BARNA GOSWAMI

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Senior Scientific Officer, Genomic Research Laboratory, Plant Tissue Culture Section

Bangladesh Council of Scientific and Industrial Research (BCSIR Laboratories, Dhaka)

Dhaka-1205, Bangladesh

Education

Master of Science in Botany **2011 (held in March 2013)**

Plant Biotechnology group, Department of Botany, University of Dhaka, Bangladesh *Result: GPA 4.00, Grade: A+ Thesis: Agrobacterium-mediated genetic transformation of oilseed Brassica spp.*

Bachelor of Science in Botany **2010 (held in September 2012)**

Department of Botany, University of Dhaka, Bangladesh *Result: GPA 3.86, Grade: A*

Higher Secondary Certificate **2006**

Govt. Gurudayal College, Dhaka *Result: GPA 5.00, Grade: A+*

Secondary School Certificate **2004**

S.V. Govt. Girls' High School, Dhaka *Result: GPA 4.75, Grade: A*

Professional Experience

Senior Scientific Officer **November 2020 - Present**

Genomic Research Laboratory, Plant Tissue Culture Section, BCSIR Dhaka Laboratories

Bangladesh Council of Scientific and Industrial Research, Dhaka, Bangladesh

Scientific Officer **July 2015 - November 2020**

Genomic Research Laboratory, Plant Tissue Culture Section, BCSIR Dhaka Laboratories

Bangladesh Council of Scientific and Industrial Research, Dhaka, Bangladesh

Research Associate **December 2013 - June 2015**

Plant Breeding and Biotechnology Laboratory, Department of Botany University of Dhaka, Dhaka, Bangladesh

Technical Skills and Competences

- **Molecular Techniques:** DNA/RNA Extraction, PCR, qPCR, Molecular Cloning, CRISPR-Cas9, ELISA, Primer Design
- **Genomics & Sequencing:** NGS Library Prep (Illumina platforms), Whole Genome Sequencing (WGS), Target Enrichment
- **Bioinformatics:** Web-based workflow platform (Galaxy, Mega), Prokaryotic Genome Annotation (Prokka), Comparative Genomics (Proksee, BRIG), De novo Assembly (SPAdes)
- **Genetic Transformation:** Agrobacterium-mediated genetic transformation

Computational Skills

- **Programming:** R Studio
- **Operating Systems:** Windows

Research Grants (Selected)

- **Principal Investigator:** In vitro regeneration and Agrobacterium–Mediated Genetic Transformation of Chili pepper (Capsicum spp.)
- **Principal Investigator:** Enhancement of Secondary Metabolites in in vitro cultures of Withania somnifera (L.) Dunal with Methyl Jasmonate Elicitor
- **Principal Investigator:** Volatile profiling and in vitro regeneration of traditional rice varieties (kalijira, Kataribhog, Rajvog, Maloti, Doairgura, Jirabhog, kaliguchi) in Bangladesh
- **Principal Investigator:** Special Research Grants from Ministry of Science and Technology: In vitro regeneration of Withania somnifera (L.) Dunal, a rare special important medicinal plant in Bangladesh
- **Principal Investigator:** Special Research Grants from Ministry of Science and Technology: Assessment of Phytochemical Potentials of Elicitor Induced Regenerated plants of Withania somnifera (L.) Dunal

Current Research Projects

- In vitro regeneration and Agrobacterium–Mediated Genetic Transformation of Chili pepper (Capsicum spp.)
- Enhancement of Secondary Metabolites in in vitro cultures of Withania somnifera (L.) Dunal with Methyl Jasmonate Elicitor
- Xanthan gum extraction from Xanthomonas spp isolated from local plant source
- A Metagenomic Approach to Evaluate Water and Airborne Microbiome in Dhaka City
- High efficiency regeneration system of Gynura procumbens (Lour.) Merr. an important medicinal plant and identification of its active compounds through NMR profiling
- Genome analysis of PGPR to evaluate their role as growth promotor abiotic stress tolerance in plants
- Construction of a plasmid vector against Pneumococcal surface protein antigen in Streptococcus pneumonia
- Establishment of Genomics Research Laboratory ADP project for the use of Next Generation Sequencing (NGS) increasing the capability of genomics research
- Qualitative and quantitative determination of bioactive metabolites in field grown plants, in vitro grown plants and callus tissues obtaining from Rauwolfia serpentina L and Bacopa monnieri L.
- CRISPR-Cas9 mediated genome editing in Tomato
- Extraction and characterization of exo-polysaccharides (EPS) from plant pathogenic bacteria
- Methyl Jasmonate and salt stress induced modulation of Bacoside-A production and biosynthetic gene expression in Bacopa monnieri (L.) Wettst
- Agrobacterium Mediated Genetic Transformation of PspA gene in to Lactuca sativa L
- Isolation and Characterization of biopolymer producing bacteria soil
- Landscaping of soil microbiome in Bangladesh

Training Experiences

- Successfully completed 2nd Special Foundation Training Course for the officials of BCSIR organized by BPATC from 04 April to 02 June 2016 and awarded first position 2016
- Participated in NovaSeq 6000 instrument training at Illumina Way San Diego, CA, USA 13 May 2019
- Completed Introductory course in Applied Microbial Genomics for public health and Antimicrobial resistance organized by The Peter Doherty Institute for Infection and Immunity, University of Melbourne 2-6 December 2019
- Successfully completed LC-MS training organized by BCSIR 19-23 June 2024
- Training on Next Generation Sequencing system, Central Laboratories Facilities, BCSIR, Dhaka 26-28 January 2019
- Training for NovaSeq Sequencing System, Illumina, Inc., Singapore 25-29 November 2018

- Bioinformatics Training Course by Diagnosis, London, UK 28 July - 29 September 2018
- Training on Genetic Analyzer (Capillary System) and Next Generation Sequencer, Central Laboratories Facilities, BCSIR, Dhaka 6-12 June 2018
- Completed Training on Operation and maintenance of HPLC 16-20 March 2025
- Successfully completed a training program on Basic principle, maintenance and troubleshooting of XRD, FTIR and Raman Spectroscopy 21 May 2025
- Participated in a training program on Research Methodology and Publication 26 May 2025

Lab Experiences

- Tissue Culture and Breeding
- Agrobacterium-mediated genetic transformation
- Isolation of genomic and plasmid DNA
- Gene cloning
- PCR, Isozyme analysis
- Molecular marker analysis
- EPS production using Fermenter
- Library preparation for NGS and Sanger sequencing

Publications (Selected)

1. Al Sium SM, **Goswami B**, Chowdhury SF, Naser SR, Sarkar MK, Faruq MJ, Habib MA, Akter S, Banu TA, Sarkar MM, Khan MS. An insight into the genome-wide analysis of bacterial defense mechanisms in a uropathogenic Morganella morganii isolate from Bangladesh. *PloS One.* **2025**, 20(1), e0313141.
2. **Goswami B**, Sarkar MM, Akter S, Banu TA, Jahan I, Hossain MS, Uddin MM, Nafisa T, Molla MM, Yeasmin M, Osman E. Emergence of SARS-CoV-2 variant of interest B.1.525 (Eta) in Bangladesh. *Biologicals.* **2023**, 84, 101714.
3. **Goswami B**, Hoque MI, Khan S, Sarker RH. In vitro regeneration of three varieties of Brassica campestris L. grown in Bangladesh. *Bangladesh Journal of Scientific and Industrial Research.* **2020**, 55(3), 181-188.
4. **Goswami B**, Momtaz N, Hoque MI, Sarker RH. Performance of F1 progenies developed through crosses between Brassica carinata A. Braun (female) and Brassica rapa L (male). *Genetic Resources and Crop Evolution.* **2022**, 69(8), 2745-2753.
5. Rahman MS, Nandi NC, **Goswami B**. In vitro regeneration of Mirabilis jalapa L. *Bangladesh Journal of Scientific and Industrial Research.* **2021**, 56(1), 25-28.
6. **Goswami B**, Akter S, Nandi NC, Banu TA, Akter S, Afrin S, Habib A, Khan S. Antioxidant and antibacterial activities of four local medicinal plants. *Plant Tissue Culture and Biotechnology.* **2020**, 30(2), 179-189.
7. **Goswami B**, Khan S, Banu TA, Akter S, Islam M, Habib A. In Vitro Mass Propagation of Withania Somnifera (L.) Dunal An Important Medicinal Plant of Bangladesh. *Bangladesh Journal of Botany.* **2022**, 51(2), 191-197.
8. **Goswami B**, Banu TA, Akter S, Afrin S, Habib A, Khan S. In vitro regeneration of aromatic rice (Oryza sativa L. var. doairgura). *Bangladesh Journal of Botany.* **2022**, 51(4), 677-682.
9. **Goswami B**, Rahman A, Jahan I, Akter S, Banu TA, Osman E, Uzzaman MS, Habib A, Alam MS, Obaida AS, Sarkar MM. A rare homozygous ALX4 mutation in a Bangladeshi girl with frontonasal dysplasia type-2 (FND2). *Heliyon.* **2024**, 10(15), e34929.
10. **Goswami B**, Hoque MI, Sarker RH. Agrobacterium-mediated Genetic Transformation of oilseed Brassica juncea (L.). *Journal of Natural Sciences Research.* **2018**, 8(Special Issue for ICNST 2018).
11. Khan S, Akter S, **Goswami B**, Habib A, Banu TA, Barton C, Osman E, Samir S, Arjuman F, Hasan S, Hossain M. Whole genome mapping and identification of single nucleotide polymorphisms of four Bangladeshi individuals and their functional significance. *BMC Research Notes.* **2021**, 14(1), 105.

12. Mohammad Mahmud AS, Andersson P, Bulach D, Duchene S, da Silva AG, Lin C, Seemann T, Howden BP, Stinear TP, Taznin T, **Goswami B**. Molecular Epidemiology of SARS-CoV-2 in Bangladesh. *Viruses.* **2025**, 17(4), 517.
13. Nahian M, Shahab M, Khan MR, Akash S, Banu TA, Sarkar MH, **Goswami B**, Chowdhury SF, Islam MA, Abu Rus'd A, Begum S. Development of a broad-spectrum epitope-based vaccine against Streptococcus pneumoniae. *PLoS One.* **2025**, 20(1), e0317216.
14. Hoque MN, Sarkar MM, Rahman MS, Akter S, Banu TA, **Goswami B**, Jahan I, Hossain MS, Shamsuzzaman AM, Nafisa T, Molla MM. SARS-CoV-2 infection reduces human nasopharyngeal commensal microbiome with inclusion of pathobionts. *Scientific Reports.* **2021**, 11(1), 24042.
15. Naser SR, Chowdhury SF, Sarkar MM, Habib MA, Akter S, Banu TA, **Goswami B**, Khan MS. Exploring the potential of Bacillus spp. for secondary metabolite production through genome mining approaches. *Journal of Genetic Engineering and Biotechnology.* **2025**, 23(4), 100595.
16. Hoque MN, Sarkar MM, Khan MA, Hossain MA, Hasan MI, Rahman MH, Habib MA, Akter S, Banu TA, **Goswami B**, Jahan I. Differential gene expression profiling reveals potential biomarkers and pharmacological compounds against SARS-CoV-2: Insights from machine learning and bioinformatics approaches. *Frontiers in Immunology.* **2022**, 13, 918692.
17. Shahab M, Akter S, Sarkar MM, Banu TA, **Goswami B**, Chowdhury SF, Naser SR, Habib MA, Shaikh AA, Saki M, Zheng G. Computational design of medicinal compounds to inhibit RBD-hACE2 interaction in the Omicron variant: Unveiling a vulnerable target site. *Informatics in Medicine Unlocked.* **2023**, 40, 101281.
18. Akter S, Banu TA, **Goswami B**, Osman E, Uzzaman MS, Habib MA, Jahan I, Mahmud AS, Sarker MM, Hossain MS, Shamsuzzaman AM. Coding-complete genome sequences of three SARS-CoV-2 strains from Bangladesh. *Microbiology Resource Announcements.* **2020**, 9(39), 10-128.
19. Sarkar MM, Naser SR, Chowdhury SF, Khan MS, Habib MA, Akter S, Banu TA, **Goswami B**, Jahan I, Nayem MR, Hassan MA. M gene targeted qRT-PCR approach for SARS-CoV-2 virus detection. *Scientific Reports.* **2023**, 13(1), 16659.
20. Hoque MN, Rahman MS, Sarkar MM, Habib MA, Akter S, Banu TA, **Goswami B**, Jahan I, Hossain MA, Khan MS, Islam T. Transcriptome analysis reveals increased abundance and diversity of opportunistic fungal pathogens in nasopharyngeal tract of COVID-19 patients. *PLoS One.* **2023**, 18(1), e0278134.
21. Rahaman MM, Sarkar MM, Rahman MS, Islam MR, Islam I, Saha O, Akter S, Banu TA, Jahan I, Habib MA, **Goswami B**. Genomic characterization of the dominating Beta, V2 variant carrying vaccinated (Oxford-AstraZeneca) and nonvaccinated COVID-19 patient samples in Bangladesh: A metagenomics and whole-genome approach. *Journal of Medical Virology.* **2022**, 94(4), 1670-1688.
22. Mahmud AS, Seers CA, Shaikh AA, Taznin T, Uzzaman MS, Osman E, Habib MA, Akter S, Banu TA, Sarkar MM, **Goswami B**. A multicentre study reveals dysbiosis in the microbial co-infection and antimicrobial resistance gene profile in the nasopharynx of COVID-19 patients. *Scientific Reports.* **2023**, 13(1), 412.
23. Akter S, Oliveira JI, Barton C, Sarkar MH, Shahab M, Banu TA, **Goswami B**, Osman E, Uzzaman MS, Nafisa T, Molla MA. Spike protein mutations and structural insights of pangolin lineage B.1.1.25 with implications for viral pathogenicity and ACE2 binding affinity. *Scientific Reports.* **2023**, 13(1), 13146.
24. Akter S, Shahab M, Sarkar MM, Hayat C, Banu TA, **Goswami B**, Jahan I, Osman E, Uzzaman MS, Habib MA, Shaikh AA. Immunoinformatics approach to epitope-based vaccine design against the SARS-CoV-2 in Bangladeshi patients. *Journal of Genetic Engineering and Biotechnology.* **2022**, 20(1), 136.

Conference Presentations

- Presented oral and poster presentations in many national and international conferences

Thesis Supervision

- Supervised two MS students. Another student's MS thesis research is ongoing under supervision

Professional Memberships

- Bangladesh Botanical Society (BBS) - Life Member
- Bangladesh Association of Plant Tissue Culture & Biotechnology (BAPTC&B) - Life Member
- Scientist Forum of Bangladesh Council of Scientific and Industrial Research
- Member at AFOB (Asian Federation of Biotechnology)

Professional Trainings

- See "Training Experiences" section above

Awards

- First position in 2nd Special Foundation Training Course for BCSIR officials, BPATC 2016
- NST Fellowship for postgraduate research from MOST
- Dean's Award for outstanding achievement in Honours examination

References

- **Dr. Rakha Hari Sarker**
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- **Dr. Tanjina Akhtar Banu**
  Principal Scientific Officer, Genomic Research Laboratory
  Plant Tissue Culture Section, BCSIR Laboratories, Dhaka
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