SAJJADUR RAHMAN

MSc Researcher · Soil Science & Environmental Chemistry
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RESEARCH PROFILE

Soil scientist and environmental researcher specializing in nitrogen use efficiency (NUE), slow-release and nano-fertilizer technologies, and heavy-metal characterization in atmospheric and agricultural systems. Currently pursuing an MSc at the University of Dhaka with simultaneous affiliations at BCSIR and the Dhaka University Nanotechnology Centre (DUNTC). Developer of SPADE — an open-source Python/Streamlit platform for standardized NUE statistical analysis. National Science and Technology Fellow (Ministry of Science and Technology, Bangladesh). Presented research at eight international and national conferences across four countries. Seeking fully funded postgraduate or research opportunities in soil/environmental science or sustainable agriculture.

EDUCATION

Master of Science — Soil Science | University of Dhaka Apr 2025 – Present

CGPA: In progress · National Science and Technology Fellow (Ministry of Science and Technology)
Thesis: Optimizing Nitrogen Efficiency Using Bentonite–Biochar–Coated Urea (BBCU) in Rice and Eggplant Systems

- Core coursework: Advanced Soil Physics · Advanced Soil Chemistry · Soil Carbon Dynamics & Organic Matter Management · Coastal & Wetland Soil Management · Analytical Techniques · Experimental Design · Environmental Biotechnology

Bachelor of Science — Soil, Water, and Environment | University of Dhaka Jan 2020 – Jan 2025

CGPA: 3.60 / 4.00 · Government Scholarship for Academic Excellence

- Relevant coursework: Soil Physics · Pedology · Soil Chemistry · Biostatistics · Ecology · GIS & Remote Sensing · Hydrology · Plant Nutrition · Climate Change Mitigation & Adaptation · Agronomy · Soil Microbiology
- Seminar paper: Internet of Things (IoT) in the Development of Agriculture 5.0: Prospects and Challenges
- Laboratory training: soil morphology, environmental chemistry, GIS/remote sensing, biostatistics (R), hydrology, petrology & mineralogy

RESEARCH EXPERIENCE

MSc Thesis Researcher | University of Dhaka | May 2025 – Present

Optimizing Nitrogen Efficiency Using Bentonite–Biochar–Coated Urea in Rice and Eggplant Systems

- Designing CRD-based pot and field experiments (8 treatments × 3 replications) evaluating biochar–bentonite-coated urea as a climate-smart slow-release fertilizer for South Asian rice–vegetable systems.
- Quantifying four NUE indices — Agronomic Efficiency (AE), Recovery Efficiency (RE), Physiological Efficiency (PE), and Nitrogen Harvest Index (NHI) — against an unfertilized control.
- Post-harvest soil analysis: residual NH_4^+/NO_3^- (KCl extraction), available nutrients, Walkley-Black OC, pH, and EC.
- Developing field-scalable, climate-smart fertilizer management strategies for Bangladesh's rice–vegetable agroecological conditions.
- Awarded National Science and Technology Fellowship (Ministry of Science and Technology, Bangladesh) for this research.

Research Assistant |Dhaka University Nanotechnology Centre (DUNTC) | Apr 2025 – Apr 2026

Role of Nano-Fertilizers on Growth, Yield, and Nutrient Quality of Wheat (BARI Gom 33)

- Conducted a CRD pot experiment (8 treatments × 3 replications, 24 pots) comparing nano-urea versus conventional urea application methods on wheat growth and soil health.

- After hail damage, redirected focus to plant tissue nutrient quality (Kjeldahl N, protein estimation at N% × 5.7, P/K/S/Ca/B via AAS and ICP-OES) and NUE indices.
- Post-harvest soil dynamics: residual mineral N, available nutrients, pH, EC, and Walkley-Black organic carbon to assess fertilizer carry-over effects.
- Developed SPADE (Statistical Platform for Agronomic Data Evaluation) — an open-source Python/Streamlit application for integrated NUE computation, factorial ANOVA with Tukey HSD, outlier detection, and publication-ready figure export; manuscript in preparation.
- Managed a master sample log covering 24-pot tissue and soil datasets; prepared project completion report for DUNTC.

Research Trainee — Atmospheric Pollution & Metal Analysi | Bangladesh Council of Scientific and Industrial Research (BCSIR) | Nov 2025 – Present

- Conducting ultrafine particulate matter ($PM_{0.1}$) sampling in Dhaka's urban environment using Nanosampler II (Model 3182, Kanomax, Japan).
- Performing heavy-metal characterisation via AAS (Varian AA 240 FS) to assess atmospheric contamination and ecological risk indices.

Research Assistant |Department of Soil, Water & Environment, University of Dhaka | 2025 – Present

Phytoremediation Efficiency of Indoor Plants in Optimizing Indoor Air Quality

- Assisting with study design and methodology development for evaluating the phytoremediation potential of selected indoor plant species under controlled indoor conditions.
- Contributed to plant procurement and transportation to experimental sites; assisted with air quality monitoring, data collection, and will contribute to analysis and reporting through project completion.

Principal Investigator (Self-Funded) | Independent Research Team, Dhaka| Jan 2025

Integrated Assessment of Heavy Metal Contamination in Industrial Areas of Dhaka

- Led a four-member team collecting and analysing 40+ soil, dust, and leaf samples from industrial zones surrounding Dhaka.
- Assessed spatial distribution, contamination indices (geo-accumulation index, enrichment factor), and ecological risk factors of heavy metals affecting surrounding agro-ecosystems.

Graduate Seminar Researcher |University of Dhaka Jun 2024 – Sep 2024

- Reviewed 60+ peer-reviewed publications on IoT applications in Agriculture 5.0; presented evidence-based recommendations to faculty and peers on smart farming technologies for Bangladesh.

Undergraduate Research Group Member | University of Dhak | Jan 2023 – Nov 2025

- Collaborated with a 3–5-member team on sustainable agriculture and climate resilience projects.
- Conducted socio-economic surveys on organic fertilizer adoption in Dhaka's urban/peri-urban farming systems; manuscript in preparation.
- Presented findings at four international conferences (2024–2025).

PUBLICATIONS & SOFTWARE

Manuscripts in Preparation

1. Rahman, S., Hossain Rubab, M. M., Payal, M. P., Maksud, F. H., & Islam, R. Organic Fertilizer Adoption Completeness Among Urban Growers in Dhaka: Site Type as a Determinant of Exclusive Versus Mixed Organic-Synthetic Practice. Target: Urban Agriculture & Regional Food Systems (Wiley/ASA-CSSA) / Sustainability (MDPI)

2. Rahman, S. Environmental and Agricultural Governance in Post-July Bangladesh: Accountability, Reform and Sustainable Futures. Prepared for 2nd International Conference on the July Revolution (ICJR-II), 19 July 2026, University of Dhaka
3. Rahman, S. SPADE: An Integrated Open-Source Framework for Standardised Nitrogen Use Efficiency Analysis in Small-Plot Agricultural Experiments. Target: Computers and Electronics in Agriculture (Elsevier) / SoftwareX

Software

— **SPADE v1.0** — Statistical Platform for Agronomic Data Evaluation. Open-source Python/Streamlit application for NUE computation (five indices), factorial ANOVA with Tukey HSD and compact letter display, outlier detection (Dixon's Q, Grubbs), and publication-ready PNG/JPG figure export. GitHub: [repository URL — forthcoming]

Conference Presentations & Proceedings

1. Rahman, S. (2025, September). Nano-fertilizers in wheat cultivation: A comprehensive review and strategic framework for sustainable productivity and biofortification. https://doi.org/10.13140/RG.2.2.29613.35043
2. Rahman, S., Hossain Rubab, M. M., Payal, M. P., Maksud, F. H., & Islam, R. (2024, December). Economic viability and sustainability of hydroponics in flood-prone Bangladesh. Asian Institute of Technology International Conference, Bangkok, Thailand.
3. Rahman, S. (2024, December). Internet of Things (IoT) on the development of Agriculture 5.0: Prospects and challenges. In G. N. Günay (Ed.), Proceedings of the 3rd International Ege Congress on Scientific Research (pp. 170–178). IKSAD Publishing House. https://doi.org/10.13140/RG.2.2.17269.69600
4. Rahman, S., Hossain Rubab, M. M., Payal, M. P., Maksud, F. H., & Islam, R. (2024, June). Climate change and resilient farming approaches in Bangladesh: A review of potential impacts and adaptation strategies. In Proceedings of the International Congress on Food, Agriculture and Environmental Research in the Global World. https://doi.org/10.13140/RG.2.2.33718.72005
5. Rahman, S., Hossain Rubab, M. M., & Payal, M. P. (2024, May). Developing a smart, sustainable agriculture initiative in Bangladesh: A data-driven approach to ensuring food security and minimizing environmental impact. In Proceedings of the HODJA AKHMET YASSAWI 8th International Congress on Scientific Research. https://doi.org/10.13140/RG.2.2.35396.44165
6. Rahman, S., Hossain Rubab, M. M., Payal, M. P., Maksud, F. H., & Islam, R. (2024, March). Navigating sustainability in urban landscapes: Assessing organic fertilizer adoption and challenges among farmers in the Dhaka region, Bangladesh. In Proceedings of the International Congress on Sustainable Agriculture. https://doi.org/10.13140/RG.2.2.21075.55849
7. Rahman, S., Hossain Rubab, M. M., & Payal, M. P. (2023, May). Improving crop productivity in Bangladesh through advanced yield prediction techniques. In Proceedings of the IEEE SIGHT Student Branch, University of Dhaka "Ideas for Life" Conference. https://doi.org/10.13140/RG.2.2.16907.36644
8. Rahman, S., Hossain Rubab, M. M., & Payal, M. P. (2022, November). An assessment and analysis of Bangladesh's agricultural approach based on technology. In Proceedings of the 2nd International Competition for Young Researchers 2022. https://doi.org/10.13140/RG.2.2.13587.96809

TECHNICAL SKILLS

Instrumentation: Nanosampler II (Kanomax Model 3182) · AAS (Varian AA 240 FS) · ICP-OES (multi-element tissue analysis)

Analytical Methods: Kjeldahl N digestion & distillation · Protein estimation (N% × 5.7) · Walkley-Black OC · Indophenol blue colorimetry (NH_4^+) · KCl soil extraction · EC/pH measurement · Contamination indices (geo-accumulation, enrichment factor, ecological risk)

Experimental Design: CRD · RCBD · pot and field experiments · leaching columns · jar-based volatilisation · NUE index calculation (AE, RE, PE, NHI, PFP) · N release kinetics modelling (zero-order, first-order, Korsmeyer-Peppas, Higuchi)

Computing & Data: Python (Streamlit, pandas, scipy, matplotlib, statsmodels — developer of SPADE) · R (biostatistics, ANOVA, regression) · Excel (advanced) · SPSS · Minitab · GitHub (forthcoming)

Spatial Analysis: QGIS · remote sensing · ArcGIS (basic)

Laboratory: Soil & water chemistry · soil morphological analysis · microbiological analysis · hydrology · heavy metal speciation
Scientific Communication: Zotero · scientific writing · Wiley Researcher Academy certified · Stanford Writing in the Sciences certified · manuscript preparation for international journals
Software & Tools: Microsoft Office · Google Suite · LaTeX (basic) · Streamlit (dashboard development)

AWARDS & FELLOWSHIPS

2026	National Science and Technology Fellowship — Ministry of Science and Technology, Bangladesh
2026	Government Scholarship for BSc Academic Excellence — Government of Bangladesh
2025	Research Fellowship — Dhaka University Nanotechnology Centre (DUNTC)
2025	Transforming Dhaka into an Eco-Friendly Megacity — Preliminary Round Winner, Ministry of Youth & Sports
2025	Academic Admission — Wageningen University & Research (WUR), The Netherlands, MSc Soil Science (Student No. 1841033; self-funding not viable)
2023	Project GreenZen: Seaweed-Based Biodegradable Packaging — Top 10% of 50 competing teams
2022	Gold Award — 2nd International Competition for Young Researchers (top 10%)
2020	Jahangir Alam Education Foundation Scholarship
2017 & 2019	Talent Pool Scholarships — SSC 2017 · HSC 2019

LEADERSHIP & ACADEMIC SERVICE

President | Soil Club – University of Dhaka Chapter |Nov 2025 – Present
- Conceptualised and coordinated the 'Healthy Soils for Healthy Cities' World Soil Day 2025 campaign — 50,000+ outreach; delivered a technical presentation on organic fertilizer adaptation for urban soil sustainability to an international audience.

Class Representative | MS Session 2023-24, University of Dhaka | Mar 2025 – Present
- Representing 120+ students; coordinating between students, faculty, and administration; assisting professors with scheduling and departmental communications.

Magazine Editor | Byapon – Youth Science Magazine | Jan 2022 – Dec 2024
- Edited and authored science content; led editorial and design strategy reaching 5,000+ youth readers in Bangladesh.

Research Intern / Workshop Organiser| UniV | Dec 2021 – Sep 2024
- Organised 30+ workshops on research methods, R, bioinformatics, IELTS, and Python for 500+ students; collaborated with 20+ researchers on academic and environmental seminars.

Student Mentor & Counsellor | University of Dhaka Jan 2021 – Present
- Mentored 100+ students in academic guidance, research skills, and idea development.

Campus Research Co-Ambassador | Be Researcher World Forum | Mar 2021 – Mar 2022
- Coordinated 15+ webinars on environmental/agricultural research for 100+ students; led the graphics and design team.

Executive Secretary | Dhaka University Model OIC Club | Feb 2020 – Feb 2022

- Managed research/public relations teams and communications for 50+ members; oversaw academic and environmental policy-related student projects.

PROFESSIONAL DEVELOPMENT

Aug 2025	Writing in the Sciences — Stanford University (Coursera)
Dec 2025	Key Components of a Research Article — Wiley Researcher Academy
Sep 2024	Green Skills and Social Accountability — Global Youth Leadership Center
Jan 2024	Introduction to R — UniV
Jan 2021	Research Methodology — Be Researcher World Forum

LANGUAGES

English — Proficient. IELTS 7.5: Listening 8.0 · Reading 8.0 · Speaking 7.5 · Writing 6.5 ·
Bangla — Native

REFERENCES

Dr. Mohammad Enayet Hossain · Associate Professor, Department of Soil, Water & Environment, University of Dhaka · enayetswe@du.ac.bd · +8801746661122

Additional references available on request.