Centurion UNIVERSITY

Shaping Lives...
Empowering Communities...

Research Centre for Phytopharma

Established: 2020-23

1/2023

Research Centre for Phytopharma

Centurion University of Technology and Management, Odisha

COE: Dr. Preetha Bhadra, MD, GTF Testing Lab

RC Coordinator: Dr. Poulami Sil

Mentor: Mr. Babu Shankar, MD, GT Tech

Message From COE's Desk:

The mind that opens to a new idea never returns to its original size.

~ Albert Einstein

There is no privilege greater than that of serving humanity and I feel honoured to say that our research centre has worked diligently from past three years to be able to stand where we are now.

Today, the need to innovate is greater than ever and there is absolutely no field that can continue to thrive without continuous improvement. A continuous process of Research and Development is the pillar on which our industries are relying. It is a great pleasure to see our centre surviving the storms with its resilience. Our dedication to our work has always been the greatest strength which has lead to our unwavering success over the years.

The field of pharmaceuticals is indeed challenging as the smallest mistake can lead to a matter of life and death. We might not be playing on the front end but we work as a backbone. The only way to provide the best to our community is through excellent quality which has been our motto since day one.

Dr. Preetha Bhadra

MD, Gram Tarang Foods Testing Lab

Team Members: Centre for Phytopharma

Dr. Preetha Bhadra
CEO, Centre for Phytopharma

Dr. Poulami Sil
RC Coordinator

Dr. S. P. Nanda
Dean Administration (MSSSoA)

Dr. Gitanjali Behera
Associate Dean, SoABT

Dr. Panchashree Das
Assistant Professor

Dr. Soma Maji
Assistant Professor

Dr. Rajashree Jena
Assistant Professor

Dr. Prasanta Chowdhury
Assistant Professor

Dr. Ruby Pandey
Assistant Professor

Dr. Bhukya Jithender
Assistant Professor

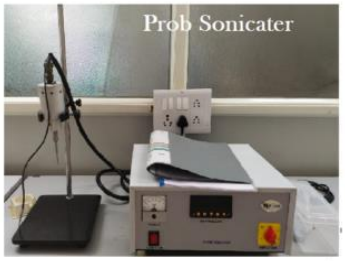
Contents

1. Introduction

i) Focus Areas

- Phytochemical analysis (Antioxidants, Biochemical Constituents) of different Medicinal Plants
- Essential oil extractions
- Implications of Phytochemicals on human Physiological Disorders
- Extraction and Purification of bioactive compounds from plants
- Prebiotics and Probiotics

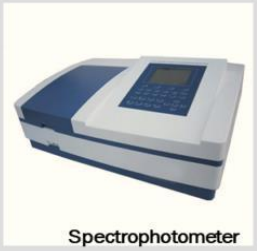
ii) Infrastructure and Facilities



CO_2 Extraction Unit

Soxhlet extraction device

Autoclave



Spectrophotometer

Laminar Air Flow

Colum Chromatography Unit


BIOBASE
BJPX-C80
CO2 Incubator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iii) Outcomes

1. Identification of Novel compounds from Plan Sources
2. Applications of those compounds on human health
3. Formulation of Synbiotics
4. Products
5. Patent

iv) **Industry Partners**

- **ITC** (https://www.itcportal.com/)
- **Nutrify India (**http://nutrifyindia.com/)
- **Gram Tarang Foods (**https://gramtarangfoods.in/)

v) **Domain Courses**

- **Nutraceuticals**
  http://courseware.cutm.ac.in/courses/domain-nutraceuticals/
- **Commodity and Food Storage**
  http://courseware.cutm.ac.in/courses/commodity-and-food-storage/
- **Food Processing**
  http://courseware.cutm.ac.in/courses/food-processing/
- **Dairy Processing and Development**
  http://courseware.cutm.ac.in/courses/dairy-processing-and-development/

vi) Post-Graduation

- Nutraceuticals
- Food QC and testing
- Human Genomics and Diagnostics

vii) **Diploma Courses**

- Diploma in Nutraceuticals
- Diploma in Dairy Processing and Development

viii) **Certification Courses**

- Certificate in Fruit Processing with Dryers
- Certificate in Supercritical CO2 plant operation
- Certificate in Pharmacophores

ix) **Skill Courses**

- Supercritical CO2 plant operation
- Introduction to Nutraceuticals
- Extraction Techniques
- Spectroscopic Analysis

1. Research Work and Projects

i. Ongoing Projects / Products / Assignments

- Value addition of coconut oil to study antimicrobial and anti-aging properties.
- In-silico analysis of Phytochemicals from different medicinal plants
- HPLC Set up
- Data bank creation of the pharmacophore models and applications
- Aflatoxin Detection Kit
- Book Publication

ii. **Projects Information of Research Center**

Seed Money Projects:

1. Name of the Investigator: Dr. Preetha Bhadra
Funded By: Seed Money Grant
Topic: Mahua an alternative for regular sugar
Proposal Summary:
Mahua in daily life are being used for making the desi liquor, which is not at all beneficial. This showsthat Mahua is having high amount of the carbohydrate molecule which can easily get fermented andwasted. My aim is to extract those carbohydrate molecules and make it as an alternative of the regularsugar as those sugar may contain more of antioxidants rather than normal sugar.
Introduction/ Background
Madhuca indica, commonly known as mahua is a large tree found in the dry deciduous forests of India.The tree produces edible flowers and fruits during leanest season of agriculture (March-May).Collection of mahua flowers and fruits is one of the most important sources of employment for thepoorest of the poor in India. The flowers are edible and rich source of sugar, protein, vitamin andminerals. Present paper reviews the earlier research on these flowers and highlights the study conductedfor value addition. About 80 per cent of juice was successfully extracted from fresh flowers andconcentrated to produce a honey like liquid sweetener. The produced concentrate was analyzed andused for preparation of bakery and confectionary goods. Apart from this fresh flower pulp was used forpreparation of jam, jelly and sauce. The study shows the income and employment generation potentialof mahua flowers.







2. Name of the Investigator: Dr. Preetha Bhadra
Funded By: Seed Money Grant
Topic: Biopesticides Using different medicinal Plants

Concept of the Proposal:

Medicinal plants, also called medicinal herbs, have been discovered and used in traditional medicine practices since prehistoric times. Plants synthesise hundreds of chemical compounds for functions including defence against insects, fungi, diseases, and herbivorous mammals. Numerous phytochemicals with potential or established biological activity have been identified. However, since a single plant contains widely diverse phytochemicals, the effects of using a whole plant as medicine are uncertain. Further, the phytochemical content and pharmacological actions, if any, of many plants having medicinal potential remain unassessed by rigorous scientific research to define efficacy and safety.

Objective:

Biopesticides are certain types of pesticides that are derived from natural materials like plants (Botanical origin), bacteria, fungi and virus (Microbial origin) and certain minerals. When used as a component of Integrated Pest Management (IPM) programs these biopesticides can greatly decrease the use of conventional pesticides, while crop yields remain high. The BioPesticides control pests / diseases either selectively or with broad-spectrum approach. Biopesticides are usually inherently less toxic than conventional pesticides. Biopesticides are generally target specific and affect only the target pest and closely related organisms vis-à-vis broad spectrum, conventional pesticides that may also affect organisms such as birds, insects and mammals. We want to define this problem with a bio-solution using BIOVIA and some other fieldwork.




3. Name of the Investigator: Dr. Preetha Bhadra
Funded By: Seed Money Grant
Topic: Targeted therapy for different Cancer

Concept of the proposal:
Ancient India is one of the pioneers of studies of plants as medicine, i.e. Ayurveda. In our social and economic life, we hardly take care of the food we are taking. The uses of various pesticides, preservatives, etc. turn the foods into poison. Moreover the side effects of these pesticides and preservatives etc. are dangerous because it leads to the initiation of different cancer. In this whole world, the number of patients dying from cancer is increasing in a very threatening way. We found Medicinal plant is packed with antioxidants that help in detoxing and cleansing from within. The medicinal plant is a source of powerful antioxidants. Phenolic compounds like catechin, alkanols, apigenin, and linalool are found in Coriandrum sativum. These kinds of antioxidants help to scavenge free radicals, which can be very detrimental to the body if not cleared properly. The Medicinal plant is also thought to have potent anticancer

abilities against some cancer cell lines. Due in large part to its antioxidant capabilities, the medicinal plant is considered a possible tool to help treat cancer. Extract from the root of the plant has been shown to inhibit DNA damage, prevent cancer cell migration, and promote cancer cell death in laboratory studies. Several components of Medicinal plant help fight cancer. This occurs either by causing cell death directly or boosting your immune system so that your body is better able to fight off cancer on its own. Medicinal plant tea is sometimes used as an adjuvant therapy during chemotherapy and radiation. It helps in removal of toxins from the body by relieving fluid retention.

We have first studied the effect of Medicinal plant extract on Cancer cell line and the observed some significant result in MTT assay, followed by ROS analysis and Fluorescence Anisotropy, from which we have decided to target some genes responsible for Cancer IL6 (6MG1), VDR (5XZF), MTOR (5YK5) and pharmacophores Decene (6DJC), 2- Bornyl acetate (5ZF4) from Medicinal plant. After identification of the genes and pharmacophores, we did the docking and got some positive value. From this analysis report, this can be concluded that some pharmacophores of Medicinal plant have an effect on the Cancer. Some of the animal studies followed by the isolation of the targeted pharmacophore and the effect on the gene (in-vitro and in-vivo analysis) are on process. Based on this the new drug design is also in the long term future work.

Preparation of Herbal Extract: 1) Selection of the plant 2) Collecting the Plant, 3) Preparing the plant extract: It involves steps such as cutting , washing and chopping of the plant and then extraction 4) Keeping it for a period of at least 3-4 weeks before using it 5) Filtration 6) Storage under refrigerated conditions.

Sponsored Projects:

1. Name of the Investigator: Mr. M. Vijay & Shashikant Tewary (2015-2016)

Sponsored By: Nutraceutical, Food & Flavour Industries
Topic: Phyto Chemical Research & Extraction

2. Name of the Investigator: Shashikant Tewary (2016-2017)

Sponsored By: Nutraceutical, Food & Flavour Industries
Topic: Phyto Chemical Research & Extraction

3. Name of the Investigator: Dr. G. V. Ramana (2016-2017)

Sponsored By: Nutraceutical, Food & Flavour Industries
Topic: Phyto Chemical Research & Extraction

4. Name of the Investigator: Dr. G. V. Ramana (2017-2018)

Sponsored By: Nutraceutical, Food & Flavour Industries
Topic: Phyto Chemical Research & Extraction

5. Name of the Investigator: Dr. G. V. Ramana (2018-2019)

Sponsored By: Nutraceutical, Food & Flavour Industries

Topic: Phyto Chemical Research & Extraction

6. Name of the Investigator: Dr. G. V. Ramana (2019-2020)

Sponsored By: Nutraceutical, Food & Flavour Industries

Topic: Phyto Chemical Research & Extraction

7. Name of the Investigator: Dr. Preetha Bhadra, Dr. Pradipta Banerjee, Dr. Rosy Mallik (2021-2022)

Sponsored By: Spice Board

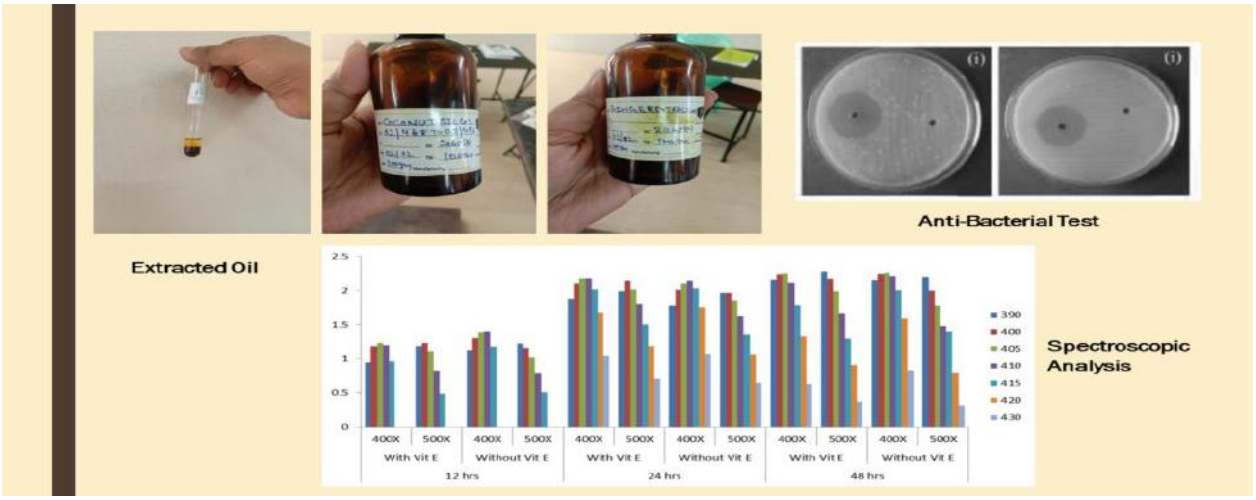
Topic: Affordable and efficacious skincare products based on natural spice extracts obtained from super critical CO2 extraction process.

iii) **Product Development in RC**

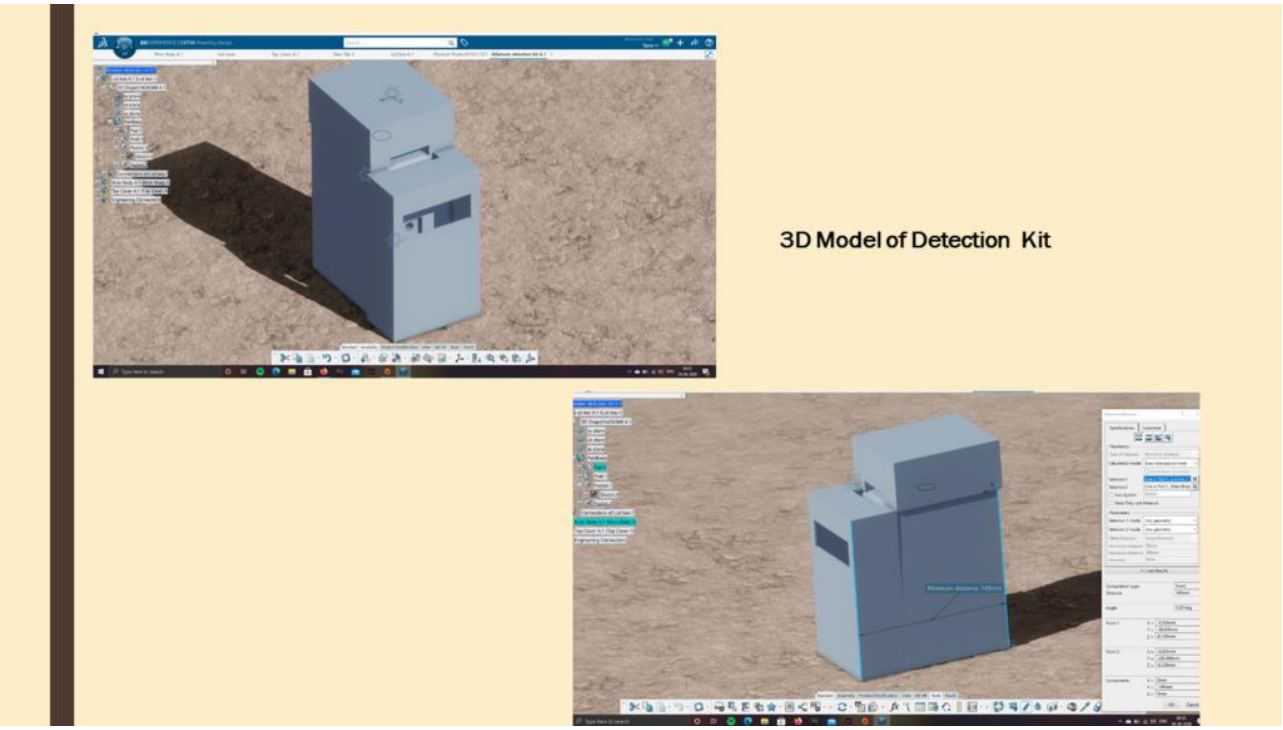
Marigold Extract with greater Lutine :

Product	Stage	Expected Completion Date
Cleanser	Gel formation done, we will go for testing now	September, 2021
Day Cream	Cream formulation done, we will go for testing now	September, 2021
Nano Curcumin	First phase Extraction Completed	November, 2021

- Value-added coconut oil with ginger oil.



- Aflatoxin Detection Kit



2. Publications, Internships, and Workshops

i) Publication:

Book Chapters:

1. Adhikary, S., Das, P., Paramanik, B. and Roy, D. (2022). Chapter FUNCTIONS OF MICRONUTRIENTS IN THE SOIL-PLANT SYSTEM AND THEIR MANAGEMENT TOWARDS SUSTAINABLE AGRICULTURE. *Insights of Agricultural Sciences*, p.127.
2. Soma Maji and Ryan Das. **(2021)**. Supercritical fluids and their characteristics in *Supercritical Carbon dioxide extraction*. Supercritical Carbon Dioxide Extraction. Handbook Scholars' press.
3. Preetha Bhadra and Soma Maji **(2021)**. Advantages of supercritical extraction over other extraction methods in *Supercritical Carbon dioxide extraction*. Supercritical Carbon Dioxide Extraction. Handbook Scholars' press.
4. Akbar Hossain, Zahoor Ahmad, Debjyoti Moulik, Sagar Maitra, Preetha Bhadra, Adeel Ahmad, Sourav Garai, Mousumi Mondal, Anirban Roy, Ayman EL Sabagh, and Tariq Aftab. **(2021)**. Jasmonates and Salicylates: Biosynthesis, Transport and Signalling Mechanisms during Abiotic Stress in Plants. Jasmonates and Salicylates Signaling in Plants. Springer.
5. Bhadra Preetha, Maitra Sagar, Hossain Akbar, Banerjee Pradipta. **(2021)**. Role of phytohormones in heat stress tolerance in plants Plant Growth Regulators for Climate-Smart Agriculture. Apple Academic Press.
6. Sagar Maitra, Preetha Bhadra, Ajar Nath Yadav, Jnana Bharati Palai, Jagadish Jena, Tanmoy Shankar. **(2021)**. The Omics Strategies for Abiotic Stress Responses and Microbe-Mediated Mitigation in Plants. Soil Microbiomes for Sustainable Agriculture. Springer.

7. Bhadra, P. **(2021)**. The Role of Gibberelin against abiotic stress tolerance.
8. Bhadra, P. **(2021)**. The Role of Phytohormones in Heat Stress Tolerance in Plants Plant Growth Regulators for Climate-Smart Agriculture. Taylor & Francis Group.
9. Sagar Maitra, Biswajit Pramanick, Prithwiraj Dey, Preetha Bhadra, Tanmoy Shankar, and Kumar Anand. **(2021)**. Thermotolerant Soil Microbes and Their Role in Mitigation of Heat Stress in Plants Soil Microbiomes for Sustainable Agriculture. Springer.
10. Akbar Hossain, Sharif Ahmed, Zahoor Ahmad, Md Jahangir Alam, Debojyoti Moulick, Bedabrata Saha, Suman Samanta, Sagar Maitra, Preetha Bhadra, Muhammad Adnan Bukhari, Tariq Aftab. **(2021)**. Next-generation genetic engineering tools for abiotic stress tolerance in plants Frontiers in Plant-Soil Interaction. Academic Press.
11. Mishra S. K. **(2021)**. Phytochemical constituents in clove (*Syzygium aromaticum*) and their role in the management of Diabetes mellitus and Obesity. Role of phytochemicals in Human Physiological Disorders: Diabetes and Obesity. Scholar Press.
12. Soma Maji **(2020)**. Role of neem leaves in diabetes and obesity in *Role of Phytochemicals in Human Physiological Disorders: Diabetes and Obesity.* Book: Pre-biotics and Pro-biotics: A new era of neutraceuticals. Scholars' press.
13. G Behera **(2020)**. Recent Advances in Processing and Value Addition of Germinated Brown Rice. Book: Pre-biotics and Pro-biotics: A new era of neutraceuticals. Centurion Publisher.
14. Behera G; Madhumita M **(2020)**. A Review on Post-Harvest Processing and Potential of Coconut Book: Pre-biotics and Pro-biotics: A new era of neutraceuticals. Centurion Publisher.
15. Madhumita M and Behera G. **(2020)**. A Current Opinion on Application, Storage and Sensory Study of Essential Oil Formulated Food Products Book: Pre-biotics and Pro-biotics: A new era of neutraceuticals. Centurion Publisher.
16. P Banerjee, S Maitra, P Bhadra, A Das, N Ghosh, S Karmakar. **(2020)**. Nutritional Intervention to prevent Neuro-degenerative diseases (NDDs).
17. A Madesiya, P Banerjee, S Santra, A Das, N Ghosh, D Bagchi. **(2020)**. Roles of Metals in Redox Biology. CRC Press, Taylor and Francis Publication.
18. P Banerjee, S Das, S Pattanayak. **(2020)**. Protozoan Biopesticides – a new horizon in organic farming, Book: Biopesticides in Organic Farming. Taylor and Francis Publication (in press).
19. Mitra S, Shankar T, Banerjee P. **(2020)**. Potential and Advantages of Maize-Legume Intercropping System. IntechOpen Publishers, UK: 1-15, DOI: http://dx.doi.org/10.5772/intechopen.91722
20. Banerjee, P. **(2020)**. Plant Abiotic Stress Responses and MicroRNAs. Advanced Agriculture (ISBN: 978-93-88879-99-6), New Delhi Publishers, India: 111-120 DOI: 10.30954/NDP-advagr.2020.6
21. Bhadra, P. **(2020)**. Experimental Methods of supercritical extraction using carbon dioxide Supercritical Carbon Dioxide Extraction. Handbook Scholar Press.
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28. Akanksha Rout, Itilagna Sahoo,Pradipta Banerjee **(2020)**. Physiological Role of Tulsi (Ocimum Sanctum) in Diabetes and Obesity Role of phytochemicals in Human Physiological Disorders: Diabetes and Obesity. Scholar Press.
29. Preetha Bhadra, S. Jagadhatri, Bishwajit Sharma **(2020)**. Marigold in the Treatment of Diabetes and Obesity Role of phytochemicals in Human Physiological Disorders: Diabetes and Obesity. Scholar Press.
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33. Sagar Maitra, Sandipan Pine, Pradipta Banerjee, Biswajit Pramanick (2020). Millets: Forgotten food for the future. Springer, Germany (Accepted)
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37. Behera G., Rayaguru K., Nayak P.K. (2020) Effect of Ultrasound-Assisted Pretreatment on Osmo-Dehydration Kinetics and Quality of Star Fruit (Averrhoa Carambola L) Slices: An Optimization Study. In: Dawn S., Balas V., Esposito A., Gope S. (eds) Intelligent Techniques and Applications in Science and Technology. ICIMSAT 2019. Learning and Analytics in Intelligent Systems, vol 12. Springer, Cham. ISBN: 978-3-030-42363-6
38. Mishra SK (2016). Anopheles culicifacies species complex in Odisha, India (ISBN: 978-3- 659-85763-8), Lambert Academic Publishing, Germany.

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1. Functional Food and Diseases (ISBN: 978-81-950971-2-8); **Preetha Bhadra and Pradipta Banerjee,** CUTM Publisher, India
2. Medicinal Plants as a Targeted Therapy for Cancer (ISBN: 978-81-950971-3-5); **Preetha Bhadra,** CUTM Publisher, India
3. Food, Diseases and Agriculture: An Anthology (ISBN: 978-93-91012-95-3), **Preetha Bhadra, Pradipta Banerjee, Atanu Deb,** New Delhi Publishers, India
4. An Anthology of Nutraceuticals (ISBN: 978-93-91012-95-3), **Preetha Bhadra, Pradipta Banerjee, Atanu Deb,** New Delhi Publishers, India
5. Aromatherapy and Its Benefits (ISBN: 978-81-940943-7-1); **Preetha Bhadra and Sagarika Parida;** New Delhi Publishers, India
6. Prebiotics and Probiotics: A New Era of Nutraceuticals (ISBN: 978-81-949112-4-

1); **Preetha Bhadra and Pradipta Banerjee**, CUTM Publisher, India
7. The Cell & Biomolecules: A fundamental Approach (ISBN: 978-819-5-13800-5); **Mishra S. K. & Anisetti S. S.**, NASSD International Publishers, India
8. Role of phytochemicals in Human Physiological Disorders: Diabetes and Obesity (ISBN: 978-613-8-94587-1); **Pradipta Banerjee, Preetha Bhadra, SP Nanda** , Scholars' Press, Germany
9. Supercritical Carbon Dioxide Extraction Handbook (ISBN: 978-613-8-94652-6); **Pradipta Banerjee, Rosy Mallik, Soma Maji,** Scholars' Press, Germany

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2022

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2021

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ii) Webinars Organized

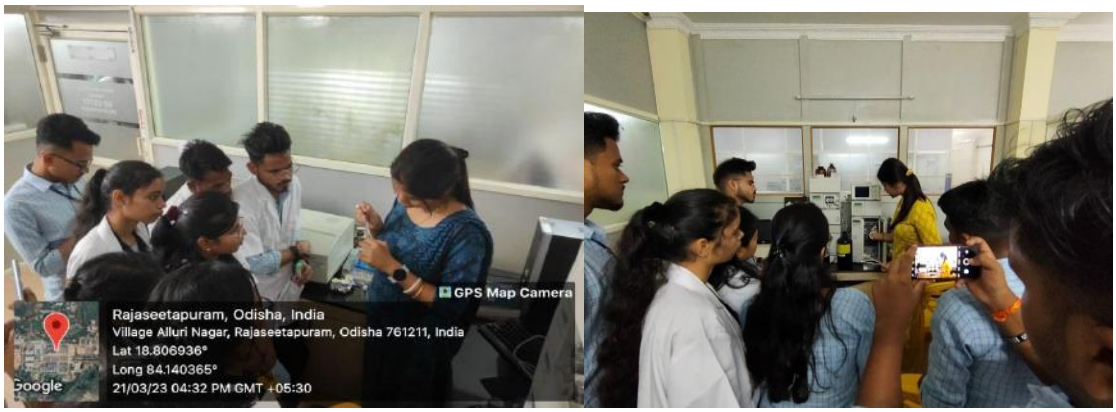
- Webinar on Drying Techniques
- Webinar on Characterizations of Materials
- Webinar on Nutraceuticals
- Webinar on Beauty Chemistry
- Webinar on Computational Biology
- Workshop on Different Extraction and Purification Method
- Application of calcium phosphate bioceramic in bone implant
- Probiotic Dairy Foods in Human Health
- Prebiotics and Gut Microbiome Health
- Workshop on Bioinformatics

- Spectroscopic analysis
- Process for New Food Product Development
- Trends and opportunities in Food Packaging and Processing Operation

iii) Training Program organized

1. Three Days Hands on Training Programme on Basic Extraction and Fractionation Procedure for Medicinal Plant from 20.03.2023 to 22.03.2023.

Some Glimpses of training programme.



2. One Day Hands-on Training Programme on Production of immune boosters on 29.03.2023.

Some Glimpses of training programme.




Way Forward

We keep moving forward, opening new doors, and doing new things, because we're curious and curiosity keeps leading us down new paths.

…….. Walt Disney

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