

SCIENCE COLLEGE, KOKRAJHAR Published book/book chapter details (from 2018 to 2023)

Sl. No	Author/Deptt	Book title	Paper title	Year of pbl	ISBN	DOI & Website
1	Nath B, Dept. of Chemistry	Advanced Materials from Recycled Waste	Agricultural Waste: Sustainable Valuable Products	Elsevier/2023/ International	978-0-323- 85604-1	https://doi.org/10.1 016/B978-0-323- 85604-1.00009-3
2	Al Kausor M, Dept. of Chemistry	Basic Inorganic Chemistry	Acids and Bases	Kripa Drishti Publications, Pune, India/2023/ National	978-81- 19149-01-8	https://books.kdpu blications.in/index. php/kdp/catalog/bo ok/245
3	Brahma J, Dept. of Botany	Traditional knowledge system of the Bodos	Customary application of herbal remedies by Bodo tribes	Pragya Media Type/2023/ National	978-93- 93837-93-6	
4	Al Kausor M, Dept. of Chemistry	Photocatalysts and Electrocatalysts in Water Remediation: From Fundamentals to Full Scale Applications	Photocatalytic Decontamination of Organic Pollutants from Water	John Willey & Sons/2022/ International	978-1-11- 985531-6	https://doi.org/10.1 007/s12588-019- 09230-x
5	Nath B, Dept. of Chemistry	Proceedings of International Multidisciplinary Conference on Environment: Issues, Challenges, Impact & Steps Towards Sustainable Development. Organized by Gopikabai Sitaram Gawande Mahavidyalaya and Amravati University	Green synthesis and characterization of zno nano particle	Vidyabharati International Interdisciplinar y Research Journal/2022/In ternational	2319-4979	https://www.resear chgate.net/publicat ion/369039227 G REEN_SYNTHES IS_AND_CHARA CTERIZATION_ OF_ZNO_NANO_ PARTICLE
6	Brahma J, Dept. of Botany	Biodiversity conservation (Issues and prospects)	Study of wild aromatic plants used as a source of food and medicines by the Rabha tribes	Mahaveer Publications, New Delhi/2022-23/ National	978-81-961- 731-0-4	

Ħ			of Goalpara district, Assam			
7	Adhikary H, Dept. of Botany	Recent trends in biological sciences	Taxonomy and ethnobotany of some sacred plants found in Kokrajhar district, BTR, Assam	ARBC/2023- 24/National	978-93- 90706-39-6	www.arba.ac.in
8	Ray S, Dept. of Zoology	Recent trends in biological sciences	Comparative Analysis of food value of wild edible insects in Kokrajhar district, BTR, Assam	ARBC/2023- 24/National	978-93- 90706-39-6	www.arba.ac.in
9	Chakrabarty S, Dept. of Zoology	Recent trends in biological sciences	Comparative Analysis of food value of wild edible insects in Kokrajhar district, BTR, Assam	ARBC/2023- 24/National	978-93- 90706-39-6	www.arba.ac.in
10	Al Kausor M, Dept. of Chemistry	Nanostructured Carbon Nitrides for Sustainable Energy and Environmental Applications	Carbon nitride photocatalysts for water treatment and purification.	Elsevier/2022/ International	978-1-11- 977136-4	https://doi.org/10.1 016/B978-0-12- 823961-2.00010-0
11	Nath B, Dept. of Chemistry	Biodiesel Production: Feedstocks, Catalysts, and Technologies,	Homogeneous Catalysts Used in Biodiesel Production	Willey/2022/ International	978-1-11- 977136-4	https://doi.org/10. 1002/9781119771 364.ch5
12	Dhar M, Dept. of Mathematics	Handbook of Research on Advances and Applications of Fuzzy Sets and Logic, 428-442, IGI Global, 2022	Probability and Fuzziness: A case study	IGI Global/2022/ National	978-17- 99879-79-4	http://dx.doi.org/10 .4018/978-1-7998- 7979-4.ch020
13	Gogoi M and Basumatary M, Dept. of Botany	Recent Progress in Plant and Soil Research Vol. 2	Determination of Chlorophyll concentration in seven <i>Citrus</i> spp. of Kokrajhar district, BTAD, Assam	B. P. International/20 21/ International	978-93- 91473-25-9	https://doi.org/10.9 734/bpi/rppsr/v2/1 1874D
14	Jabeen F, Dept. of Zoology	Advances in Scientific Approaches for sustainable development	Fishing Crafts and Gears of the River Manas in Assam, India	AkiNik Publications/20 21/National	978-93- 91538-67-5	https://doi.org/10.2 2271/ed.book.1361
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		Basin	(Hamilton, 1807) from Manas River, Assam			
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17	Brahma F, Dept. of Physics	Frontiers in Basic Physics and Application (Vol-II)	Dielectric and Impedance Spectroscopy of Ba- doped multifunctional double perovskite for device application	Knowledge Publication/202 1/ National	978-81- 948719-3-4	
18	Singh A K, Dept. of Physics	Advance in Science and Technology	Analysis of Rainfall events in the Northeast region of India	Mc Graw Hill Education Pvt. Ltd./2020/ National	978-93- 90491-11-7	https://doi.org/10. 1002/joc.3483
19	Singh A K, Dept. of Physics	Advance in Science and Technology	Study of structural Electronic and Interaction Mechanism of Functionalised carbon Naotubes with Oxygen	Mc Graw Hill Education Pvt. Ltd./2020/ National	978-93- 90491-11-7	https://www.resear chgate.net/publicat ion/348231315 St udy of Structural Electronic and Int eraction Mechanis m of Functionaliz ed Carbon Nanot ubes with Oxygen
20	Gogoi M, Dept. of Botany	Nemu Kheti (1st Edition - January, 2019 & 2nd Edition- December, 2023)		Purbayon Pbl/2019/2023/ National	978-93- 88593-68-7	www.purbayonpub lication.com
21	Dey B, Dept. of Physics	Convergence	System-Size dependence of the effective temperature of FAIR energy	Purbayon Pbl/2019/ National	978-93- 88593-33-5	www.purbayonpub lication.com
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23	Jabeen F, Dept. of Zoology	Research Trends on Fish & Fisheries in	Diversity of Hill Stream Fish Fauna in the Upper	Notion Press, Chennai/2029/ National	978-1- 64546-842- 4	

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25	Brahma J, Dept. of Botany	@PANORAMA	Ethno Botanical Study of Wild Edible Plants Used by the Bodos of Kokrajhar District, Assam	Vision Publications/20 18/ National	978-162- 776186-4	
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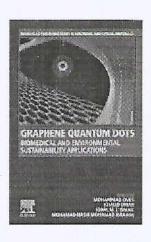
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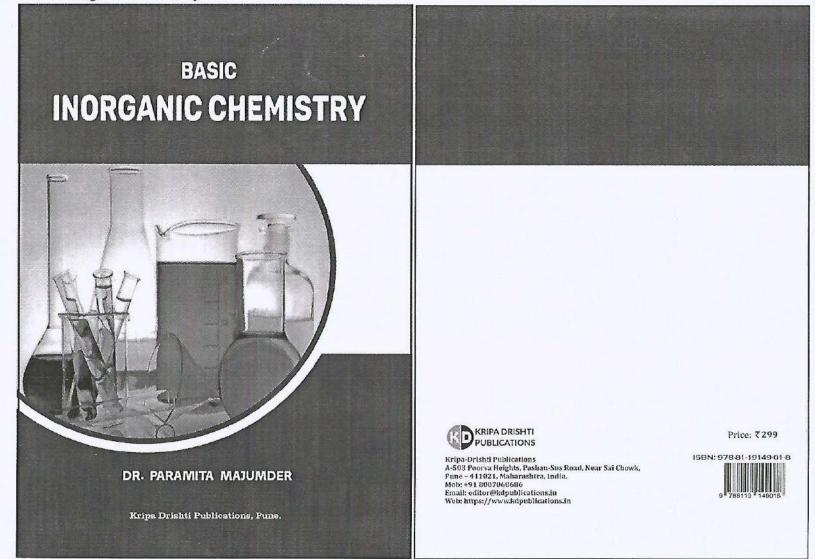
Pranjal Kalita^a, Sanjay Basumatary^b, Biswajit Nath^{b,c}, and Manasi Buzar Baruah^d

^aDepartment of Chemistry, Central Institute of Technology Kokrajhar (Deemed to be University, Ministry of Education, Govt. of India), Kokrajhar, Assam, India, ^bDepartment of Chemistry, Bodoland University, Kokrajhar, Assam, India, ^cDepartment of Chemistry, Science College, Kokrajhar, Assam, India, ^dDepartment of Physics, Central Institute of Technology Kokrajhar (Deemed to be University, Ministry of Education, Govt. of India), Kokrajhar, Assam, India

8.1 Introduction

With the advancement of human civilization and rapid industrialization, the worldwide energy demand, particularly fuel, is increasing. Out of the total energy sources, 81% is originated from petroleum resources [1]. Due to the rapid depletion of nonrenewable petroleum, the fossil resources probably may exhausted by 2050, resulting in an energy crisis [2]. The bulk chemicals, 95 out of 100 used in manufacturing numerous items for modern society, are extracted from petroleum resources. In the USA, ~13% of the total crude oil is used to produce nonfuel chemicals [3]. Natural gas is being used in the preparation of fertilizers [4]. The solvents, reagents and educts used in today's industries are from oils and hydrocarbons extracted from coal. The world population is dependent on nonrenewable fossil sources for energy and essential chemicals. Alongside, combustion and use of these petroleum products are causing pollution, degrading the environment and bringing climate change. Concerning the environment and the future crisis of feedstock for energy and chemicals, the scientific community is in search

3. Basic Inorganic Chemistry



Book Title:

Basic Inorganic Chemistry

Editor By:

Dr. Paramita Majumder

Authored By:

Dr. Shubhendu Dhara, Mrs. Nivedita, N. Hiremath, Mrs. Pratiksha Akki, Dr. Kusum S. Akki, Dr. Shiyakumar Belur, Akshata S. Menasinakai. Dr. Aryan A. Ankalikar, Dr. Pradeepkumar M. Ronad, Avijit Sarkar, Meena Rani, Dr. Basu Maan Daas, Nazima Sultana, Mehdi Al. Kausor,

Dr. Rituparna Biswas

Price: ₹299

1st Edition

ISBN: 978-81-19149-01-8



Published: May 2023

Publisher



Kripa-Drishti Publications

A. 503. Poorva Height, SNO 148-1A-1-1A. Sus Road, Pashan-41-1021, Pune, Moharashira India. Mob: -91-8007068686 PUBLICATIONS Email: editor@kdpublications.m Web: https://www.kdpublications.up

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Basis: Inorganic Chemistry 28BM: 978-81 19140-01 3 kaps desse kdjaskiranara m

7. Acids and Bases

Nazima Sultana

Assistant Professor. Department of Chemistry, University of Science & Technology, Meghalaya.

Mehdi Al. Kausor

Assistant Professor, Department of Chemistry, Science College, Rokmihar, Assam

Abstract:

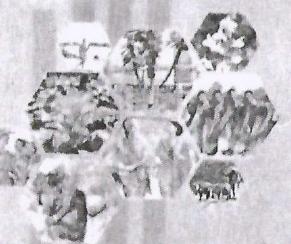
In Today's Chemistry World, the concept of acids and bases are resonance very promptly. The term 'anid' was derived from the Latin word 'acidus' that means some and the consequently the substances having sour taste were termed needs. Similarly, the substances having hitter taste and soopy in nature were termed as bases. But these are some traditional general concepts which is not equally applicable in case of all chemicals. Therefore, we need some theoretical basis for defining acids and bases. The acids and bases do not have equal chemical strength. There are some factors on which the strength of an acid or a base depends such as the palarity of bonds and electronegativity, size of atoms and bond dissociation energy, type of substituents and nature of solvent and Levelling effect. On this basis acids and bases can be classified as weak or strong and also, we can compare the acidic or basic strengths of two or more substances as well. The strength of an acid or a base is quantitively measured by pH scale and the pH value determines to what extent a substance is acidic or basic, in this chapter, the theories regarding the acid-base concepts and the factors officially actd-base strength are discussed in detail along with some representative examples.

Keywords:

Arrhenius Concept; BrÖnsted-Loury Concept; Lowis Concept; Pearson's Concept; HSAB Principle: Actd-Basa Swength, pH and Ionization Constant.

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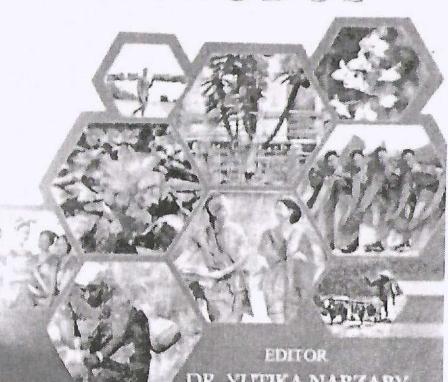
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TRADITIONAL KNOWLEDGE SYSTEM OF THE BODOS



DR. YUTIKA NARZARY

understanding of animal behavior, their ecological roles, and their symbolic importance. Through detailed research on bioresources unlimation, ethnobotany, ethnozoology, insightful interviews, and an exploration of oral traditions, this book aim to unveil the unique scienarial perspectives of the age old knowledge system on nature, spiratuality, healing practices, and social structures of Bodo Tribe. This book endeavors to explore and celebrate the traditional knowledge system of the Bodos, a resilient and vibrant community with a deep-morted history.

My deepest gratitude goes out to the research team which consists of my students and colleagues of department of Botany, Bodoland University. I sincerely appreciate Dr. Sanswrang Busumatary's assistance with the plant identification. I want to thank my sister, Mrs. Pratibha Brahma, and mother, Mrs. Sarala Narzary, for their university graphics appreciation to my loving busband Mr. Raman Misshary, who always encouraged me in all my endeavors. I convey my heartiest pratitude to my two children, Hamanshu and Bibekiyoti, for their constant and uncondational love. I am really appreciative of all the other family members for their love and support.

My deepest grantede to the authors and co-authors of the book Dr. Nie ha Beahma (Assistant Professor, Govt. College), Dr. Jahnon Brahma (Assistant Professor, Science College, Kokrajhar). Ms Chiena Beahma, Mr. Rafwr Gwra Besumatary, Ms Filina Beahma, Ms. Chienawce Basumatary and Rwdwmsei Beahma for their valuable input to this book.

Dr. Yutika Narzary
Assistant Professor
Department of Botany
Bodoland University

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2

CUSTOMARY APPLICATION OF HERBAL REMEDIES BY BODO TRIBE

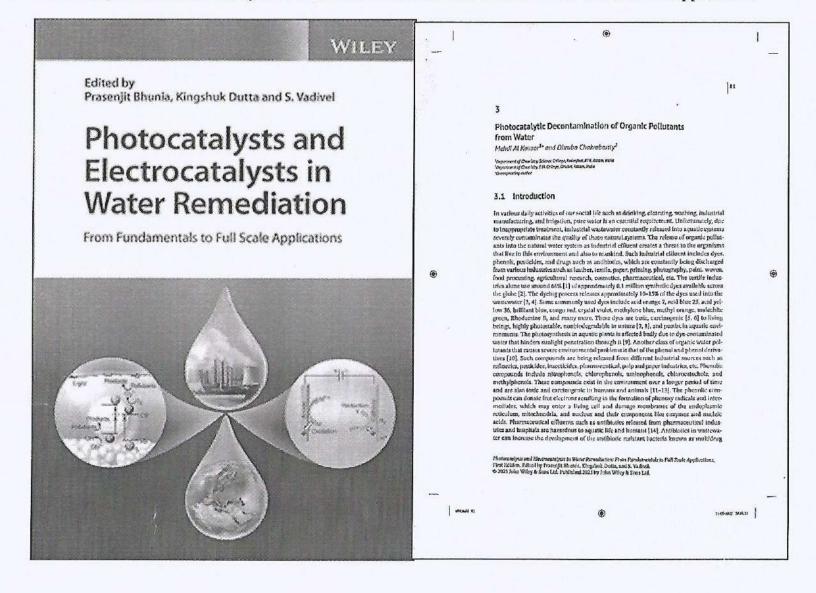
Yutika Nargary and Jahnovi Brahma

Introduction

There are an estimated 4, 22,000 known species of plants on Earth (Govacrts, 2001). Out of these, between 50,000 and 80,000 plant species are used for therapeutic reasons worldwide. This figure is likely to be underestimated because many plant species have yet to be researched for their therapeutic characteristics (Chera et al., 2016). More than 43% of the total flowering plants in lada are thought to be medicinally important (Pushpangadan, 1995) plants have long been used for medical purposes in India, as evidenced by ancient literature (Tulsidas: Rainchantmanas (1631 samvat). However, organized studies in this field began to 1956 (Rao, 1996) and such studies have recently gained prominence and appeal as a result of the loss of traditional knowledge and the dwindling plant population.

Tribal communities all around the world have graned extensive knowledge of using plants and plant products to treat a variety of diseases. (Uniyal et al., 2006) This knowledge is the result of

2. Photocatalysts and Electrocatalysts in Water Remediation: From Fundamentals to Full Scale Applications



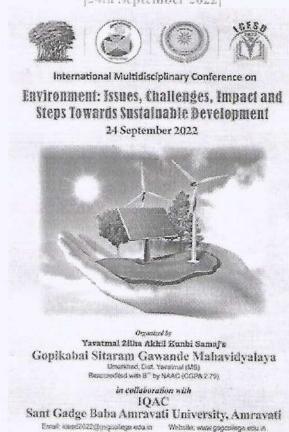
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Special Issue

International Multidisciplinary Conference on Environment: Issues, Challenges, Impact & Steps Towards Sustainable Development [24th September 2022]



Preliminary

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Part 3

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-----Marathi Section-----

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Marathi Pert 1

GREEN SYNTHESIS AND CHARACTERIZATION OF ZnO NANO PARTICLE

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ABSTRACT

Zinc Oxide (ZnO), as a material with attractive properties, has attracted great interest worldwide, particularly owing to the implementation of the synthesis of nano- sized particles. The synthesis of ZnO nanoparticles using plant's part is always an attractive and eco-friendly method. Researchers in nanotechnology highlight the possibility of green chemistry pathway to produce technologically important nanoparticles. The present study is focused on synthesis and characterization ZnO nanoparticles from the plant Leucas Cephalotes. Synthesis nano-particles were characterized through UV-Vis spectroscopy, X-ray fluorescence (XRF) & Fourier transform spectroscopy (FTIR) analysis.

Keywords: nanoparticle, green synthesis, environmentally friendly, characterisation.

1. Introduction

Nanotechnology is the most innovative field of 21st century. Researches in this field has gained momentum in the recent years by providing innovative solutions in different scientific disciplines. This technology is capable of providing miscellaneous novel applications that ranges from innovative fabric compounds, food processing and agricultural production to sophisticated medicinal techniques. It is considered as the synthesis, characterization and exploration of materials in the nanometer region(1-100nm). At this level, the properties and functions of living and anthropogenic systems are defined. In this technology the pertinent materials are those whose structure exhibit new and considerably enhanced physicochemical and biological properties as well as distinct phenomenon and functionalities as a result of nano scale size. This nano scale size generally confers larger surface areas to nanoparticles. Nanoparticles are known as controlled or manipulated particles at the atomic level(1-100). They show size-related properties significantly different from bulk materials [1]

The current existing nanoparticles are classified by their chemical composition namely

- (1) Metallic nanoparticles,
- (2) Nanoparticles of metals and non-metals,
- (3) Semiconductor nanoparticles,

(4) Carbonnanoparticles (fullerenes, nanotubes, graphenes {1,5},diamond),

(5) nanoparticles of organically modified layered silicates and aluminosilicates (nanoclays of different composition etc.) [2]. Among a variety of nanoparticles, ZnO nanoparticles have advantages because of the extraordinary physical and chemical properties. In materials science, zinc oxide is classified as a semi- conductor whose covalence is on the boundary between ionic and covalent semiconductors. It has high luminescent efficiency, a wide band gap(3.36eV), and a large excit ation binding energy (60meV) has triggered intense research on the production of nanoparticles using different synthesis methods and on their future applications. ZnO has high chemical stability, high electrochemical coupling coefficient, broad range of absorption high photostability so it is a multifunctional material.ZnO crystallizes in two main forms, hexagonal wurzite and cubic zincblende. The wurtzite structure is most stable at ambient conditions and thus most common.The zinc blende forms can be stabilized by growing ZnO on substrates with cubic lattice structure. ZnO are available as powders and dispersions. These nanoparticles exhibit antibacterial, anti-corossive, anti-fungal and UV filtering properties. Zinc is a Block D, Period 4 element while Oxygen ia a Block P. Period 2 element. Some of the synonyms of

Dr. Shafiqui I. Bhuyan (M.sc, Ph.D, SLET) presently working as Assistant Professor & Head of Department of Botany, Pandit Deendayal Upadhyaya Adarsha Mahavidyalaya, Behali, Assam. He published 40 research papers in national international journals, 6 books, 7 book chapters and 3 full papers in proceeding. He has more than 200 citations, Guided 02 PhD & 18 PG students. He also serves as Editor and Reviewer of many Scientific



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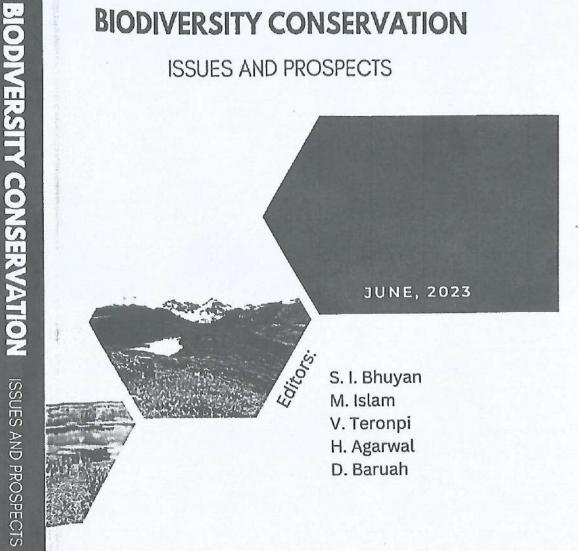


Dr. Debojit Baruah, Msc. Ph.D. is serving as the principal, Pandit Deendayal Upadhyaya Adarsha Mahavidylaya, Behali, Assam. He has more than 25 years of teaching & research experience. Dr. Baruah has over 75 research paper to his credit and has supervised many Doctoral students. He has also co-authored many books. He is reviewer of many national and international journals and a life member of many organizations.



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Study of Wild Aromatic Plants used as a Source of Food and Medicine by the Rabha Tribes of Goalpara District, Assam

D. Boro¹, H. Narzary², J. Brahma³

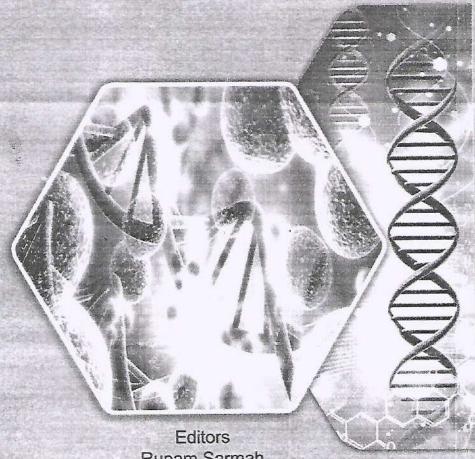
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Abstract

The wild edible medicinal plants are used by the various indigenous tribes for curing a variety of ailments. Some of those plants are having aromatic compounds or essential oils and may act as novel source of drugs. In this study, the wild edible aromatic plants consumed by Rabha tribes of Assam have been studied randomly by surveying various local markets in remote areas of Goalpara District of Assam. During study, information such as parts used, available season, local name, medicinal use etc. were noted and specimens were collected for scientific identification. The study reveals 39 species of aromatic plants from 14 families with different parts being used as food well as medicine. Of the total collected specimens, 20 species were used as spices which include roots, bulbs, tubers, bulbils, leafy vegetables, oil seed, spices and fruits. The study also revealed that the members of the family Brassicaceae, Zingiberaceae, Asteraceae, Verbenaceae and Apiaceae are largely consumed as aromatic food sources. Based on the part uses, the highest uses were found from leaves (71%) followed by young shoots (21%), whole plants (19%), inflorescences (17%), rhizomes (15%) and fruits (5%). Thus, the study highlighted the ethnomedicinal aromatic plants and their uses by the Rabha communities for the treatment of a number of diseases and ailments along with food sources.

Keywords: wild edible plants, aromatic compounds, ethnomedicine

RECENT TRENDS IN BIOLOGICAL SCIENCES



Editors
Rupam Sarmah
Dr. Panna Deb
Dr. Silu Basumatary



RESEARCH AND INNOVATION CELL Anundoram Borooah Academy Degree College Pathsala, Bajali, Assam RECENT TRENDS IN BIOLOGICAL SCIENCES: A collection of research articles by several scholars edited by Rupam Sarmah, Dr. Panna Deb & Dr. Silu Basumatary and published by Dr. Ranjit Deka, Chairman, Research and Innovation Cell, Anundoram Borooah Academy Degree College, Pathsala.

Published by
Dr. Ranjit Deka
Chairman
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ISBN

978-93-90706-39-6

1st Edition February, 2024 Setting & Layout Akhil Baruah

Price

Rs. 1100/-

Printed at

Destury Gowahati



BODOLAND UNIVERSITY, KOKRAJHAR

Debargaon, P.O. Rangalikhata Kokraihar - 783370, BTAD, As Parte: January 27, 2024

Message

It gives me immense pleasure to know that the Botany Department of Anundoram Borocah Academy Degree College is publishing an edited book, "Recent Trends in Biological Science" which I wish will be a landmark study for featuring the resources related to Botany in North East India. I hope the book will be of much use, once published as it may increase the consciousness and knowledge of all those concerned. As sustainable development is the buzz-word of contemporary time, there is immense scope for the preservation and cultivation of the biological resources.

Wish you best of luck. .

(Prof. Prädib K. Pafra Vice-Chancellor i/c Vice-Chancellor Bedeland University Kohrajhar

- Shivanna, V., & Dasegowda, V. (2023). Comparison of Disk Diffusion and Agar Dilution Method for the Detection of Mupirocin Resistance in Staphylococcal Isolates from Skin and Soft Tissue Infections. *Journal of Laboratory Physicians*.
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TAXONOMYAND ETHNOBOTANY OF SOME SACRED PLANTS FOUND IN KOKRAJHAR DISTRICT, BTR, ASSAM

Harajit Adhikaryi, Rupam Sarmah*

Department of Botany, Science College, Kokrajhar, BTR, Assam Department of Botany, Anundoram Borooah Academy Degree College, Pathsala, Bajali, Assam

ARTICLE INFO

Keywords:

Sacred plant, Traditional worshiping, Taxonomic study, Ethno-medicine.

Abstract:

The present research paper describes the study on taxonomy and ethnobotany of some sacred plants found in Kokrajhar district, BTR, Assam. This study was carried out from April to July 2022. Several intensive surveys were carried out to find the definite role and importance of sacred plant species in Kokrajhar district. An attempt has been made to identify the sacred and medicinally important plants frequently used by rural

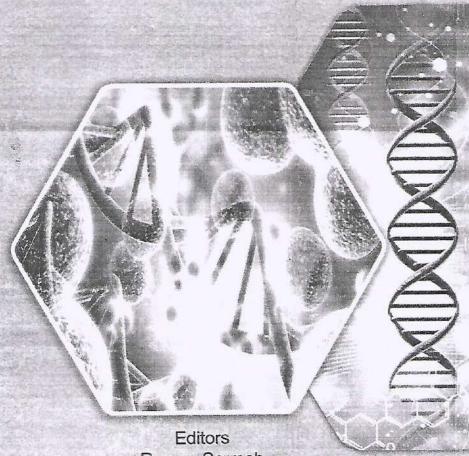
communities of Debargaon, Dimalgaon and Boro Bhatarmari area in Kokrajhar. A total of ten sacred and medicinally important plants of nine genera and nine families were enumerated.

INTRODUCTION

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Sacred plants have special religious importance with in a particular culture. Sacred plant feature in various cultures throughout the world. Singular plants which a commonly deems to hold religious, significance are known as sacred plants. The sacred plants have played

RECENT TRENDS IN BIOLOGICAL SCIENCES



Rupam Sarmah
Dr. Panna Deb
Dr. Silu Basumatary



RESEARCH AND INNOVATION CELL Anundoram Borooah Academy Degree College Pathsala, Bajali, Assam RECENT TRENDS IN BIOLOGICAL SCIENCES: A collection of research articles by several scholars edited by Rupam Sarmah, Dr. Panna Deb & Dr. Silu Basumatary and published by Dr. Ranjit Deka, Chairman, Research and Innovation Cell, Anundoram Borooah Academy Degree College, Pathsala.

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Vice-Chancellor I/c Vice-Chancellor Bodeland University Kokrajhar

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COMPARATIVE ANALYSIS OF FOOD VALUE OF WILD EDIBLE INSECTS IN KOKRAJHAR DISTRICT, BTR, ASSAM

Sumi Ray*, Sukanya Chakraborty

Department of Zoology, Science College, Kokrajhar, BTR, Assam

ARTICLE INFO

Keywords:

Edible insects, Morphology, Protein estimation

Abstract:

The present research paper describes the comparative analysis of wild edible insects found in Kokrajhar district BTR, Assam. 6 different species of order Orthoptera, Hymenoptera, Isopteran, Lepidoptera were collected. The edible insects can serve as the source of protein requirement in the body. The protein is essential for the sustenance of life. Their morphological characters were studied andthe protein

estimation of different types of edible insects was done by Lowry's method in Science College Laboratory, Kokrajhar.

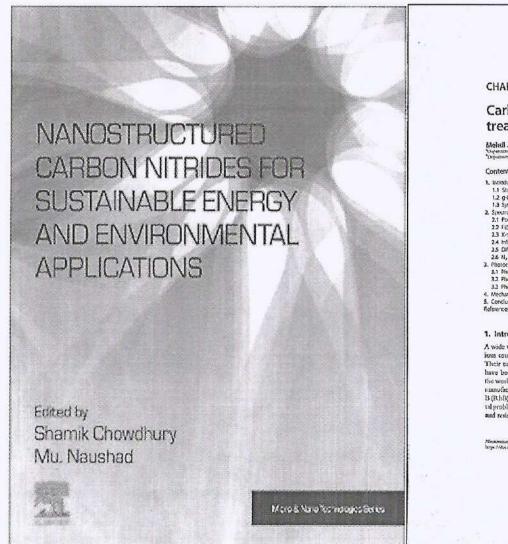
INTRODUCTION

The consumption of edible insects had started nearly 7000 years ago (Ramos-Elorduy, 2009). They found more than 2300 species of 18 orders as edible insects, of which 5 orders are with at least 100 records. Insects are nutrient-efficient compared to other meat source. Insects such as crickets are the complete protein and contain a useful

amount of protein, comparable with that of

*Corresponding author

1. Nanostructured Carbon Nitrides for Sustainable Energy and Environmental Applications



CHAPTER 7

Carbon nitride photocatalysts for water treatment and purification

Mehdl Al Kausor^a and Dhruba Chakrabortty^b Department of Chemies, Science Delige, Neksjihas Amini, India "Department of Chemiesy, B.H. College, Olerlet, Assosi, hells

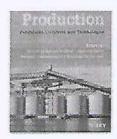
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1. Introduction

A wide variety of organic pollutants are introduced into the freshwater system from various sources, such as industrial effluents, agricultural runoff, and chemical spills [1,2]. Their toxicity, stability to natural decomposition, and persistence in the environment have been the cause of much concern to societies and regulatory authorities assume the world [3]. In particular, dye-containing offluents from textile industries and chemical manufacturing containing, methylene blue (MB), methyl orange (MO), rhodamine B (RhB), congo red (CR), acid orange 7 (AO7), etc., are becoming serious environmental problem because of their soxicity, unacceptable color, high chemical oxygen demand, and resistance to chemical, photochemical, and biological degradation [4]. Most of the

Monomoral Cakes Finds for Sunded in the pool inches and Application https://doi.org/10.10/ac/19/144-12-02/064-2-06440-4

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Biodiesel Production: Feedstocks, Catalysts, and Technologies

Editor(s): Dr. Samuel Lalthazuala Rokhum, Prof. Gopinath Halder, Prof. Suttichai

Assabumrungrat, Assoc. Prof. Kanokwan Ngaosuwan

First published: 6 May 2022

Print ISBN: 9781119771333 | Online ISBN: 9781119771364 | DOI: 10.1002/9781119771364

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About this book

An incisive discussion of biofuel production from an economically informed technical perspective that addresses sustainability and commercialization together

In *Biodiesel Production: Feedstocks, Catalysts and Technologies*, renowned chemists Drs Rokhum, Halder, Ngaosuwan and Assabumrungrat present an up-to-date account of the most recent developments, challenges, and trends in biodiesel production. The book addresses select feedstocks, including edible and non-edible oils, waste cooking oil, microalgae, and animal fats, and highlights their advantages and disadvantages from a variety of perspectives. It also discusses several catalysts used in each of their methods of preparation, as well as their synthesis, reactivity, recycling techniques, and stability.

The contributions explore recently developed technologies for sustainable production of biodiesel and provides robust treatments of their sustainability, commercialization, and their prospects for future biodiesel production.

- A thorough introduction to the various catalysts used in the preparation of biodiesel and their characteristics
- Comprehensive explorations of biofuel production from technical and economic perspectives, with complete treatments of their sustainability and commercialization
- Practical discussions of the development of new strategies for sustainable and economically viable biodiesel production
- · In-depth examinations of biodiesel feedstocks, catalysts, and technologies

Perfect for academic researchers and industrial scientists working in fields that involve biofuels, bioenergy, catalysis, and materials science, *Biodiesel Production: Feedstocks, Catalysts and Technologies* will also earn a place in the libraries of bioenergy regulators.

Chapter 5

Homogeneous Catalysts Used in Biodiesel Production

Bidangshri Basumatary, Biswajit Nath, Sanjay Basumatary

Book Editor(s):Dr. Samuel Lalthazuala Rokhum, Prof. Gopinath Halder, Prof. Suttichai Assabumrungrat, Assoc. Prof. Kanokwan Ngaosuwan

First published: 06 May 2022

https://doi.org/10.1002/9781119771364.ch5

Citations: 1

Summary

Biodiesel is a promising substitute for fossil fuel and is mostly prepared by transesterification of vegetable oil with methanol in the presence of a catalyst. Catalyst plays a vital role in the biodiesel production process. Various catalysts like homogeneous, heterogeneous, and enzyme catalysts are used in the preparation of biodiesel. In this chapter, biodiesel production using homogeneous acid and the base-catalyzed reaction is reviewed. Homogeneous base catalysts result in a good yield of biodiesel with a shorter reaction time at ambient temperature. Transesterification reaction of vegetable oil with high free fatty acid content is preferable by the acid catalyst. Its major drawback is the slow reaction rate and requirement of high temperature. Alternatively, esterification of oil with high free fatty acid followed by transesterification is recommended for good quality biodiesel production. However, oil with low free fatty acid can be transesterified directly by the homogeneous base catalyst. The biodiesel produced by homogeneous acid and base catalysts shows comparable fuel properties to that of diesel and meets the limits prescribed in the international standards.

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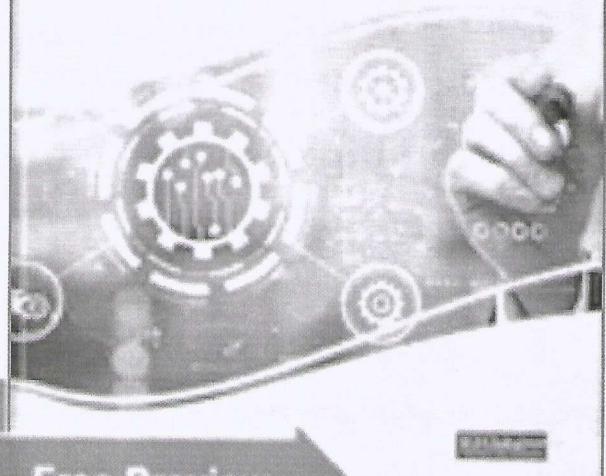
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Handbook of Research on

Advances and Applications of Fuzzy Sets and Logic



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Chapter 20 Probability and Fuzziness: A Case Study

Mamoni Dhar

Science College, Kokrajhar, India

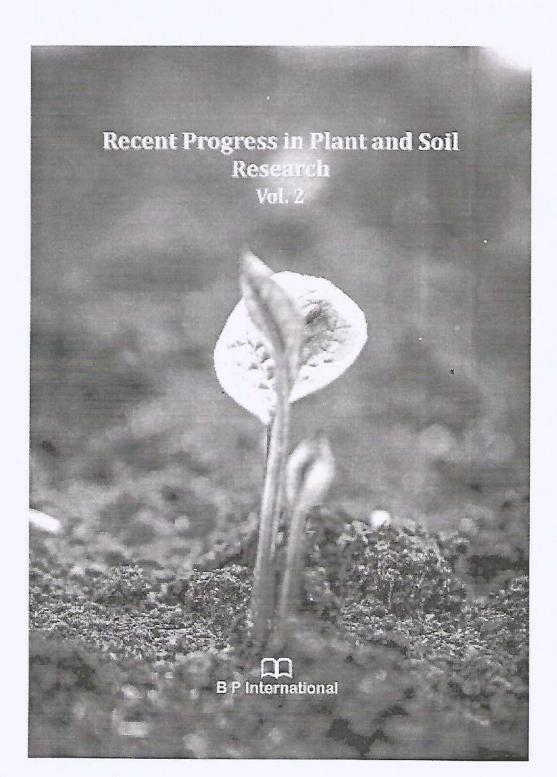
ABSTRACT

From the beginning of the theory of fuzzy sets, it has been a matter of concern for many researchers in the field to find an appropriate connection between probability and possibility. One such effort can be found in the randomness-fuzziness consistency principle where a fuzzy number of the type $[\alpha, \beta, \gamma]$ is expressed as a combination of two probability laws. The main intention of this work is to show that a fuzzy number of the type $[\alpha, \beta, \beta]$ or $[\beta, \beta, \gamma]$ can be expressed by one probability law with the help of superimposition of uniformly fuzzy intervals.

1. INTRODUCTION

The notion of fuzzy sets is an extension of the most fundamental property of sets. The concept of fuzzy sets were introduced by (Zadeh, 1965, pp.338-353) to represent or manipulate data and information which possesses uncertainties of non statistical nature. It was specifically designed for representing mathematically the uncertainties and vagueness which are intrinsic to many problems. It provides a means for representing uncertainties which cannot be dealt with probability. Fuzziness is a type of imprecision that arrived from the concept of grouping of elements into classes having no sharp boundaries. It has made inroads into all branches of studies. It can be found in many application areas in both theoretical and practical field of studies to arts and humanities, from computer science to health sciences, from physical sciences to life sciences and so on. In the beginning fuzziness and randomness were considered as two independent concepts. Since the inception of the theory of fuzzy sets, the method of finding a connection between probability and possibility has received attention as can be seen in the works of (Zadeh,1978; Klir,1993; Dubois & Prade,1993). These are known as Probability-Possibility Consistency Principle in the literature of fuzzy set theory. But all these attempts remained unclear and incomplete as in these consistency principles possibility space is defined in the same probability space. Many years

DOI: 10.4018/978-1-7998-7979-4.ch020



Editor(s)

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 Professor of Plant Biology and Pathology,
 Department of Agricultural and Environmental Sciences, Milan State University, Italy.

ISBN 978-93-91473-25-9 (Print) ISBN 978-93-91473-33-4 (eBook)

DOI: 10.9734/bpi/rppsr/v2

This book covers key areas of plant and soil research. The contributions by the authors include Scheffé multiple comparison method, joint regression analysis, test for parallelism, test of coincidence, nitrogen fertilization, nodulation, yield and yield components, irrigation, genotype-environment interaction, models of dynamic, prediction, design, interpreting of the nature of ecological reaction, signs, levels of correlations, the shifts of dominance in different environments, pure cultures, aqueous extracts, microbial load, microorganisms, eco-genetic portrait, genetic-physiological systems, selection, mathematical model of "genotype - environment interaction", management by environmental factors, composting, crop rotation, mobility, environmental consequences, cassava brown streak disease, Cassava brown streak virus, Disease symptoms, fertilizer application, agricultural practices, jojoba seedlings, agricultural practices, pigment, photosynthesis, metabolite and productivity. This book contains various materials suitable for students, researchers and academicians in the field of plant and soil research.

Media Promotion:

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- Chapter 11

Chapter 12

Determination of Chlorophyll Concentration in Seven *Citrus* species of Kokrajhar District, BTAD, Assam, India

Mohesh Gogoi1* and Miniswrang Basumatary2

DOI: 10.9734/bpi/rppsr/v2/11874D

ABSTRACT

Citrus species grown to different localities of Kokrajhar district were identified in 2016 and thereafter another investigation was undertaken for determination of chlorophyll content in seven selected Citrus species during 2017-18. The primary aim of the study was to find out the chlorophyll concentration and its relationship with growth and development of the said plant species. Therefore, estimation and quantification of ChI a, ChI b and total chlorophyll (ChI a + ChI b) content in each species were carried out in Biotech Hub laboratory. An established fact is that green plants synthesize a wide range of primary and secondary metabolites in different quantity. Chlorophylls belong to the primary metabolites that give the color of the leaves and fruits, especially in the unripe stage. The spectral properties of chlorophylls are essential in harvesting light energy and in the transduction of absorbed light energy for photosynthesis. Like other plants, the variation of leaf colour as well as photosynthetic activity in Citrus species is dependent on chlorophyll concentration. Chlorophyll content determines the photosynthetic capacity of the plant per unit area of leaf, stress and nutritional deficiencies. The study has revealed district variation in terms of chlorophyll concentration among the studied species.

Keywords: Citrus leaf; pigment; photosynthesis; metabolite and productivity.

1. INTRODUCTION

Chlorophylls are the most important green pigments in plants for the photosynthetic process [1]. Higher plants contain Chl a, Chl b, accessory pigments and several additional forms of chlorophyll. The Chl a and Chl b are the best known among five main types of chlorophyll and are most commonly found in all autotrophic organisms except pigment containing bacteria. Chl a has an empirical formula of C₅₅H₇₂O₅N₄Mg and the empirical formula of Chl b is C₅₅H₇₀O₆N₄Mg. Needless to mention here that Lehninger [2] has been developed the structure of Chl a and Chl b with illustration. However, Chl a usually appears blue-green and Chl b is yellow-green [3]. Both Chl a and Chl b pigments are associated with light harvesting processes [4], which are solely responsible for photosynthesis in higher plants.

Chlorophyll concentration in leaves is an indicator of plant health [5]. The chlorophyll a:b ratio also indicates the developmental state of photosynthetic apparatus in plants. It has a determinative role in growth and development of higher plants. The chlorophyll content also indicates the photosynthetic capacity per unit area of the leaf [6] that determines the rate of photosynthesis in the plant [7]. Determination of chlorophyll content as an indirect method of estimating the productivity also provides a good understanding of the photosynthetic regime of plants [8]. The chlorophyll content increases with leaf development and then decreases with the senescence phenomenon [9]. The rate of photosynthesis is also higher in flowering and fruiting branches of sub-tropical fruit species in comparison to non-fruiting branches [10]. However, the pigment is a factor that might also be

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Advances in Scientific Approach for Sustainable Development

Editors Dr. Manoj Barthakúr Dr. Mridul Kumar Borthakur

> AKINIK PUBLICATIONS New Delhi

Published By: AkiNik Publications

AkiNik Publications 169, C-11, Sector - 3, Rohini, Delhi-110085, India Toll Free (India) — 18001234070

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Editors: Dr. Manoj Barthakur and Dr. Mridul Kr. Borthakur

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Edition: 1st

Publication Year: 2021

Pages: 254

ISBN: 978-93-91538-67-5

Book DOI: https://doi.org/10.22271/ed.book.1361

Price: ₹1185/-

Preface

B. Borooah College is one of the premier educational institutions of Assam, which was established in the year 1943 and the institution is continuously striving for excellence in academics. The B. Borooah College has been accredited 'A' grade by NAAC. The present book entitled "Advances in scientific approach for sustainable development" has been published under the initiative of the Publication Cell, B. Borooah College, Guwahati, Assam. The book was initially conceived by the Publication Cell, B. Borooah College, as a platform for researchers working in different disciplines in various aspects of sustainable development to publish their findings. The present volume comprises of 24 research papers from different science disciplines such as Botany, Zoology, Chemistry, Geography and Mathematics. Various researchers working in different educational and research institutes of India, mainly from the state of Assam have contributed in this volume. This book will indeed give concrete ideas regarding the recent research trends in various applied fields and it will definitely help future researches as an excellent reference material. This research volume is jointly edited by Dr. Manoj Barthakur, Associate Professor and Head of the Department of Botany and Dr. Mridul Kumar Borthakur, Assistant Professor, Department of Zoology of B. Borooah College. I offer my sincere gratitude to all the members of the Editorial Board and the reviewers for their support. I would like to offer my thanks to Dr. Mridul Kumar Borthakur, Coordinator, Publication Cell, B. Borooah College for his initiative to publish the book. I would like to express my appreciation for the generous support provided by AkiNik Publications, New Delhi for publishing the book.

> Dr. Satyendra Nath Barman Chairperson, Publication Cell and Principal, B. Borooah College

Chapter - 17

Fishing Crafts and Gears of the River Manas in Assam, India

Fariha Jabeen and Amar Deep Soren

Abstract

Fishing is a major occupation and the main source of income for the residents along the Manas river in Assam, India. This study describes the various fishing crafts and gears operated by fishermen to capture fishes in the Manas river. Five different locations were selected for the study along the bank of the Manas river. Field surveys, interactions with the fishermen and repeated physical observations and visits were made to carry out this study. The study revealed that only a single craft (plank boat) and nine different kinds of gears were observed to be operational. They were Khewalijaal, Ber jaal, Langi jaal, Phansijaal, Khot-khotijaal, Dhekijaal, Nalbarshi, Sip barshi and Chepa. Traditional fishing through hand picking was also a common practice observed among the fishermen and local people. It was also evident from the study that Ber jaal, Langi jaal and Phansijaal were the most employed gears in commercial fishing. The varied fishing techniques depended upon a variety of behavioural pattern and scasonal availability of fish species. The residents completely depend on fishing as a source of income and traditionally have developed these various types of gears and crafts and despite various developments, these are still in wide use today.

Keywords: fishery, fishing crafts, fishing gears, Manas

Introduction

Every water body, whether lentic or lotic, has its inimitable pattern of gears and crafts operating in their system. Based on the topology, ecology and habitat of the resources availability, there is a well-defined pattern and distribution of fishing techniques for the riparian sectors. Fishing gear are tools used for capturing fish from water body^[1]. They are intrinsic part of the fishing process, without which fishing would be ineffective ^[2]. The traditional fishing methods in the different water bodies of Northeast India have been described by various authors ^[3-7]. Studies on the different types of fishing gears

and crafts has also been reported from other parts of India^[8-10] and other countries as well^[11,12]. The number of fishing cycle per day depends upon the daily pattern of occurrence (density) of fishes, types of fishing methods used, geographical condition of fishing grounds and fishermen. Fishermen all over the world use some kind of traditional knowledge to attract and aggregate fishes to facilitate its easy harvest. The artisanal fishermen of the state use wide fish catching techniques and methods.

The Manas river, a snow-fed river of Assam, and has a total length of 376 km (flows about 272 km in Bhutan and then 104 km through Assam) prior to merging with the mighty Brahmaputra. In Assam, the river bifurcates at Mothanguri to give rise a tributary named Beki which passes through the Manas National Park. Apart from Beki, the river has a number of other tributaries namely Saralbangha, Hel, Tanali, Gourang, Sidli (Bhor) Aai, Puthimari, Kaladia, Tihunala, Morapagaldia, Nona, Baralia, Pub-Bornodi and Dhansiri, all along its length in the Manas National Park. It is reported that the upper stretches of Manas river and its tributaries are predominantly inhabited by cold-water fish species^[13].

Prior to the present research, recent studies on the population and distribution of fish fauna of the Manas river had been carried out by several authors^[13,14-17]. However, there are no reports on the usage and operation of crafts and gears from the river. Therefore, the present study has been made to describe the various fishing crafts and gears used throughout the length of the river.

Materials and methods

The study was conducted in the Manas river for a period of two years from December 2018 to November 2020. Five sites were selected along the entire length of the Manas river from Mothanguri to its discharge to the Brahmaputra at Jogighopa in Assam, Northeast India (Fig. 1). The selection of the study sites was made on the basis of accessibility and similarity in physical habitat. The study sites were Mothanguri (B₁ – 26°46′90.2″N, 90°57′41.9″E; 87.5 m MSL); Narayanguri (B₂ – 26°39′63.0″N, 90°59′43.2″E; 56.7 m MSL); Bekipar (B₃ – 26°29′71.1″N, 90°55′16.7″E; 40.8 m MSL); Kolgasia (B₄ – 26°23′31.0″N, 90°45′17.3″E; 29.9 m MSL) and Jogighopa (B₅ – 26°11′57.4″N, 90°34′18.0″E; 13.4 m MSL).

Glimpses of Biological Research in

Upper Brahmaputra Basin



Editors Akash Kachari S P Biswas Jyotirmoy Sonowal Akash Kachari, S. P. Biswas, Jyotirmoy Sonowal Glimpses of Biological Research in Upper Brahmaputra Basin

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ISBN: 978 81 946922 01

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First Published in 2021 by EBH Publishers (India) an imprint of Eastern Book House 136, M.L. Nehru Road, Panbazar Guwahati-781 001, Assam (India)

Phone: +91 361 2513876, 2519231, 92070 45352

Fax: +91 361 2519231

Email: easternbookhouse@gmail.com.

www.easternbookhouse.in

Printed in India

Preface

Biological research has achieved a unique chair in the entire research arena. It is now recognized as an indispensable field of research with immense awaited possibilities in multiple areas of human interest. The legacy of exciting and groundbreaking discoveries in biology is still nascent. Dramatic improvement in medicine, agriculture, and forestry is perceived to be endured through the new biological findings. It will be praiseworthy to probe the cure of many threatening diseases like cancer amongst the vast biological resources. At the same time, a major chunk of the population is dependent on bioresources for their livelihood. With burgeoning population and subsequent pressure on limited bioresources, adoption of technology and up-gradation of traditional knowledge systems will help increase agricultural production including fish production. In this context, biologically enriched regions need to play a crucial role in such strategic endeavors. Being a hotbed of biodiversity, northeast India has immense capability to become a key contributor for biological data which may fill up some of the knowledge gap prevailing in biological fields. It is indeed the need of the hour to capitalize on these biological resources of the northeast region through scientific exploration. This book is intended to draw the participation of young minds in the process of biological investigation and to cast their ideas regarding various avenues of this majestic field of knowledge. We deeply believe the notion of exposing the scientific minds to such a platform to encourage their endeavor of knowledge hunt. The mantra behind this book is to reflect the various facet of biological research effort and to capture a snapshot of the ongoing voyage of inquiry, especially in northeast India. This book envisions the idea of accepting a wide range of ideas and works which will impart a holistic outlook to this piece of chore. We also strongly believe that researchers will get a chance to improve their scientific writing skills which is indeed an unavoidable aspect of research.

> Dr. Akash Kachari Dr. Shyama Prasad Biswas Mr. Jyotirmoy Sonowal

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Study on the Gonado-Somatic Index (GSI) of the Indian Hill Trout, *Barilius bendelisis* (Hamilton, 1807) from Manas River, Assam

Fariha Jabeen

Abstract

Maturity index or Gonado Somatic Index (GSI) of the torrential ornamental fish species, *Barilius bendelisis* from river Manas of Assam was studied. The minimum GSI values in male and female fishes were observed in June (0.81 \pm 0.35) and November (2.04 \pm 0.73) respectively while maximum GSI value was recorded in April for both male (1.51 \pm 0.59) and female (10.23 \pm 1.55) of *B. bendelisis*. The GSI of both males and females of *B. bendelisis* was observed to reach two peaks - April and September. Based on GSI values, the fish species *B. bendelisis* has two active spawning seasons in a year.

Keywords: Barilius bendelisis, gonadosomatic index, Manas River, Assam

Introduction

Barilius bendelisis (Hamilton, 1807) locally known as 'Korang' is a hill stream ornamental fish having excellent food value. It is commonly known as Indian hill trout (Family: Cyprinidae) that dwells in the streams and rivers along the base of hills with a pebbly and rocky bottom. The Gonado-Somatic Index (GSI) also referred to as the maturity index, expresses the relative change in gonad weight to the percentage of body weight (Ghanbahadur and Ghanbahadur, 2012). By measuring the general bodyweight ratios, GSI measures the reproductive strain of

Research Trends in Parasitology

Chief Editor Dr. S. Arivoli

Volume - 1

AkiNik Publications New Delhi

Published By: AkiNik Publications

AkiNik Publications 169, C-11, Sector - 3, Rohini, Delhi-110085, India Toll Free (India) – 18001234070 Phone No. – 9711224068, 9911215212 Email – akinikbooks@gmail.com

Chief Editor: Dr. S. Arivoli

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Publication Year: 2021

Pages: 127

ISBN: 978-93-91538-29-3

Book DOI: https://doi.org/10.22271/ed.book.933

Price: ₹ 759/-

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Chapter - 3

Current Status and Drawbacks of Parasitology Research with Reference to Ethnopharmacology

Amar Deep Soren, Deepali Soren and Fariha Jabeen

Abstract

Intestinal helminth infections are a common cause in developing countries. With limited drugs and increasing resistance, anthelmintic drug research needs to be accelerated. Several workers have worked on different aspects of anthelmintic efficacy using different parasitic models. Literature also revealed that many authors have used non-parasitic models to claim anthelmintic efficacy. Most of the efficacy studies have been only confirmed by in vitro studies. Studies on in vivo anthelmintic efficacy are scanty. Also several authors have contributed by authenticating the claims of efficacy using both in vitro and in vivo studies on different parasite models. However, these studies lack toxicity assessment of the traditionally used medicinal plant. Studies that authenticate the efficacy using both in vitro and in vivo models using suitable parasite models along with toxicity assessments of the medicinal plant are necessary to access the pros and cons of its use as a medicine. These tests are the backbone of any pre-clinical testings to be carried forward for clinical tests and ultimately for human consumption. This paper is an effort to describe the studies conducted in recent years in anthelmintic research and the drawbacks of previous researches.

Keywords: anthelmintic, medicinal plants, toxicity, traditional medicine

Introduction

Helminthiasis is the most common type of infections in tropical and subtropical regions and affects the poor and deprived communities [1]. The highest numbers of infections occur in sub-Saharan Africa, the Americas, China and East Asia [2]. According to the WHO, approximately 1.5 billion people which comprises of 24% of the world's population are infected with soil-transmitted helminths [3]. The global target of WHO is to eliminate morbidity due to soil-transmitted helminthiases in children by 2020, which is envisaged to be obtained by regularly treating at least 75% of the children in

Frontiers in Basic Physics and Applications

(Volume-II)

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not discussed in details about them. Thus, we arrive at the amplitude formula for GWs derived some 100 years back. This prediction of GR was very intuitive and purely driven by mathematical calculations. The mathematical masterpiece achieved by Einstein and many others are very remarkable in a sense they changed the way physicists approach problems of GR and the universe as a whole. It brought a shift from the Newtonian era to the modern era of science driven by zeal to know our universe better.

4. Conclusions

In this work, we have discussed the basics of Gravitational wave physics along with a historical account of the discovery of these waves in 2015. We have also discussed some basic basic mathematical theory of linearized gravity which serves as a beginning point in understanding GW. These waves are very hard to detect and it has taken efforts of many years for us to be able to detect them. New technologies are constantly being developed and tested in the lab to get perfect resolution and discover more events in the near future to develop our understanding of the universe. The upcoming LISA detector to be operated in space, will definitely be a game-changer in the field and create buzz among scientist community.

5. Acknowledgement

The author is thankful to his guide, Dr. Umananda Dev Goswami for his enlightening discussions during the work. R.K. also acknowledges the fruitful discussions with Dhruba Jyoti Gogoi and Mrinmoy Gohain for important discussions regarding various topics of cosmology and astronomy.

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Frontiers in Basic Physics and Applications (Volume-II) | | 45 ISBN: 978-81-948719-3-4

Dielectric and Impedance spectroscopy of Ba-based multifunction double perovskite for device application

S. Bhattacharjee¹, F. Brahma¹, Bhagyashree Mohanty², R.K. Parida², B.N. Parida¹

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Abstract

The solid-state route technique has been utilized to prepare the multifunctional double perovskite Ba₂FeVO₆. The structure investigation carried out through the Rietveld refinement technique of the experimental XRD profile reveals the formation of monoclinic crystal structure (space group P21/n). The frequency-temperature dependent variation of dielectric parameters (e, and tanδ) illustrate the material has a high dielectric constant and relatively low tangent loss, Impedance spectrum was analyzed through the Nyquist plots which suggest a non-Debye type relaxation phenomenon in the investigated material.

Keywords: Perovskite, XRD, Dielectric, Impedance.

1. Introduction

The enhancing demand of designing smart and advanced materials has created a great quest among the researchers for searching new materials either available naturally or synthesis artificially possess various fascinating features like ferroelectric, magnetic, magnetoelectric, multiferroic, piezoelectric, superconducting and many more [1–3]. Among these, the co-existence of multiferroic features in a single material is found very fascinating from a technological and

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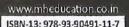
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Edited by

Bharat Kakati Biswa Ranjan Phukan Tapan Rajbongshi Dhiraj Bora

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Analysis of Rainfall Events in Northeast Region of India

Ashok Singh^{1*}, Samir Thakur² and Nirab C. Adhikary³

Abstract

An analysis of sixty-three years daily recorded data from 1950 to 2013 to discern the characteristics of rainfall and trends over northeast region of India by applying different statistical methods. The analysis of the frequency of numbers of light rainfall, heavy rainfall, very heavy rainfall, extremely heavy rainfall and consecutive rainfall days has been carried out to observe the impact of climate change. The linear regression analysis was used to check the correlation between rainfall and elevation the stations under study. A high-low-high gradient in spatial distribution of annual and seasonal rainfall was observed from west to east direction. A similar spatial trend was also observed in south-north direction along latitudes. Mann-Kendall (M-K) test and Sen's slope estimator is used to identify the statistically significant trends and magnitude of trends in the time series. Wavelet analysis shown prominent annual periods ranging from 4 to 6 years at all the stations, after 1970s resulting in describing more changes in the rainfall pattern after 1970s.

Keywords: Mann-Kendall test, Sen's slope estimator, Linear regression, and Wavelet analysis

1. INTRODUCTION

The adverse influence associated with the alteration of the dynamic behavior of the climate can be found in agriculture and eco-hydrological patterns of several areas throughout the whole world. One of the main features of global climate change is understood through the study of rainfall over a particular period of time. The analysis of rainfall data provides the chance to learn the progression of the climate change with regards to time of a certain region. Precise forecast of rainfall, which is the primary aspects of hydrologic period, is essential because it's directly involved in evaluation of stream flow depletion in river basin, ground-water basin, etc. Aside from these, a precise prediction of rainfall help farmer to improve agriculture efficiency. The optimum amount of rainfall is the crucial for crop production especially region like northeast region of India. There are several studies [1-5] capture the variability and trend of rainfall over northeast region. A few of them stated that annual rainfall trend over northeast region is non-significant, while many others revealed important trend in monthly and seasonal rainfall scale as well as in regional scale. Pawel Prokop et al, [6] reported that the forming of intense rainfall events 30-60 days over Meghalaya Hills throughout extreme rainy season years is because of Madden–Julian oscillation.

The northeast region of India located between 20° to 29°30' North latitude and 89°46' to 97°30' East longitude. This region is a part of Himalaya and Indo-Burma hotspots (2 of 25 such hotspot in the world). It consisting eight states of India and covering an area of 255036 km². About 40% of its total geographical area are plains and rest 60% area are Plateau, Hills and mountainous. More than 60% area of this region is covered by forest. The agricultural domain is the main source to production of food and economy of the people living in these geographic compartments. In hilly areas, rainfall is the fundamental source for the farming generation, that's done along side inclines as well as slopes. However, within the plane locations, abundance of rainfall accounts for the flood [7-8]. Furthermore, because of creation of local low-pressure gradient over Brahmaputra as well as Barak basin

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Study of Structural, Electronic and Interaction Mechanism of Functionalized Carbon Nanotubes with Oxygen

Samir Thakur^{1*}, Sankar M. Borah¹, Ashok Singh² and Nirab C. Adhikary³

Abstract

Oxygen storage nanocomposite materials are receiving much attention from material scientist because of having a huge amount of industrial as well as medical applications. The efficiency of these nanocomposite materials depends upon both on the oxygen concentration and oxygen adsorption energy. In this article, we report a theoretical study to investigate how the adsorption energy is enhanced by using functionalized single-wall carbon nanotube as a storage material. A functionalized single-wall carbon nanotube is designed by introducing germanium and phosphorous as a doping element. The structural, electronic and interaction mechanism are investigated using density functional theory. Our study reveals that doping not only modifies the bonding arrangement of the adjacent carbon atoms but also provides the structural deformation on the carbon nanotube surface. Moreover, a comparative analysis of both undoped and functionalized carbon nanotube surface are evaluated by using natural bonding orbital analysis, the partial density of states and partial charge analysis. Under the study of the density of states analysis, we found that the energy of the highest occupied molecular orbitals (–4.3 eV) and lowest unoccupied molecular orbitals (–2.54 eV) of undoped CNT changes to –4.29 eV and –3.07 eV respectively due to doping effect. Besides that, the energy gap (~1.75 eV) along with the Fermi energy level (~ –4.3 eV) is shifted to 1.21 eV and –4.17 eV respectively. A weak interaction of oxygen adsorption energy (–0.40 eV) is found in pristine CNT. However, a strong interaction of oxygen having adsorption energy (–0.40 eV) is found in doped CNT.

Keywords: Density Functional Theory, functionalization, Carbon nanotube, density of states, Fermi energy

1. INTRODUCTION

In recent days, nanostructured materials are one of the most essential classes of materials in science and engineering to study for many researchers. Exceptional chemical, mechanical and thermal stability of these materials have confirmed to be a quite interesting material for a variety of applications [1-5]. These materials also play an important role as an effective catalyst for the improvement of electrocatalytic performance in catalytic reactions [6]. The catalytic reactions are not only the core of the production of most chemical compounds, but it also plays a significant role in renewable energy like biofuel production and in PEM fuel cells [7]. Apart from this, nanostructured materials are also used as an efficient material for storage systems. One of these nanostructured materials called single-walled carbon nanotubes (SWCNTs) were discovered by Iijima in 1991 [8] and since then a substantial research work on its application in various fields have been done by many researchers [9,10]. In the last few decades number of works have been reported regarding the use of CNTs as a supporting material not only for the catalysts, for the oxygen reduction reaction in the electrode of Proton-exchange membrane fuel cells (PEMFCs) but also in oxygen storage systems [11]. Carbon nanotubes are considered to be electrochemically more stable and showing high corrosion resistance. Moreover, it possesses a high power density and electrocatalytic activity enhancement [12]. However, few types of research found that CNT and oxygen composites suffer from weak interaction issues due to the fact that the CNT surface does not actively take part in the interaction [13]. To

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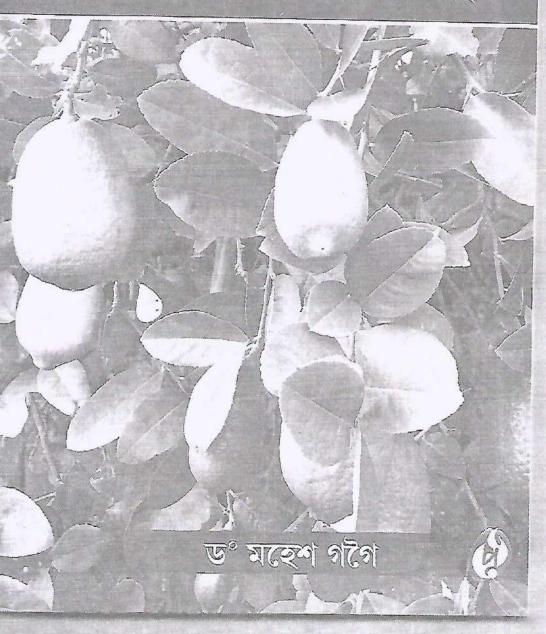
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Nemukheti:

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1st Edition: July, 2019

Price: 120/-

2nd Edition: December, 2023

ISBN: 978-93-88593-68-7

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Printed at: Purbayon Publication Pvt. Ltd.
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শেষত এটাই আশা, কিতাপখনে খেতিয়কক সহায় কৰিব আৰু সেই উদ্দেশ্য পূৰণ হ'লেহে আমাৰ শ্ৰম সাৰ্থক হ'ব।

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কোকৰাঝাৰ।

দ্বিতীয় তথা পৰিবৰ্ধিত সংস্কৰণ সন্দৰ্ভত

পূথি প্ৰকাশক ড° অমৃত কুমাৰ উপাধ্যায়দেৱৰ তাগিদা মানি নেমু খেতিৰ লগত জড়িত হৈ থকা মূল বিষয়কেইটা সাঙুৰি খৰধৰকৈ লিখা পাণ্ডুলিপিটো 'পূৰ্বায়ণ প্ৰকাশন'ৰ কাৰ্যালয়ত জমা দিলোঁ আৰু কম দিনৰ ভিতৰতে কিতাপখন প্ৰকাশ কৰিলে। সেয়ে কিতাপখনত কেতবোৰ আসোঁৱাহ ৰৈ গ'ল। তৎস্বত্বেও সদাশয় পাঠক তথা নেমু খেতিয়কসকলে আমাৰ এই ক্ষুদ্ৰ পুথিখন আদৰি ললে। পঢ়ুৱৈ সমাজৰ সমাদৰলৈ লক্ষ্য কৰি প্ৰকাশকে দ্বিতীয় সংস্কৰণ ছপাবলৈ যো-জা কৰি কথাটো মোৰ কাণত পেলাবলৈহে পালে, তাৰ কেইদিনমানৰ পিছতে কভিড মহামাৰীয়ে স্তব্ধ কৰিলে বিশ্বজনগণৰ জীৱন-গতি। তেতিয়া কিতাপৰ কথা তল পৰি আছিল যদিও ছেগা-চোৰোকাকৈ নেমু বিষয়ত চৰ্চা আব্যাহত ৰাখিছিলোঁ। সুখবৰ এয়ে যে ২০২৩ বৰ্ষৰ পহিলা মাহতে কেন্দ্ৰীয় চৰকাৰৰ জৈরপ্রযুক্তিবিদ্যা বিভাগে এটা গরেষণা প্রকল্প— "Scientific approaches to develop Biopesticide for controlling Citrus diseases and standardize the products obtained from Citrus limon (L.) Burm f." (Sanctined by the Department of Biotechnology, Govt. of India, 2023) অনুমোদন দিয়াৰ বাবে এই বিষয়টো কৃষকৰ মাজলৈ লৈ যাবলৈ হাত পুথিখনৰ প্ৰয়োজন হ'ল। সাতে-পাঁচে ভাবি দ্বিতীয় তথা পৰিবৰ্ধিত সংস্কৰণ প্ৰকাশ কৰিব পাৰিলে ভাল হয় বুলি কোৱাত প্ৰকাশকে না নকবিলে। আশা কৰিছোঁ, এই হাতপুথিখনে নেমু খেতিয়কসকলক সহায় কৰিব।

৫-৯-২০২৩ কোকৰাঝাৰ।

ড° মহেল গগৈ

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System-size dependence of the Effective Temperature at FAIR energy

Kalyan Dey*, Barnali Saikia, Bikash Dey**

Abstract

This article presents the report of a systematic study of the system-size dependence of the effective temperature at FAIR energy using String Melting version of the AMPT model. In this study, the transverse mass (mr) spectra of the hadrons produced in different systems such as Pb+Pb, Au+Au, Si+Si and C+C central collisions at the beam energy of $E_{LAB} = 30A$ GeV are reported. The m_T spectra are fitted using the Boltzmann function to extract the effective temperature of the produced hadrons.

Keywords: QGP, AMPT, radial flow, effective temperature, FAIR

1. Introduction

Lattice QCD predicted that under the extreme condition of temperature and/or baryon density normal nuclear matter undergoes aphase transition to form a new state of matter known as Quark-Ghon Plasma (QGP) [1]. This noble phase of matter, consisting of

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*Email: kalyn.dey@gman.com epartment of Physics, Science College, Kokrajhar

Few lines about Editors:



Dr. Caroline Basumata is Associate Professor in Zoology department of Hojai College (alias, Rabindranath Tagore University) with a post graduate degree in Zoology. Her specialization is Immunology and Cell Biology. She did her research on anti-diabetic properties of Cissampelos pareira (a medicinal plant) in Fructose-induced and Fructose-Aloxan induced wistar rats. She did her M. Sc. degree from North Bengal University, Darjeeling, West Bengal and her PhD. Degree from Gauhati University, Guwahati, Assam. She has keen interest on Environmental issues and conservation of biodiversity and therefore pursuing various activities related to it. She is a fellow member of World Researchers' Association, which is working on for the causes of environment by awareness campaigns and through publications of various journals such as 'Research Journal of Biotechnology'. 'International Journal of Chemistry and Environment', 'Journal of Disaster Management' etc. She firmly believes in 'Traditional knowledge of indigenous people' and utilization of this valuable knowledge in Wild life management and Sustainable development.



Dr. Dulumont Tamuly is working as Lecturer in Zoology department of Hojai College. She passed her M. Sc. from Gauhati University, Guwahati with specialization in 'Entomology' and did her PhD. from Assam University, Silchar, Assam. Her area of research work is 'Herpetology' and Eco-toxicology' and has interests on various environment on various environment related activities. She is a member of working committee of Hojai district 'Children's Science Congress' and actively participates in giving guidance to the School children in their project works. She is multi-talented and striving to pursue her research on ecology to contribute something in conservation of Biodiversity of North-East and Assam in particular.



Printed at Computer Point, Hojai, Assam ₹299/-

Role of Biodiversity Conservation in Promotion of Adventure Tourism & Entrepreneurship

Editors

Dr. Caroline Basumata
Dr. Dulumoni Tamuly

This book titled "Role of Biodiversity in promotion of Adventure tourism and entrepreneurship" contains some of the papers presented in the International conference (From 22-24th February, 2019) Corporation was organized by the Zoology department of Hojai College in collaboration with Indian Institute of Entrepreneurship in association with World Researchers' Association.







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Printed at : Computer Point,

Main Road, Hojai, Assam-782435

ISBN : 978-93-85310-48-5

Price : Rs. 299/-(Rupees two hundred ninety nine)

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Message



It gives me immense pleasure to witness the results of desired and expected outcome of the international conference organized by Zoology department of Hojai College on the 'Role of Biodiversity in promotion of Adventure tourism and entrepreneurship' from 22-24 February' 2019 in association with Indian Institute of Entrepreneurship, Guwahati.

As Hojai College is in the process of being upgraded to Rabindranath Tagore University, activities such as Conferences, workshops, Exchange programs etc., bring fresh insights into our minds. As the topic of the event covers multiple interdisciplinary subjects, it has given scope to many scholars to participate in this great event. It has also provided a platform to the scholars to carry out in-depth analysis of practically challenging issues in the respective subjects. This endeavor has also given an opportunity to the organizers and participants to update their knowledge to carry out further research and other actions in future.

I congratulate the organizing committee and I am hopeful that our institution would acquire greater heights in the years to come.

BY

Dr. Biman Kumar Bhatta Principal, Hojai College, Hojai.

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APPLICATION OF TRADITIONAL KNOWLEDGE BASED PRACTICES FOR THE MANAGEMENT OF SMALL RICE GRASSHOPPER, OXYA HYLA HYLA (SERVILLE) ON RICE IN CACHAR DISTRICT OF ASSAM, NORTH- EAST INDIA.

Manika Das1, S.K. Thakur2 and D.C. Ray3

¹Dept. of Zoology, Science College, Kokrajhar ²Dept. of Mathematics, Science College, Kokrajhar ³Dept. of Ecology and Environmental Science, AUS e-mail: manika4ever@gmail.com

Introduction:

The present trend in world population growth reflects the need of constant increase in food grain production. Insect pest cause heavy losses to crops. The most common solution to this problem is the use of chemical pesticides since long time- but have serious drawbacks, affect non- target organisms and environment (Sinha *et al.*, 2004; Nath and Ray, 2012).

The traditional pest control practices play an important role in the management of agriculture and it is an inevitable practice for sustainable agriculture (Nath and Ray, 2012). By traditional agricultural knowledge one can understand the cultural and technical knowledge that farmers in a specific area have. Rice is the most important crop in Assam India grown on about 70% of the total cultivated land. The farmers from the different ethnic diversity of the state have developed their own systems of cultivation of various crops (Islam *et al.*, 2004). These practices are commonly known as Indigenous technical knowledge. The history of indigenous knowledge (IK) is as old as the human race.

RESEARCH TRENDS ON EISH & FISHERIES

IN MOUNTAIN WATERS OF EASTERN

Debangshu Narayan Das Santoshkumar Abujam Achom Darshan Singh



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ISBN 978-1-64546-842-4

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Diversity of Hill Stream Fish Fauna in the Upper Reaches of Manas River, India

Farina Jabeen

Department of Zoology, Gauhati University, Guwahati – 781014, Assam, India Email: liza_0612@yahoo.co.in Contact number: 8638806116

Abstract

The present investigation deals with the study of hill stream fish fauna in the upper reaches of Manas River. The river Manas, a snow fed river of Assam, is a global hotspot for fish faunal diversity harbouring both hill stream as well as plain water fish species. The survey was conducted from January, 2015 to November, 2017. Hill stream fishes belonging to almost all the major families were recorded including some of the major genera like *Neolissocheilus, Cyprinion, Tin, Schizothorax, Barilius, Glyptothorax, Garra, Schiztura, and Opsarius.* A total of 92 species belonging to 7 orders, 22 families, and 50 genera were recorded of which, 26 species were torrential, 25 species (semi torrential) and 41 species (plain water varieties). The family Cyprinidae dominated the list with 40 species followed by the family Sisoridae (9 species) and Bagridae (8 species). Shannon-Weiner diversity index was calculated 3.78, which indicated moderate to high diversity. Moderate evenness (0.48) across all the three sampling sites of the river was observed. The study showed 14.13% of fish species belong to threatened categories being either vulnerable, endangered or near threatened.

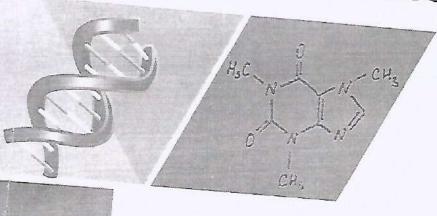
Key words: Fish fauna, Relative abundance, Conservation, Hotspot, Hill stream, Manas River, Shannon-Weiner Diversity Index.

Introduction

The north-eastern region of India comprises of as many as 58 notable rivers besides numerous rivulets or hill streams which form rich fisheries resources in the region (Sharma and Bhattachariya, 2012). Over two-third of the region's tetritory is occupied by hills and mountains. The fast flowing rivers and streams have magnificent habitat and environment allowing evolution of rich fish diversity. The diversity is attributed some extent due to the past geological history as well as the orogeny of the Himalayas

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Email-purbayonindia21@gmail.com

First Edition & July, 2018

₹ 1200/-

Recent Trends in Life Sciences

First Edition: July, 2018

ISBN: 978-93-87263-67-3

© Editors

Cover:

Dr. Pankaj Chetia

Published by:

Purbayon Publication
Satmile, Near Gauhati University
Guwahati- 14, Assam, India
Email-purbayonindia21@gmail.com
website: purbayonpublication.com
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Recent Trends in Life Sciences ISBN: 978-93-87263-67-3

Karyotype studies in Citrus species: A reliable tool for taxonomic verification

Mohesh Gogoi*

Abstract

Chromosome counts revealed 2n = 18 in Citrus species and 9 is the haploid number. Dissimilar karyotype of seven studied species native to NER of India has been indicated their individuality. The karyomorphological data that was developed from cytological study carried out during 2002-2004 has provided ample scope in understanding the chromosome number, morphological features of chromosome complements and taxonomic position of Citrus species within the subfamily-Aurantioideae and family-Rutaceae.

Key words: Citrus, Chromosome, Diploid, Karyotype and Taxonomy

Introduction

The NER of India is a natural home of many Citrus species and varieties hich is indicated by its diversity of species existing in the tropical and ubtropical forests and wide distribution pattern of species (Gogoi, 2004). thenotypic variations among the species is quite interesting as the enotype determines their characters (Raghuvanshi, 1962) and it may orther be modified due to variety of climatic and topographic conditions revailing in the state. Now it has established that nine (n= 9) is the

Department of Botany, Science College, Kokrajhar, Kokrajhar -783370, Assam, ndia, E-mail: mohesh.gogoi@rediffmail.com

Vol-II: No. I

ISBN: 978-162776186-4

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A Journal of Multidisciplinary Research Papers and Articles

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Ethno Botanical Study of Wild Edible Plants Used by the Bodos of Kokrajhar District, Assam.

Jahnovi Brahma

Department of Botany, Science college, Kokrajhar

Dr. B.K Brahma

Department of Biotechnology, Bodoland University, Kokrajhar

Dr. P. Rethy

Department of Forestry, NERIST, Itanagar, Arunachai Pradesh

Abstract:

Of all the ethnic groups belonging to Tibeto-Burman stock of Mongoloid origin, the Bodo kacharis or Bodos constitute a sizable population in Kokrajhar district where limited work has been done on the ethno botany of these people from this district. The present work is the result of a thorough investigation, exploration and detailed study of the ethno botany of the Bodos residing in the Kokrajhar district. Many exploration trips were made in different seasons to cover all the areas of the district followed by extensive study of the specimens. Plant specimens were compared with related literature available in the Kanjilal Herbarium and library of Guwahati University and records available in different offices of the district headquarter.

Key words: Bodos, ethno botany, Native plants

Background:

Millions of people in many developing countries do not have enough food to meet their daily requirements and a further more people are deficient in one or more micronutrients [1]. Hence in most cases rural communities depend on wild resources including wild edible plants to meet their food needs in periods of food crisis. The wild plants are essential components of many poor people's diet specially in periods of seasonal food shortage with some poor households relying on wild fruits and leaves as an alternate to cultivated food for a quarter of all dry season's meals [2]. Nutritional analysis of some wild food plants demonstrates that in many cases

Socio-Economic Issues of Assam

Published by
Publication Cell
Bengtol College, Bengtol

Socio-Economic Issues of Assam: A book produced by Internal Quality Assurance Cell (IQAC), bengtol College, Bengtol under Chirang district and published by Publication Cell, Bengtol College, Chirang (BTAD), Assam.

This book has been published on the understanding that authors are solely responsible for the statements made on their respective research papers. The publisher and editors are not responsible for any disputes for the statement made by respective authors.

1st Edition : 17th May, 2018

Producer : Internal Quality Assurance Cell (IQAC)

Bengtol College, Dist. Chirang (BTAD), Assam.

ISBN : 978-81-929915-1-1

Published by: Publication Cell, Bengtol College,

Chirang (BTAD) Assam

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Oasis Offset Printers, Chapaguri-1, Chirang, BTC, Assam Email: oasischirang@gmail.com:: Phone: 9435020367 & 72

Assam is one of the states of India and it is situated in the North-Eastern region with a land of socio-cultural diversity. Assam is a multi cultural, multi ethnic, multi religious and multi lingual state. The state of Assam has demographic, economic and strategic significance. Demographically, Assam is the hub of diverse social groups and economically is filled with natural resources including oil, tea, mineral and water resources. A wide range of ethnic group is also present in the region and they have contributed a lot towards the socio-cultural development of the state.

In the post- independent India, Assam was one of those states of North East which had to suffer from the development strategy of the Indian state. Assam is economically a backward region, though the state has a lot of natural resources which, if properly tapped, will bring a huge boost to their economic development and improve the living standards of the people. But unfortunately because of the absence of large scale industries these raw materials cannot be manufactured within the region and hence it has just become only a major supplier of raw materials. Agriculture in the region is quite primitive, subsistence farming is mostly practiced;

Corruption and Economy

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Many studies have revealed that the corruption adversely affects economic growth of a country. At the macro level, the literature generally shows that corruption has a negative, direct impact on economic growth and development. Corruption also has an indirect effect on a country's economic performance by affecting many factors fuelling economic growth such as investment, taxation, level, composition and effectiveness of public expenditure. Economists have long identified a number of channels through which corruption may affect economic growth -(1) Corruption distorts incentives and market forces, leading to misallocation of resources. (2) Corruption diverts talent and resources, including human resources, towards "lucrative" rentseeking activities, such as defence, rather than productive activities. (3) Corruption acts as an inefficient tax on business. ultimately raising production costs and reducing the profitability of investments. (4) Corruption may also decrease the productivity of investments by reducing the quality of resources. For example, by undermining the quality and quantity of health and education services, corruption decreases a country's human capital. (5) Rent-seeking behaviour is also likely to create inefficiencies, fuelling waste of resources and undermining the efficiency of public expenditure. Therefore corruption is as an obstacle to economic growth.

Macro level studies, using country-level data to explore cross-country variations in both governance and economic indicators, have consistently found that corruption significantly decreases economic growth and development. For example, cross-country data indicate that corruption is consistently correlated with lower growth rates, GDP per capita, economic equality as well as lower levels of human development. According to the analysis, corruption also has indirect effects through transmission channels such as investment, human capital and public finance/expenditure. While the direct and indirect effects of corruption on growth hold true for all countries under scrutiny, the review suggests that they can be mitigated by contextual factors such as the level of development and the overall quality of governance, with the effect of corruption expected to be more detrimental for countries with higher levels of per capita income and institutional quality. Therefore Corruption is negatively correlated with economic growth.

Many studies have established that corruption discourages investment and acts as an additional cost of doing business, reducing the profitability of investment projects. Firstly, empirical evidence suggests that corruption reduces the ratio of investment to GDP, lowers investment and retards economic growth to a significant extent (Maura 1995). Corruption is also known to distort the decision-making process associated with public investment and affects the composition of government expenditure. Corruption may lead public officials to allocate public resources less on the basis of public welfare than on the opportunity they provide for extorting bribes, such as large infrastructure or defence projects. Mauro finds that government