

Microbial degradation of bis-phenol A and estriol
using psychrotrophic bacteria

A THESIS

Submitted for the award of the degree

of

DOCTORS OF PHILOSOPHY

in

BIOTECHNOLOGY

by

POOJA THATHOLA

G.B. Pant National Institute of Himalayan Environment,
Kosi-Katarmal, Almora-263643,
Uttarakhand, India

And

Department of Biotechnology
Bhimtal, Campus
Kumaun University
Nainital-263136,
Uttarakhand, India

2022



Graphic Era

Deemed to be University

Accredited by NAAC with Grade A

NBA Accredited Program in CSE, ECE & ME

Approved by AICTE, Ministry of HRD, Govt. of India

566/6 Bell Road, Clement Town, Graphic Era (Deemed to be University), Dehradun 248002, INDIA

17 June 2022

CERTIFICATE

I, the undersigned, hereby certify that the research work embodied in the thesis entitled "Microbial degradation of bis-phenol A and estriol using psychrotrophic bacteria" submitted by Ms Pooja Thathola, for the award of the degree of Doctor of Philosophy in Biotechnology from Kumaun University, Nainital is original work and carried out under my supervision and guidance, and this work has not been submitted for any degree of any other University.

It is further certified that the candidate has worked for a period of more than twenty-four months and has put in more than 200 days of attendance in supplicating for the PhD work.


Anita Pandey

(Supervisor)

Former Scientist

G.B. Pant National Institute of Himalayan Environment

Kosi-Katarmal, Almora-263 643, Uttarakhand, India



DEPARTMENT OF BIOTECHNOLOGY

KUMAUN UNIVERSITY
BHIMTAL CAMPUS, BHIMTAL

Pin Code - 263136

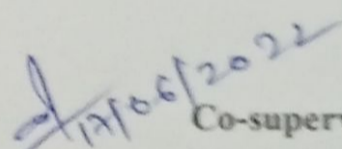
Ph. : 05942-248185

Fax : 05942-248042

CERTIFICATE

I, the undersigned, hereby certify that the research work embodied in the thesis entitled "Microbial degradation of bis-phenol A and estriol using psychrotrophic bacteria" submitted by Ms Pooja Thathola, for the award of the degree of Doctor of Philosophy in Biotechnology from Kumaun University, Nainital is original work and carried out under my supervision and guidance, and this work has not been submitted for any degree of any other University.

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Co-supervisor

Dr. Santosh K. Upadhyay

Assistant Professor

Department of Biotechnology

Bhimtal Campus, Kumaun University, Nainital- 263136

Uttarakhand, India

MEMORANDUM OF UNDERSTANDING (MoU)

BETWEEN

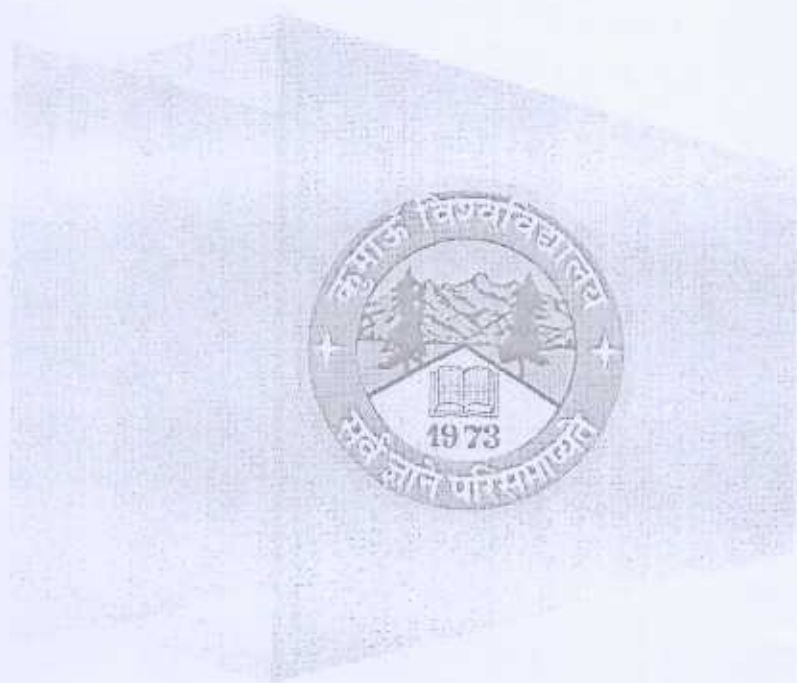
KUMAUN UNIVERSITY, NAINITAL

&

GRAPHIC ERA HILL UNIVERSITY, DEHRADUN CAMPUS

FOR

INSTITUTIONAL partnership



MEMORANDUM OF UNDERSTANDING

This Memorandum of Understanding (hereinafter called as the 'MOU') is entered into on this the *Fourth day of March – Two Thousand and Twenty Two (04-03-2022)*, by and between **Kumaun University, Nainital**, the First Party represented herein by its Registrar / University Coordinator Placement and Counseling (hereinafter referred as 'First Party', shall include its successors – in-office, administrators and assigns).

AND

School of Pharmacy, Graphic Era Hill University, the Second Party, and represented herein by **Registrar Graphic Era Hill University, Dehradun**, (hereinafter referred to as "Second Party", shall include its successors – in-office, administrators and assigns).

(First Party and Second Party are hereinafter jointly referred to as 'Parties' and individually as 'Party') as

WHEREAS:

First Party is a Higher Educational Institution named:

Kumaun University, Nainital

Second Party is also is a Higher Educational Institution named:

Graphic Era Hill University, Dehradun

First Party & Second Party believe that collaboration and co-operation between themselves will promote more effective use of each of their resources, and provide each of them with enhanced opportunities.

NOW THEREFORE, IN CONSIDERATION OF THE MUTUAL PROMISES SET FORTH FOR INDUSTRY INSTITUTE PARTNERSHIP IN THIS MOU, THE PARTIES HERE TO AGREE AS FOLLOWS:

SCOPE OF THE MEMORANDUM OF UNDERSTANDING (MoU)

Both parties believe that close co-operation would be of major benefit to the student community to enhance their skills and knowledge which in turn could play a key role in technological up-gradation, innovation and competitiveness of the industry. The key areas for mutual cooperation would be:-

1. **Curriculum Design:** Both parties would share the valuable inputs from each other to suitably customize the curriculum to train the students for competitive world.
2. **Exchange of Staff:** The faculty/ research fellows registered for Ph. D program may visit the institute for a short period in connection with their research work under collaborative program.
3. **Joint Workshops/ Conference:** Both the organizations will hold/ conduct joint conference/ workshop/ training courses for students & faculties within the areas of cooperation.
4. **Sharing of Facilities:** Both the organization will to share important R&D facilities in order to promote academic and research in the areas of cooperation. Joint Campus placement drives with pooling of resources.

There is no financial commitment on the part of the **Kumaun University, Nainital**, the First Party to take up any programme mentioned in the MoU. If there is any financial consideration, it will be dealt separately.

VALIDITY

This Agreement will be valid until it is expressly terminated by either Party on mutually agreed terms. Both Parties may terminate this MOU upon 30 calendar days' notice in writing. In the event of Termination, both parties have to discharge their obligations

RELATIONSHIP BETWEEN THE PARTIES

It is expressly agreed that **First Party** and **Second Party** are acting under this MOU as independent contractors, and the relationship established under this MOU shall not be construed as a partnership.


First Party

Second Party


Any divergence derived from the interpretation or application of the MoU shall be resolved by arbitration between the parties as per the Arbitration Act, 1996. The place of the arbitration shall be at District Head Quarters of the First Party. This undertaking is to be construed in accordance with Indian Law with exclusive jurisdiction in the Courts of **Nainital**.

AGREED:

For **Kumaun University, Nainital**


Authorized Signatory
Kumaun University
NAINITAL


For **Graphic Era Hill University, Dehradun**


Capt. Himanshu Dhuiya
(Indian Navy Retd.)
Authorized Signatory
Graphic Era Hill University
Dehradun (Uttarakhand)

Kumaun University, Nainital	GEHU, Dehradun
Address: Sleepy Hollow, Mallital, Nainital	Address: Bell Road, Clement Town, Dehradun
Contact Details: Registrar, Kumaun University, Nainital	Contact Details: Registrar Graphic Era Hill University, Dehradun
E-mails: registrar@kunainital.ac.in	E-mails: registrar@gehu.ac.in
Web: www.kunainital.ac.in	Web: www.gehu.ac.in

Witness 1:


Witness 2:


04.03.22
Director
School of Pharmacy
Graphic Era Hill University
Dehradun

Registered



कुमाऊँ विश्वविद्यालय, नैनीताल-263001(उत्तराखण्ड)
KUMAUN UNIVERSITY, NAINITAL-263001(UTTARAKHAND)
Sponsored Research and Industrial Consultancy Cell(SRICC)
Office: 05942-235213, Fax: 05942 -235213, E-mail: sriccku@gmail.com

No. SRICC/MOU/2019/5350

Dated: 07 February, 2018

To,

Director
G.B. Pant Institute of Himalayan, Environment and Development
Kosi-Katarmal, Almora - 263643.

Subject: Regarding MOU between Kumaun University and G.B. Pant Institute of
Himalayan, Environment and Development, Kosi-Katarmal, Almora

Sir,

Please enclosed find herewith the original MOU between the Kumaun University
and G.B. Pant Institute of Himalayan, Environment and Development, Kosi-Katarmal,
Almora for researchers of both institutions.

Thanking you.

Enclosure - Original MOU/Photostat.

Yours faithfully

O/C

Prof. (Rajeev Upadhyay)

Director
SRICC

Copy to - PS to Vice Chancellor for kind information to Hon'ble Vice Chancellor.

Director
SRICC

एच. सी. वंत स्टाम्प (वेल्ड)
ता. नं०-5/11-12
ई स्टाम्प आई.डी. - UK-1215786
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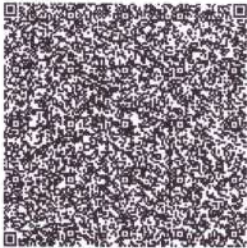


सत्यमेव जयते

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MEMORANDUM OF UNDERSTANDING
BETWEEN
KUMAUN UNIVERSITY, NAINITAL
AND

G.B. PANT NATIONAL INSTITUTE OF HIMALAYAN ENVIRONMENT AND
SUSTAINABLE DEVELOPMENT

CL.1 THE MoU

CL.1.1 THIS MoU made and entered into on 12 July 2018 day of 2018 between Rajeev G.B. Pant National Institute of Himalayan Environment and Sustainable Development, a Society registered

under the Societies Registration Act (1860), having its registered office at **Kosi-Katarmal, Almora** having its Office Kosi-Katarmal, Almora 263643 (hereinafter called **GBPNIHESD** which expression shall where the context so admits include its successors and permitted assigns) of the one part,

And

CL.1.2 KUMAUN UNIVERSITY, NAINITAL, was established in 1973 under the UP State Act, having its office at Kumaun University, Nainital Uttarakhand – 263001 (hereinafter called the KUMAUN UNIVERSITY (KUN) which expression shall where the context so admits include its successors and permitted assigns) of the other part.

PREAMBLE:

The Department of Science and Technology Govt. of India and the University Grants Commission have realized the need for a close linkage between the National Laboratories and the Universities in terms of research and academic activities. In compliance to this idea, Kumaun University, Nainital (KUN) and **GBPNIHESD** have decided to sign a Memorandum of Understanding (MoU) as per the following terms and conditions:

1. GENERAL

1.1 The scientist of **GBPNIHESD** may participate in the teaching programme in the different departments such as **Department of Biotechnology, Botany, Chemistry, Economics, Forestry, Geology, Geography, Mathematics, Pharmacy, Physics, RS&GIS, Sociology, and Zoology** (SSJ, Almora and DSB, Nainital Campuses), of the Kumaun University on request and subject to mutual convenience.

*Tourism
Zojew*

1.2 The scientist of **GBPNIHESD** and the faculty members of KUN will work towards joint research projects thereby mutually using research facilities developed/to be developed at **GBPNIHESD** and KUN.

1.3 KUN will recognize and accept the students of **GBPNIHESD** for supervising research leading to Ph.D. degree of KUN.


1.4 The Faculty and students of the above mentioned Department of KUN shall be allowed the use of library of **GBPNIHESD** subject to prior permission of the Director/Head, **GBPNIHESD**. Scientists and Ph.D. students of **GBPNIHESD** shall likewise be given the above mentioned facilities at KUN.

1.5 The Scientists/Faculty members and students of above mentioned department of **GBPNIHESD/KUN** shall be issued necessary permission, on request, to access to laboratories and other facilities of KUN/ **GBPNIHESD** as per their respective rules.

- 2.8. **GBPNIHESD** and KUN will work closely to **generate appropriately trained manpower in the related areas** through organization of formal academic curricula, symposia, short term training courses, etc.
- 2.9. **GBPNIHESD** will provide training facilities (minimum for **3 months**) for selected number of students of KUN as per availability of space. The scientists of **GBPNIHESD** will help in preparation of project dissertations wherever needed. The students will mention these scientists as senior guide in the Pre-PhD Dissertation reports. Data generated during project work can be published only after technical clearance from **GBPNIHESD** with equal/amicable sharing amongst **GBPNIHESD** and KUN.
- 3.0. **Honorarium, TA/DA (if applicable) will be provided** to the faculty members/Scientists/technical staff of KUN and **GBPNIHESD** as per rule by requesting organizations.
- 3.1. **The MoU related to PhD degree will be done under the JOINT SUPERVISION of the faculty of the respective department of Kumaun University, Nainital and the scientists of GBPNIHESD.**
- 3.2. It is further agreed that the Vice-Chancellor, KUN and Director/Head, **GBPNIHESD** through periodic meetings will monitor the progress of this MoU. Any change/modification/termination as introduced/suggested by the Review Committee (comprising of Vice-Chancellor, KUN and Director **GBPNIHESD** and other members as may be mutually decided by them) shall be acceptable to both the institutions. **In case of difference of opinions and dispute, if any, the verdict of the Hon'ble Vice-Chancellor, Kumaun University, Nainital shall be final.**

12 July 2018 Rajeev

Signed this day of July 9, 2018 at Kumaun University, Nainital.



Director/Head

निदेशक
Director

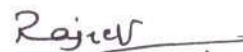
श्री.ब.पन्त हिमालय पर्यावरण एवं विकास संस्थान
G. B. Pant Institute of Himalayan
Environment and Development,
कोशी-काठारमल, अल्मोड़ा-263643
Kosi-Katarmal, ALMORA.-263643



Registrar

Kumaun University,
Nainital

Registrar
Kumaun University
NAINITAL.



Director-SRICC

Kumaun University
Nainital

12/07/2018
DIRECTOR
Sponsored Research And Industrial
Consultancy Cell
Kumaun University, NAINITAL

Signature of the Convenor of different departments

1. Biotechnology *Arjun*
12/7/18

2. Botany *Rande*
12.7.2018

3. Chemistry *Rande*
12/7/18

4. Economics *Debi*
12-7-2018
Convenor & HOD
Economics

5. Forestry *Ajayadhar*
10.07.2018

6. Geology *Abshama*
Convenor & HOD.
12-7-18

7. Geography
Professor & Head
DEPARTMENT OF FORESTRY &
ENVIRONMENTAL SCIENCE
KUMAUN UNIVERSITY
NAINITAL

8. Mathematics *Rande*
10-7-2018
Professor & Head
Department of Mathematics
Kumaun University
Baba Singh Jeena Campus
ALMORA - 263601
Uttarakhand, INDIA

9. Physics *Arjun*
12/7/18
Convenor & HOD
Dept. A
KUNTL

10. Pharmacy *Arjun*
12/7/18

11. RS&GIS *Arjun*
12/7/18
Head,
Department of Geography
Kumaun University
S.S.I. Campus, Almora

12. Sociology *Arjun*
12/7/18

13. Zoology *Arjun*
12/7/18
(Convenor
Zool.)

14. Tourism *Arjun*
12/7/18

The MoU will come into force from the date of approval of the draft both by the Executive Council of Kumaun University, Nainital and Chairman Governing Body of the GBPNIHESD.