

# BRYOFLOA OF LOWLAND NEPAL: TARAI AND CHURIA HILLS

A Thesis Submitted to the  
CENTRAL DEPARTMENT OF BOTANY  
**INSTITUTE OF SCIENCE & TECHNOLOGY**  
**TRIBHUVAN UNIVERSITY**  
Kathmandu, Nepal

For the fulfillment of  
THE DEGREE OF DOCTOR OF PHILOSOPHY IN BOTANY

NIRMALA PRADHAN

2008

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**2008**

# CERTIFICATE

This is to certify that the dissertation work entitled "Bryoflora of Lowland Nepal: Tarai and Churia Hills" was carried out extensively by Ms. Nirmala Pradhan under our supervision. This work has been accomplished on the basis of her original research and submitted here for her Doctor of Philosophy Degree in Botany at the Central Department of Botany, Tribhuvan University, Kathmandu, Nepal. This is the original research work which has never been submitted previously for other degree. We, therefore, have pleasure to forward this thesis for the final approval.

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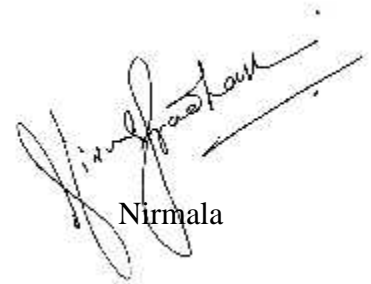
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# DECLARATION

It is declared that this thesis, submitted in fulfillment of the requirements for the award of Doctor of Philosophy Degree in the Central Department of Botany, Institute of Science and Technology, Tribhuvan University, is entirely based on my own original research work. This original text or documents has not been submitted to any other Academic Institutions for qualification or other purposes.

Date: June 19, 2008  
Pardhan



Nirmala

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Date: June 19, 2008

Nirmala Pradhan

## Preface

Though the study of bryophytes in Nepal was initiated long time before but was focused mainly upon the Himalayan species. Few available literatures on Nepalese mosses and liverworts provide very scarce information about lowland species which occur below 1000 m of elevation. My aim with this research is to explore out details of lowland bryophytes which are distributed along the east to the west lowland stripe as no such study has ever been done. This study was quite fruitful to come up with many new findings and also explored many interesting rare species which demand effective conservation measures.

In connection to this research, I had an opportunity to visit the National Botanical Research Institute (NBRI), Lucknow, India where I got privilege to make a brief study on their collections and with appreciable cooperation of Dr. Virendra Nath, a Senior Bryologist; I was able to confirm some of the confusing species that I had taken with me. Some species which were not identified in Nepal were also sent to Edinburgh, UK where the well known bryologist Dr. David Long who is also my Co-Supervisor in this research shared his valuable time to identify them all. Mostly, the identification work was done at the Natural History Museum and Central Department of Botany, Tribhuvan University.

Bryophyte has gained least popularity among the communities and societies of Nepal. Its sustainable use is absolutely unknown among the peoples of low land districts where this study was conducted. Some species of bryophytes carry high medicinal values like *Sphagnum* species which also occurs in Nepal. Bryophytes have been used for various purposes especially for horticulture, packing, as medicine for cough and cold, as green tea, stuffing materials in cushions and pillows etc. These valuable species also exist in lowland Nepal but needs education and information to village peoples about sustainable uses. This kind of practice can be expected to raise their socio-economical status.

The research result of this work is incorporated into my PhD. Dissertation and is submitted to the Central Department of Botany, Tribhuvan University, Nepal. Every bryofloral species recorded in the field has been included in this work including their diagnostic features, key characters, distributional and altitudinal ranges, status and references. Hand sketching of many of the species has also been provided. This research includes some significant objectives like the survey of lowland bryophytes and their documentation, status categorization, distributional range, ecology and anatomical features of every known species of lowland Nepal.

This extensive research has been expected to provide good reference to all the bryologists who are interested or study low land bryophytes of Nepal.

Date: 19.06.2008

Nirmala Pradhan

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## Acronyms and Abbreviations

ACA	Annapurna Conservation Area
BM	British Museum, Natural History
BNP	Bardia National Park
C	Central
CDB	Central Department of Botany
CITES	Conservation on International Trade of Endangered Species of Fauna and Flora
CNP	Chitwan National Park
E	East
E	Herbarium of the Royal Botanic Garden, Edinburgh
EIA	Environment Impact Assessment Team
HQ	Head Quarter
IAB	International Association of Bryologist
IUCN	International Union of Conservation of Nature
K	Royal Botanic Gardens, Kew, UK
LNP	Langtang National Park
MMA	Mahendra Morang Adarsha Campus
N	North
NBS	Nepal Biodiversity Strategy
NBRI	National Botanical Research Institute, Lucknow
NGS	National Geography Society
NICH	Herbarium of Hattori Botanical Laboratory
NHM	Natural History Museum
PWR	Parsa Wildlife Reserve
S	South
SEM	Spectra Electronic Microscope
SSC	Species Survival Commission
SWR	Suklaphanta Wildlife Reserve
TNS	National Science Museum, Tokyo
TI	University Museum, University of Tokyo, Japan
T	Typus; Type
TU	Tribhuvan University
TUCH	Herbarium of Tribhuvan University Central Department of Botany
UK	United Kingdom
UP	Uttar Pradesh, India
USA	United State of America
W	West
WWF	World Wildlife Fund

!	Specimens observed
+	Distributed in the region
–	not recorded in the region
%	percentage
*	New report to Nepal
ca.	Approximate
cf.	close to
cm	centimeter
ed.	edition
eds.	Editors
e. g.	for example
Eng.	English name
<i>et al.</i>	and other
Fig.	figure
i.e.	that is
Ind.	India
m	meter
mm	millimeter
μm	mew micron
<i>s.n.</i>	sine number
S. No.	Serial Number
sp.	Species
Sq. Km.	Square Kilometer
ssp.	subspecies
var.	variety
veg.	vegetative
viz.	namely