

**BIODIVERSITY, FOOD CULTURE AND HEALTH IN  
MOUNTAIN HILL LANDSCAPES OF  
UTTARAKHAND**

**PH.D. THESIS**

Submitted to  
**KUMAUN UNIVERSITY NAINITAL**

For the degree of  
**DOCTOR OF PHILOSOPHY**  
in  
**BOTANY**

By  
**RANJANA SINGH**

**ICAR- NATIONAL BUREAU OF PLANT GENETIC RESOURCES  
REGIONAL STATION, NIGLAT, BHOWALI- 263132 (NAINITAL)  
UTTARAKHAND**

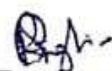
*and*

**DEPARTMENT OF BOTANY  
D.S.B. CAMPUS, KUMAUN UNIVERSITY,  
NAINITAL-263001, UTTARAKHAND  
(INDIA)**

**2021**

## CERTIFICATE

I hereby certify that the work which is being presented in the thesis entitled “**Crop Diversity, Food Culture and Health in Traditional Hill Landscapes Of Uttarakhand**” submitted to the Department of Botany, D.S.B. Campus, Kumaun University Nainital for the degree of ‘Doctor of Philosophy’ is bonafide research work and authentic record of my own work carried out during 19 July, 2017 to 27 October, 2021 under the supervision of Dr. I.S. Bisht, Principal Scientist (Retd.), ICAR-NBPGR, Regional Station, Bhowali and co-supervision of Dr. L. M. Tewari, Professor, Department of Botany, D.S.B. Campus, Kumaun University, Nainital. The matter presented in this thesis has not been submitted for the award of any other degree of this or any other University/ Institute.



**Ranjana Singh**

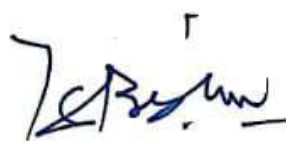
(Candidate)

This is to certify that the candidate has put more than 200 days attendance during the course of his Ph.D. thesis and the above statement made by him is correct to the best of my knowledge.



**Prof. S.C. Sati**

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**Dr. I. S. Bisht**  
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**Dr. Lalit M. Tewari**  
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Professor  
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**Registered**



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No. SRICC/MOU/2019/5373

Dated: // February, 2019

To,

Director  
National Bureau of Plant Genetic Resources  
(Indian Council of Agricultural Research)  
Regional Station, Bhowali-263132 (Nainital).

Subject: Regarding MOU between Kumaun University and National Bureau of Plant Genetic Resources, Bhowali (Nainital).

Sir,

Please enclosed find herewith the original MOU between the Kumaun University and National Bureau of Plant Genetic Resources, Bhowali (Nainital) for researchers of both institutions.

Thanking you.

**Enclosure - Photostat MOU.**

Yours faithfully

  
Prof. ( Rajeev Upadhyay )  
Director  
SRICC

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

  
Director  
SRICC

संख्या- 02 (xvi)

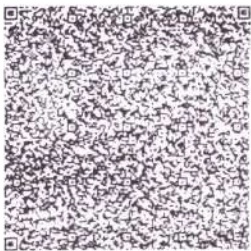


सत्यमेव जयते

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MEMORANDUM OF UNDERSTANDING  
BETWEEN  
KUMAUN UNIVERSITY, NAINITAL  
AND  
NATIONAL BUREAU OF PLANT GENETIC RESOURCES  
(INDIAN COUNCIL OF AGRICULTURAL RESEARCH)  
REGIONAL STATION, BHOWALI-263132 (NAINITAL)

**CL.1 THE MoU**

CL.1.1 THIS MoU made and entered into on 06 day of June-2018 between National Bureau of Plant Genetic Resources (Indian Council of Agricultural Research) Regional Station, Bhowali-263132 (Nainital), a Society registered under, having its registered office at National Bureau of Plant Genetic Resources (Indian Council of Agricultural Research, Ministry of Agriculture) Pusa Campus New Delhi-110 012 having its Office Bhowali, Nainital (hereinafter called National Bureau of Plant Genetic Resources (Indian Council of Agricultural Research) Regional Station, Bhowali-263132, (ICAR-NBPGR) 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 National Bureau of Plant Genetic Resources (Indian Council of Agricultural Research) Regional Station, Bhowali-263132, (ICAR-NBPGR) have decided to sign a Memorandum of Understanding (MoU) as per the following terms and conditions:

**1. GENERAL**

1.1 The mission of National Bureau of Plant Genetic Resources, (Indian Council of Agricultural Research) Regional Station, Bhowali may participate in the teaching program of the KUN in the field of plant genetic resources. The program shall be for a period of 01 year from 2018 to 2019.

(Main/Inl Campuses), of the Kurmaun University on request and subject to mutual convenience.

- 1.2 The scientist of National Bureau of Plant Genetic Resources (Indian Council of Agricultural Research) Regional Station, Bhowali and the faculty members of KUN will work towards joint research projects thereby mutually using research facilities developed/to be developed at National Bureau of Plant Genetic Resources (Indian Council of Agricultural Research) Regional Station, Bhowali and KUN.
- 1.3 KUN will recognize and accept the students of National Bureau of Plant Genetic Resources (Indian Council of Agricultural Research) Regional Station, Bhowali 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 National Bureau of Plant Genetic Resources (Indian Council of Agricultural Research) Regional Station, Bhowali subject to prior permission of the Director/Head, National Bureau of Plant Genetic Resources (Indian Council of Agricultural Research) Regional Station, Bhowali. Scientists and Ph.D. students of National Bureau of Plant Genetic Resources (Indian Council of Agricultural Research) Regional Station, Bhowali shall likewise be given the above mentioned facilities at KUN.
- 1.5 The Scientists/Faculty members and students of above mentioned department of Botany/KUN shall be issued necessary permission, on request, to access to laboratories and other facilities of KUN/ Department of Botany as per their respective rules.
- 1.6 Whenever required, National Bureau of Plant Genetic Resources (Indian Council of Agricultural Research) Regional Station, Bhowali shall arrange hostel/guest house accommodation for KUN faculty members and students visiting National Bureau of Plant Genetic Resources (Indian Council of Agricultural Research) Regional Station, Bhowali for research/collaboration work and vice-versa.


## 2. ACADEMIC AND DEVELOPMENTAL PROGRAMMES:


- 2.1 For the mutual benefit of the two institutions i.e. National Bureau of Plant Genetic Resources (Indian Council of Agricultural Research) Regional Station, Bhowali and KUN, there will be **exchange of** National Bureau of Plant Genetic Resources (Indian Council of Agricultural Research) Regional Station, Bhowali scientists and faculty members of Botany department of KUN.
- 2.2 National Bureau of Plant Genetic Resources (Indian Council of Agricultural Research) Regional Station, Bhowali and KUN scientists/faculty members will help each other in preparing **common research** programmes.
- 2.3 National Bureau of Plant Genetic Resources (Indian Council of Agricultural Research) Regional Station, Bhowali will provide laboratory and library facilities to the faculty/teacher staff students of KUN and likewise KUN will also provide the same facilities to the scientist of National Bureau of Plant Genetic Resources (Indian Council of Agricultural Research) Regional Station, Bhowali Ph.D. students/teacher staff etc.

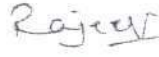
- 2.4. For Ph.D. students working under joint supervision with Botany Department Faculty of K. U and scientists of National Bureau of Plant Genetic Resources (Indian Council of Agricultural Research) Regional Station, Bhowali, the Research Ordinance related to Ph.D. degree of KUN will be applicable (KU Research Ordinance-2016 could be downloaded from [www.kunainital.ac.in](http://www.kunainital.ac.in) Link SRICC). PhD students working in MoU signed R&D institutions of Govt. of India shall have to attend Pre-PhD course, work classes of Paper-I (Research Methodology) in KU. After completion of course work classes on Research Methodology (Paper-I) in KU, such PhD students may carry-on Paper-II (Recent Advances in the Subject) and Paper-III (Dissertation) in their respective research institutes.
- 2.5. In case of very specialized research subjects, the Pre-PhD course work will be held in respective research institutions, only, after consultation with Convener (RDC)/HOD and final approval of Hon'ble Vice-Chancellor.
- 2.6. The faculty of R&D institutions of Govt. of India with specialization in respective areas may be connected to the Departments of Kumaun University as adjunct Faculty after following due procedure. Such faculty may be requested to deliver lectures in Pre-PhD course work, organized by Kumaun University, Nainital.
- 2.7. All Ph.D. students will have to clear the Pre-PhD course work examination conducted by the Kumaun University, Nainital.
- 2.8. National Bureau of Plant Genetic Resources (Indian Council of Agricultural Research) Regional Station, Bhowali 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. National Bureau of Plant Genetic Resources (Indian Council of Agricultural Research) Regional Station, Bhowali will provide training facilities (minimum for 3 months) for selected number of students of KUN as per availability of space. The scientists of National Bureau of Plant Genetic Resources (Indian Council of Agricultural Research) Regional Station, Bhowali 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 National Bureau of Plant Genetic Resources (Indian Council of Agricultural Research) Regional Station, Bhowali with equal/amicable sharing amongst National Bureau of Plant Genetic Resources (Indian Council of Agricultural Research) Regional Station, Bhowali and KUN.
- 3.0. Honorarium, TA/DA (if applicable) will be provided to the faculty members/Scientists/technical staff of KUN & National Bureau of Plant Genetic Resources (Indian Council of Agricultural Research) Regional Station, Bhowali as per the requirements of the institution.

- 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 scientist of the R&D institutions of Govt. of India.
- 3.2. It is further agreed that the Vice-Chancellor, KUN and Director/Head, National Bureau of Plant Genetic Resources (Indian Council of Agricultural Research) Regional Station, Bhowali through periodic meeting 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/Head National Bureau of Plant Genetic Resources (Indian Council of Agricultural Research) Regional Station, Bhowali 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.

Signed this day of 06/06/2018, 2018 at Kumaun University, Nainital.

  
 Director/Head 06/2018  
 National Bureau of Plant Genetic Resources  
 Regional Station, Bhowali (Nainital) UK

  
 Registrar  
 Kumaun University,  
 Nainital

  
 Director-SRICC 06/06/2018  
 Kumaun University  
 Nainital  
 DIRECTOR  
 Sponsored Research And Industrial  
 Consultancy Cell  
 Kumaun University, NAINITAL

The MoU will come into force from the date of approval of the draft both by the Executive Council of Kumaun University, Nainital and technical committee of the.....

Forwarded  
Naresh  
 2.6.2018

Forwarded

Prof. and Head  
 Dept. of Botany  
 K. U. Nainital