator (PI)	ashwanikumar@sirsyedcollege.ac.in
Mobile No. of Principal Investigator (PI)	9744773662
Date of entry in the present service of PI	03-01-2019
Date of superannuation	31-03-2046
Name of Co-Investigator (Co-I)	Dr DIVYA M S
Designation and Address of Co-Investigator (Co-I)	SCIENTIST C, Department of Pathology Sree Chitra Tirunal Institute for Medical Sciences and Technology Trivandrum, KERALA- 695011
Email of Co-Investigator (Co-I)	divyams@sctimst.ac.in
Mobile No. of Co-Investigator (Co-I)	9567305275
Date of entry in the present service of Co-I	29-10-2018
Date of superannuation Of Co-I	31-05-2046
Industry, Institution or Agency partners if any:	Co-PI (Dr Divya M S, Scientist C) works at SCTIMST Trivandrum

Letter of Understanding (LoU)

This Letter of Understanding ("LoU") is made on this 1.08.2021, between:

Dr. Manoj .K
Associate Professor
Department of Environmental sciences
Kannur University, Mangattuparamba campus
E.mail: manojk@kannuruniv.ac.in

AND

Dr. Sreeja.P,
Asst Professor and Head,
PG Dept. of Botany and Research Centre,
Sir Syed College, Taliparamba
Email: sreeja@sirsyedcollege.ac.in

Purpose

This Letter of Understanding outlines the terms and mutual understanding between **Dr. Manoj.K** and **Dr. Sreeja.P** to collaborate in the fields of Research in Ecology and Environment.

Scope of Collaboration

1. Research in Ecosystem studies

Both parties agree to collaborate on joint research activities in the field of ecology. This includes, but is not limited to, sharing of research data, methodologies, and resources, as well as organizing joint workshops, seminars, and conferences in areas of mutual interest.

2. Student Exchange

The parties agree to facilitate student exchanges between their institutions. The exchange will allow students to participate in joint research projects, laboratory work, and academic courses related to ecology. Details regarding the duration, academic credits, and financial responsibilities will be discussed and agreed upon on a case-by-case basis.

3. Journal Publication

Both parties agree to jointly publish research outcomes in recognized scientific journals. Co-authorship will be determined by mutual consent and based on each party's contribution to the research work. Both parties will seek opportunities to submit joint research papers to high-impact journals and engage in peer review processes.

Duration - This LoU shall remain in effect for a period of three years from the date of signing, unless extended by mutual written agreement. Either party may terminate the collaboration with [insert notice period] days' notice in writing.

Confidentiality

Both parties agree to keep confidential all proprietary information shared during the course of this collaboration. Any data or findings resulting from joint research will not be disclosed to third parties without prior consent from both parties.

Intellectual Property

The intellectual property rights arising from the collaboration shall be jointly owned by both parties, unless otherwise agreed in writing. Specific terms regarding intellectual property will be addressed in separate agreements as necessary.

Signatures

By signing below, both parties agree to the terms outlined in this Letter of Understanding.

Dr. Manoj K.

Associate Professor

Department of Environmental sciences, Kannur University, Mangattuparamba, E.mail-
manojk@kannuruniversity.ac.in

Date: 1.08.21

Signature :

Dr. MANOJ. K.
ASSISTANT PROFESSOR
DEPARTMENT OF ENVIRONMENTAL STUDIES
KANNUR UNIVERSITY
MANGATTUPARAMBA, KANNUR, KERALA

Dr. Sreeja P.

Asst Professor and Head,

UG Dept of Botany and Research Centre,

Sir Syed College, Taliparamba

Date: 1.8.21

Signature:

Dr. Sreeja P.
Assistant Professor
Dept. Of Botany
Sir Syed College.Taliparamba

Tree Diversity and Abundance of Western Ghats Striped Squirrels, *Funambulus Tristriatus* in Sacred Groves: Evidence from Kannur, Kerala

P.V. Amina^{1,*}, P Sreeja², Manoj K³

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Abstract The study was carried out to measure tree species diversity of six spatially heterogeneous Sacred Groves (SGs) to observe the abundance of IUCN Red List (LC) Western Ghats Striped squirrel, *Funambulus tristriatus*, Waterhouse (1837) inside these SGs. Shannon's and Simpson's Indices and IVI were used to examine the tree species diversity. The abundance of squirrels in all six SGs was also recorded through a two-month-long 48-kilometre transect walk survey. The floristic composition exhibited that *Memecylon randerianum* is the dominant species in Neeliyarkottam and Madayi kavu; *Myristica malabarica* is the dominant species in Poongottukavu, and *Carallia brachiata* is the predominant tree species in Iriverikavu. Thazhekavu is home to the mangrove species *Avicennia officinalis*. Chamakavu is a coastal SG with the highest density of *Syzygium caryophyllatum* and the highest IVI of *Gmelina arborea*. The study found that squirrels are significantly encountered in fruit-giving trees with a high canopy. Our descriptive statistical findings reveal that out of the total observed *F. tristriatus* ($n=106$), about 42% of squirrels are encountered in *Memecylon randerianum*, followed by *Mangifera indica* (31%), *Artocarpus heterophyllus* Lam. (4%), *Elaeocarpus tuberculatus* (3%), etc. Neeliyarkottam has the most tree species and individual trees with a high diversity of *Memecylon randerianum*, *Mangifera indica*, and higher squirrel encounters. *F. tristriatus* fed the flowers and berries of *Memecylon randerianum* and flowers and drupes of *Mangifera indica*. In sum, the presence of trees and the diversity of SGs is critical for the survival of *F. tristriatus* in densely populated and rapidly urbanizing districts like Kannur.

Keywords: Species Diversity, Floristic Diversity, Conservation, Squirrels, *Funambulus tristriatus*

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1. Introduction

Global environmental changes, such as land-use change, global warming, and rapid urbanization, have significantly disturbed tropical forests and unique biodiversity [1]. The Western Ghat biodiversity hotspot has also been threatened by habitat fragmentation, loss, and degradation [2]. Rapid urbanization has been affecting almost all lowland areas, except for forests that have been preserved due to Hindu religious and cultural heritage, reverence, and fear^[1] [3,4]. Such protected forest regions are called Sacred Groves (SGs). Locals revered and protected them as spiritual and botanical havens [5]. Kirk [6] states that SGs have become remnants of the original forest in some lowland areas. For many years, geo botanists and

landscape researchers have been extensively studying phytosociological aspects of SGs in different regions in India [4,7]. The SGs have a complex vegetation structure, closed canopy cover and thick litter bed [8]. In parallel, conservation biologists and biodiversity experts have been exploring the abundance of different species in such SGs and surrounding areas [9,10,11].

SGs in urbanized lowlands have been serving as tropical biodiversity reserves for a long time [3,12]. They serve as the habitat for many native endemic plant species [4]. In a recent review, it was noted that there is a critical knowledge gap on the faunal diversity of SGs, particularly of herbivores [13]. Many studies have contributed to discovering new plant species, gene pools, communities, populations, and microhabitats in various SGs of India [4,14,15]. This research inquiry builds on the different investigations by Rajesh et al. [16], Rajesh et al. [8], and

Letter of Understanding (LoU)

This Letter of Understanding ("LoU") is made on this [07.11.2022], between:

Dr. M.D.Saravanamoorthy.

Associate Professor in Botany

Thanthai Periyar Govt. Arts and Science College

(Autonomous) Tiruchirappalli – 620023

Tamil Nadu,

India. meetmds@gmail.com

AND

Dr. Abdussalam, A.K.

Assistant Prof. in Botany

Sir Syed College, Karimbam, P.O.

Taliparamba, Kannur, Kerala, India

PIN 670142, salamkoduvally@gmail.com

Purpose

This Letter of Understanding outlines the terms and mutual understanding between **Dr. M.D. Saravanamoorthy** and **Dr. Abdussalam, A.K.** to collaborate in the fields of Plant Science Research, Student Exchange, and Journal Publication.

Scope of Collaboration

1. Plant Science Research

Both parties agree to collaborate on joint research activities in the field of Plant Science. This includes, but is not limited to, sharing of research data, methodologies, and resources, as well as organizing joint workshops, seminars, and conferences in areas of mutual interest.

2. Student Exchange

The parties agree to facilitate student exchanges between their institutions. The exchange will allow students to participate in joint research projects, laboratory work, and academic courses related to plant science. Details regarding the duration, academic credits, and financial responsibilities will be discussed and agreed upon on a case-by-case basis.

3. Journal Publication

Both parties agree to jointly publish research outcomes in recognized scientific journals. Co-authorship will be determined by mutual consent and based on each party's contribution to the research work. Both parties will seek opportunities to submit joint research papers to high-impact journals and engage in peer review processes.

Roles and Responsibilities

- Both parties will actively contribute to the collaboration by sharing expertise, resources, and facilitating research work.
- Both parties agree to maintain open and continuous communication through periodic meetings to assess progress, discuss challenges, and plan future work.
- The professors will also mentor and supervise students participating in the exchange program.

Duration

This LoU shall remain in effect for a period of five years from the date of signing, unless extended by mutual written agreement. Either party may terminate the collaboration with One month days' notice in writing.

Confidentiality

Both parties agree to keep confidential all proprietary information shared during the course of this collaboration. Any data or findings resulting from joint research will not be disclosed to third parties without prior consent from both parties.

Intellectual Property


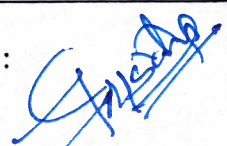
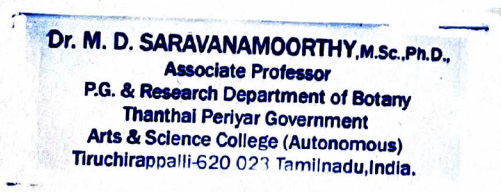

The intellectual property rights arising from the collaboration shall be jointly owned by both parties, unless otherwise agreed in writing. Specific terms regarding intellectual property will be addressed in separate agreements as necessary.

Amendments

Any amendments or modifications to this LoU must be agreed upon in writing and signed by both parties.

Signatures

By signing below, both parties agree to the terms outlined in this Letter of Understanding.

Dr. M.D.Saravanamoorthy. Associate Professor in Botany Thanthai Periyar Govt. Arts and Science College (Autonomous) Tiruchirappalli – 620023 Tamil Nadu, India.	Dr. Abdussalam, A.K. Assistant Prof. in Botany Sir Syed College, Karimbam,P.O. Taliparamba, Kannur, Kerala, India
Date: 07.11.2022 Signature with Seal : 	Date: 07.11.2022 Signature with Seal : 
 Dr. M. D. SARAVANAMOORTHY, M.Sc., Ph.D., Associate Professor P.G. & Research Department of Botany Thanthai Periyar Government Arts & Science College (Autonomous) Tiruchirappalli-620 023 Tamilnadu, India.	 Dr. Abdussalam, A. K. Assistant Professor & Research Supervisor (Kannur and Bharathiar Universities) Department of Post Graduate Studies & Research in Botany Sir Syed College, Karimbam P.O., Taliparamba Kannur, Kerala - 670142



Provisional Registration Approval - Mr. MIDHUN N K [Reg.No. BDU2220432780013]

1 message

BDU PhD Section <bduphdsection@gmail.com> Wed, 18 May 2022 at 11:27 am
To: midhunramanattukara@gmail.com
Cc: princiaag@bdu.ac.in, meetmds@gmail.com, salamkoduvally@gmail.com, kkmhss11243@gmail.com



Bharathidasan University

Palkalaiperur

Tiruchirappalli - 620024

PhD/K10/DR02/220518110457 Date : 18.05.2022
Reg. No. BDU2220432780013

To **Research Scholar**
Mr. MIDHUN N K(Reg.No: BDU2220432780013),
HSST BOTANY,
KKMHSS CHEEKODE, 11243,
CHEEKODE POST,
CHEEKODE,
MALAPPURAM - 673645, INDIA,
Contact No.: 9633212831.

Madam / Sir,
Sub : Ph.D. Programme Registration Application No: BDU/PhD/21/0905, Dated: 20.12.2021
Ref : The VC's Order dated. 18.05.2022.

I am, by direction to inform you that you have been provisionally registered for Ph.D. Degree under the **Part-Time** Category. As per the Ph.D. Regulations of this University, you have to carryout research work under the Research Supervisor for a minimum period of **Four** Years and a maximum of **Six** Years from the date of registration i.e from **01.06.2022 to 31.05.2028**.
Be it informed that, you will be governed by the regulations, rules and conditions for the Degree of Doctor of Philosophy of this University.

The Subject / Discipline of the Research chosen by you is **BOTANY [FACULTY OF SCIENCE]** and the broad topic of your Research is "**TAXONOMICAL SURVEY, PHYTOCHEMICAL, PHARMACOGNOSTICAL AND NANOPARTICLES CELL LINE CULTURE OF SECONDARY METABOLITES**".

The Subject / Discipline cannot be subsequently changed. You are requested to quote the **Registration Number** cited above in all correspondence with the University regarding your Ph.D. Programme.

Research Centre: DEPARTMENT OF BOTANY, ARIGNAR ANNA GOVERNMENT ARTS COLLEGE, Musiri, Tk , Tiruchirappalli Dt. - 621211

Yours sincerely,

Note: with an instruction to remit the one time lumpsum Research fee of **Rs.6000/-** to the University.

Copy to

1. **Dr. SARAVANAMOORTHY M D (BDU04334000121)**, (Supervisor),
Assistant Professor,
DEPARTMENT OF BOTANY,
ARIGNAR ANNA GOVERNMENT ARTS COLLEGE,
Musiri - 621 211.

To proceed to the next level, the supervisor must upload Two Experts (Related to the Research Topic) for the DC-Constitution for the first Doctoral Committee of the Scholar as per the Revised Regulation.

2. **Dr. ABDUSSALAM A K** (Co-supervisor),
ASSOCIATE PROFESSOR IN CHARGE OF THE PRINCIPAL,
SIR SYED COLLEGE, AFFILIATED TO KANNUR UNIVERSITY ,
KERALA - 670142,
INDIA
3. The Principal ,
ARIGNAR ANNA GOVERNMENT ARTS COLLEGE,
Arignar Anna Government Arts College, Musiri,
Musiri, Tk ,
Tiruchirappalli Dt. - 621211.
4. The Principal / Head ,
KKMHSS CHEEKODE, 11243,
CHEEKODE POST,
CHEEKODE,

MALAPPURAM - 673645,
INDIA.

*All communication are to be addressed to the Director - Research only.
Please quote our reference in all your replies.*



INDIAN INSTITUTE OF REMOTE SENSING
Indian Space Research Organisation
Department of Space, Govt. of India



Oct 9, 2023

Dear Azhar Ali A,

Thank you for your interest in IIRS outreach programme and conducting live & Interactive courses at your Institute/Organization. Earlier we have received your request to become network institute of IIRS/ISRO Outreach network. Currently your institute is listed as one of the nodal centers to conduct online courses offered by IIRS-ISRO Dehradun. We have received registration request from some of the participants by selecting **your Institute as a nodal center** for conducting coming live & interactive courses.

For any further query please contact us at edusat@iirs.gov.in or dlp@iirs.gov.in ,
Tel: +91-135- 2524130.

With regards

Head,
GIT&DL Department
IIRS, Dehradun





भारतीय सुदूर संवेदन संस्थान/ INDIAN INSTITUTE OF REMOTE SENSING
भारतीय अंतरिक्ष अनुसंधान संगठन/ INDIAN SPACE RESEARCH ORGANISATION
अंतरिक्ष विभाग, भारत सरकार/ DEPARTMENT OF SPACE, GOVERNMENT OF INDIA



बहिःपरिसर संपर्क/विस्तार कार्यक्रम प्रमाण पत्र
OFF - CAMPUS OUTREACH CERTIFICATE PROGRAMME

COR2023103416122

समन्वय का प्रमाणपत्र
CERTIFICATE OF COORDINATION

यह प्रमाणित किया जाता है कि सर सैयद कॉलेज कार्यरत श्री अजहर अली ने कृषि में सुदूर संवेदन आधारित आंकड़ों का विश्लेषण विषय पर इस संस्थान द्वारा दिनांक 26 अक्टूबर, 2023 को आयोजित एक दिवसीय ऑनलाइन कार्यशाला को समन्वित किया।

This is to certify that **MR. AZHAR ALI A**, working with **Sir Syed College**, has coordinated one day online workshop on **Remote sensing based data analytics in Agriculture** conducted by this institute on October 26, 2023

दिनांक/ Date: 28-11-2023
देहरादून/ Dehradun

प्रमुख,
जियोवेब सर्विसेस, सूचना प्रौद्योगिकी एवं दूरस्थ अधिगम विभाग
Head, Geoweb Services, IT & Distance Learning Department, IIRS

समूह प्रमुख,
भू-स्थानिक प्रौद्योगिकी एवं आउटरीच कार्यक्रम समूह
Group Head, Geospatial Technologies & Outreach Programme Group, IIRS



भारतीय सुदूर संवेदन संस्थान/ INDIAN INSTITUTE OF REMOTE SENSING
भारतीय अंतरिक्ष अनुसंधान संगठन/ INDIAN SPACE RESEARCH ORGANISATION
अंतरिक्ष विभाग, भारत सरकार/ DEPARTMENT OF SPACE, GOVERNMENT OF INDIA



बहिः परिसर संपर्क/ विस्तार कार्यक्रम प्रमाण पत्र
OFF - CAMPUS OUTREACH CERTIFICATE PROGRAMME

COR2023103416122

संस्थान की सहभागिता का प्रमाण पत्र
CERTIFICATE OF PARTICIPATION OF INSTITUTE

यह प्रमाणित किया जाता है कि **सर सैयद कॉलेज** ने भारतीय सुदूर संवेदन संस्थान, इसरो देहरादून द्वारा संचालित ऑनलाइन प्रशिक्षण पाठ्यक्रम **कृषि में सुदूर संवेदन आधारित आंकड़ों का विश्लेषण** में भाग लिया। इस ऑनलाइन पाठ्यक्रम का संचालन दिनांक 26 अक्टूबर, 2023 से 26 अक्टूबर, 2023 तक किया गया।

This is to certify that **Sir Syed College**, has participated in online training programme conducted by Indian Institute of Remote Sensing, ISRO Dehradun on **Remote sensing based data analytics in Agriculture**. This online programme was conducted during October 26, 2023 to October 26, 2023

दिनांक/ Date: 28-11-2023
देहरादून/ Dehradun

प्रमुख,
जियोवेब सर्विसेस, सूचना प्रौद्योगिकी एवं दूरस्थ अधिगम विभाग
Head, Geoweb Services, IT & Distance Learning Department, IIRS

समूह प्रमुख,
भू-स्थानिक प्रौद्योगिकी एवं आउटरीच कार्यक्रम समूह
Group Head, Geospatial Technologies & Outreach Programme Group, IIRS

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Confirmation for Conducting IIRS Outreach Programme

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Mon, Aug 22, 2022, 10:37 AM

IIRS Distance Learning

<no-reply@iirs.gov.in>

to me

Dear Mr. Azhar Ali A,

I am happy to inform you that your organization is now network institute of IIRS outreach network. The name of your Institute online application form of IIRS Outreach Programme.

Please see the attached documents for more technical details of the programme. Please ask your participant to register for th be receiving further communications from our side as a coordinator for all other course requirements and your roles and resp successfull conduction of the programme.

Please login to the IIRS Learning Management System (LMS) to approve your students registration and maintain the attenda

URL: <https://elearning.iirs.gov.in/>

Username for IIRS CMS: azhar@sirsyedcollege.ac.in

Password for CMS: 8943189531@iirs

Please click the following below link for more details

Coordinator Management System Detail: [click here](#)

Coordinator Management System Detail: [click here](#)

I hope that you and your participants will have an exciting learning experience with us in the field of Remote Sensing, GIS an technologies and their applications.

For any further clarification please mail us at: dln@iirs.gov.in or call us at Tel:+91-135-2524130



INDIAN INSTITUTE OF REMOTE SENSING
Indian Space Research Organisation
Department of Space, Govt. of India



IIRS-ISRO Outreach Programme

Learner centric e-learning courses

On Mission for transferring technology through
Capacity building & research

IIRS Outreach Programme focusses on strengthening the Academia and User Segments in Space Technology & Its Applications using Online Learning Platforms. Under this programme the two mode of content delivery system is developed using online learning platform (i.e) Live & Interactive mode (known as EDUSAT) and e-Learning mode.



PAYYANUR COLLEGE, PAYYANUR

(AFFILIATED TO KANNUR UNIVERSITY, ACCREDITED BY NAAC AT 'B+' GRADE)

EDAT POST, KANNUR DIST., 670327, PH : 0497 2805121, 2805521

E-mail: payyanurcollege@rediffmail.com; Website: www.payyanurcollege.ac.in

From

The Principal

COLLABORATION AGREEMENT

between

Department of Chemistry, Payyanur College, Payyanur
&

PG and Research Department of Chemistry,
Sir Syed College, Thaliparamba.

Collaboration agreement signed on 04-01-2021 between Department of Chemistry, Payyanur College, Payyanur and PG and Research Department of Chemistry, Sir Syed College Thaliparamba.

Objective of Collaboration

This document outlines a strategic understanding between, Department of Chemistry, Payyanur College, Payyanur and PG and Research Department of Chemistry, Sir Syed College Thaliparamba to perform their work together utilizing the instruments and resources available at both the institutions.


Activities Focused under the collaboration.

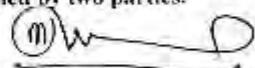
- 1) Interactive sessions with students by the faculties.
- 2) Organize and conduct Chemistry based programmes and fest.
- 3) Supervising /supporting PG and UG students for project work.
- 4) Training of students in laboratories and sharing major equipments.
- 5) Sharing of library and E-resources.

Benefits of Collaboration.

The postgraduate students of the institution can do their project work with the faculty of both the institutions. Instruments and facilities available at both the institutions can be shared for the research activities. Faculty exchange programmes, student exchange programmes, workshops and seminars and various research activities can be conducted by both the institutions.

This agreement of collaboration is valid for 3 years from the date signed by two parties.


Head of the Department
Department of Chemistry
Payyanur College
Head of the Department
P. G. Dept of Chemistry
Payyanur College
P. U EDAT-670 327


Head of the Department
PG and Research Department of Chemistry
Sir Syed College Thaliparamba
Dr. BIJU. A.R.
Assistant Professor
Department of Chemistry
Sir Syed College
Thaliparamba, Kannur - 670142

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Theoretical investigation of energetic performance and impact sensitivities of nitro and trinitromethyl substituted ozonides of ethylene and cyclopentene

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Received 28 June 2021, Revised 20 August 2021, Accepted 21 August 2021, Available online 31 August 2021, Version of Record 3 September 2021.

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Highlights

- Quantum mechanical studies ozonides of ethylene and cyclopentene as HEDMs.
- Promising trinitromethane derivatives of ozonides as high energy density materials.
- Calculation of impact sensitivity of high energy density materials.

Abstract

A series of novel energetic compounds were designed by introducing groups such as —NO₂, and —C(NO₂)₃ to the ethylene ozonide (trioxolane) and cyclopentene ozonide (6,7,8-trioxabicyclo[3,2,1]octane) skeletons and their detonation properties and impact sensitivity were investigated using DFT - B3LYP method with aug-cc-