CONTACT

Mobile No: 91-8219651370

Email Id-
monathakur8986@gmail.com
monika@ciab.res.in

O/O DIO NIC DC Office
Dhalpur Kullu, H.P, India
175101

EDUCATION

Ph.D. in Synthetic Biology and Biotechnology

Centre of Innovative and Applied Bioprocessing (CIAB), Mohali, Panjab University
Year of Completion: 2024

Title: Biotransformation of plant biomass-derived starch into value-added type-III and type-V resistant starch molecules by employing a novel type 1 pullulanase.

National Eligibility Test

CSIR-UGC NET **LECTURESHIP** (2015)

CSIR-UGC NET **JRF** (2017)

MSc Biotechnology

H.P University, Shimla, 2013
Title: Isolation, optimization and characterization of pectinase producing organism from soil samples.

BSc Biotechnology

H.P University, Shimla, 2011

Monika Thakur, Ph.D.

Professional Summary

Highly motivated researcher with a Ph.D. in Synthetic Biology and Biotechnology from CIAB, Mohali, and Panjab University. Extensive experience in mining and characterizing cold-active enzymes, molecular biology techniques, microbial fermentation, and biomolecule expression. Proficient in microbial cell culturing, functional screening of fosmid libraries, and immunological assays. Passionate about exploring the role of microproteins in innate immune pathways. Actively seeking a postdoctoral opportunity in molecular biology, medicinal chemistry, immunology, or related interdisciplinary fields.

Research Experience (Six year)

Doctoral Research Fellow

Centre of Innovative and Applied Bioprocessing (CIAB), Mohali, Panjab University *(2020 – 2024)*

- Identified and characterized novel cold-active Type 1 Pullulanase from hot spring metagenome.
- Engineered microbial strains for enhanced enzyme production and stability.
- Applied bioinformatics tools for enzyme structure-function analysis.
- Developed resistant starch-based nanocarriers for drug delivery applications.

Junier Research Fellow (DBT-JRF)

Centre of Innovative and Applied Bioprocessing (CIAB), Mohali, Panjab *(2018 – 2020)* **Project Title - Structural and functional characterization of metagenome of extreme niches and fermented foods of high altitude region of the Sikkim Himalaya**

- Conducted research on functional screening of fosmid library and functional characterization of biomolecules.
- Metagenomic investigation of DNA extracted from Himalaya hot water spring of Sikkim, Himalaya.
- Identified acid active & cold active β-galactosidase for lactose hydrolysis in milk and whey.
- Investigated microbial fermentation for bioactive peptide production.

Key Skills

Molecular Biology & Genetic Engineering:

- Molecular cloning, expression analysis at transcript and protein level,
- Mutational studies by side-directed mutagenesis.
- PCR, qRT-PCR, and next-generation sequencing (NGS) data analysis.

Bioinformatics & Computational Analysis:

- RNA-seq and proteomic data analysis.
- MEGAN programming, molecular Modelling and Docking Studies using VMD software,
- KEGG pathway analysis, CARD database functional analyses,
- Pathways generation using Ingenuity Pathways Analysis and top gene suite,
- Expasy server, EBI server, CHIMERA software, Multiple alignments, similarity searches, BLAST, Microbial BLAST, FASTQC, Clustal W, Clustal omega, primer designing.

Protein Biochemistry & Functional Characterization:

- Protein purification and enzymatic assays.
- Western blotting, ELISA, and immunoprecipitation.
- Mass spectrometry-based proteomics.

Microbiology:

- Antibacterial activity assays, biofilm preparation and characterization.

Cell Culture & Immunological Assays:

- Microbial cell culturing.
- Flow cytometry (FACS) and cytokine profiling (ELISA, Luminex).
- High-throughput functional screening of immune responses.

Analytical Techniques:

- Microscopy : TEM, SEM, Fluorescence microscopy, FTIR
- XRD spectroscopy
- Chromatographic techniques: HPLC/FPLC, IEC, GPC, TLC
- SPECTROPHOTOMETER
- Thermal analysis: TGA, DSC analysis.

RESEARCH PUBLICATIONS in SCI journals

- **Monika Thakur**, Sharma, N., Rai, A, and Singh, S.P., 2021. A novel cold-active type I pullulanase from a hot-spring metagenome for effective debranching and production of resistant starch. *Bioresource Technology*, *320*, 124288 https://doi.org/10.1016/j.biortech 2020.124288
- **Monika Thakur**, Rai, A.K., Mishra, B.B. and Singh, S.P., 2021. Novel insights into valorization of potato peel biomass into type III resistant starch and maltooligosaccharide molecules. *Environmental Technology & Innovation*, *24*, 101827. https://doi.org/10.1016/j.eti.2021.101827
- **Monika Thakur**, Kumar Rai, A.K. and Singh, S.P., 2022. An acid-tolerant and cold-active β-galactosidase potentially suitable to process milk and whey samples. *Applied Microbiology and Biotechnology*, 106, 3599-3610. https://doi.org/10.1007/s00253-022-11970-7
- **Monika Thakur**, Kumar Rai, A.K. and Singh, S.P., 2023. Structural characteristics, physicochemical properties, and digestibility analysis of resistant starch Type-V prepared from debranched corn starch and fatty acid complexation. *ACS Omega* 8, 25799−25807. https://doi.org/10.1021/acsomega.3c01093
- Kaushal, G., **Monika Thakur**, Rai, A.K. and Singh, S.P., 2022. A comprehensive metagenomic analysis framework revealing microbiome profile and potential for hydrocarbon degradation and carbohydrate metabolism in a Himalayan artificial lake. *Sustainability*, *14*(18), 11455. https://doi.org/10.3390/su141811455
- Sharma, N., Kumari, R., **Monika Thakur**, Rai, A.K. and Singh, S.P., 2022. Molecular dissemination of emerging antibiotic, biocide, and metal co-resistomes in the Himalayan

hot springs. *Journal of Environmental Management*, *307*, 114569. https://doi.org/10.1016/j.jenvman.2022.114569

- Agarwal, N., Jyoti, **Monika Thakur**, Mishra, B.B. and Singh, S.P., 2023. Preparation and characterization of biodegradable films based on levan polysaccharide blended with gellan gum. *Environmental Technology & Innovation*, 31, 103231. https://doi.org/10.1016/j.eti.2023.103231
- Jatav S, Singh R, Pandey N, Dwivedi P, Jyoti, **Monika Thakur**, Singh, S.P., Bansal, R and Mishra, B.B.., 2023. Synthesis and pharmacological evaluation of novel coumarin based triazolyl glycoconjugates as potential antibacterial and anti-proliferative agents. *Medicinal Chemistry Research*. http://dx.doi.org/10.1007/s00044-023-03178-9

PATENT GRANTED

- A method for the production of resistant starch from starch biomass employing a novel type 1 pullulanase from a hot spring metagenome. Patent ID: 50364, Inventors: Singh SP, **Monika Thakur**, Rai AK.

PATENT FILED

- A process for lactose hydrolysis and processing of milk and whey by employing a novel acid and cold active β-galactosidase. Indian Patent Appl. No. 202211022166 Inventors: Singh SP, **Monika Thakur**, Rai AK.

BOOK CHAPTER

- **Monika Thakur**, Kumar Rai, A.K. and Singh, S.P., 2023. Molecular biology of exopolysaccharides production. Taylor & Francis group. Book: Microbial Exopolysaccharides: Productions and Applications.

Awards & Fellowships

- CSIR-UGC **NET JRF** (2017)
- Won 2nd position – Idea Storm in **TREX-Startup Conclave** organized by i-RISE TBI Mohali on 24th September 2022

Conferences & Presentations

- Shortlisted to Present my Ph.D work in **Young Scientist Conference** as a part of 9th India International Science Festival (IISF) 2023
- **Oral presentation** at International Conference on "Bioengineering Solutions for Healthcare, Food, Energy, and Environment" held virtually from 09th -10th April, 2021. (Title: Valorization of potato peel-derived starch into value-added type-III resistant starch molecule by employing a cold active type 1 pullulanase).
- **Oral presentation** at International Conference on Sustainable Energy and Environmental Challenges (VI-SEEC) held virtually from 27th-29th December, 2021. (Title: Utilization of potato peel for extraction of starch and enzymatic biosynthesis of resistant starch and maltooligosaccharides)
- **Poster presentation** at National conference on 15th Chandigarh Science Congress Organized at Punjab University during September 15- 17, 2022. (Title: A cold active, acid tolerant β-galactosidase that could be used to process milk and whey samples).
- **Poster presentation** at International conference on "International conference on Food and Nutritional Security (IFANS- 2023) held at NABI, Mohali, Punjab from 6th-9th January, 2023. (Title: A novel cold active type-1 pullulanase from a hot spring metagenome for effective debranching and production of resistant starch).
- Participated in IP Awareness/ Traning program under **NATIONAL INTELLECTUAL PROPERTY AWARENESS MISSION** (NIPAM) ON 29th August 2022
- **Bioinformatics Summer Internship** from Biotecnika info Labs Pvt. Ltd. 2023

References

1. Dr. Sudhir P. Singh, FNAAS
   Professor
   Gujarat Biotechnology University (DST Govt. of Gujarat)
   Mobile Number: 9041055662
   Email: pratapsudhir@gmail.com

2. Dr. Amit K. Rai
   Scientist-D
   Food and Nutritional Biotechnology
   National Agri-Food Biotechnology Institute (A national institute under Dept. of Biotechnology, Govt. of India), Sector-81 (Knowledge City), SAS Nagar, Mohali-140306, India
   Mobile Number: 9002165460
   Email Id: amit.rai@nabi.res.in;

   amitraikvs@gmail.com