

DEBASHIS CHAKRABORTY, Ph.D.

Principal Scientist | Soil Physics • Soil Informatics • Sustainable Agricultural Systems

ICAR–Indian Agricultural Research Institute, New Delhi, India

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CORE EXPERTISE

Soil physics, hydrology and soil–water–plant relations
Conservation agriculture and climate-smart intensification
Remote sensing, GIS, machine learning and soil informatics
Nutrient-use efficiency, soil carbon and environmental services
Research leadership, decision support and capacity development

EDUCATION

Ph.D., Agricultural Physics
ICAR-IARI, New Delhi
M.Sc., Agricultural Physics
ICAR-IARI, New Delhi
B.Sc. (Ag.) Hons.
BCKV, West Bengal

RECOGNITION

Fellow, National Academy of Agricultural Sciences
ICAR National Fellow (2017–2023)
Fellow, West Bengal Academy of Science & Technology
Rothamsted International Postdoctoral Fellowship
Australia Award Fellowship; Visiting Scientist, IIRI
Dr. K.G. Tejwani Award and ISSS Congress Commemoration Award (2021)

SCIENTIFIC PROFILE

100+ peer-reviewed publications
Postgraduate faculty since 2002; supervised 7 PG researchers and 1 postdoctoral fellow.

PROFESSIONAL PROFILE

Agricultural systems scientist with 20+ years of research-for-development experience across soil physics, soil–water–plant relations, conservation agriculture, plant nutrition, remote sensing, GIS, machine learning and spatial analytics. Proven record of leading national and international programmes and translating science into farmer-ready solutions, decision-support tools and policy-relevant evidence.

PROFESSIONAL EXPERIENCE

June 2026 – Present Officer on Special Duty to Secretary, DARE and DG, ICAR

2025–April 2026 Principal Scientist — ICAR-IARI, New Delhi

Research, postgraduate teaching and programme leadership in soil physics, soil informatics and sustainable resource management.

2023–2025 Senior Cropping Systems Agronomist — CIMMYT

Led soil health, salinity-risk mapping and digital agronomy work across CWANA and South Asia; contributed to multi-partner proposals exceeding US\$10 million.

2017–2023 National Fellow — Indian Council of Agricultural Research

Directed regional root-zone soil-moisture mapping by integrating field measurements, remote sensing and modelling for agroadvisory services.

2010–2017 Principal Scientist / Senior Scientist — ICAR-IARI

Advanced long-term tillage–nutrient research, soil physical health assessment, hyperspectral crop-water studies and postgraduate mentoring.

2001–2010 Scientist / Scientist (Senior Scale) — ICAR-IARI

Developed pedotransfer functions and GIS-based approaches for soil hydraulic properties, groundwater and land-resource assessment.

International Postdoctoral Fellow, Rothamsted Research (2012–2013); Visiting Scientist, IIRI (2016–2017)

SELECTED CONTRIBUTIONS & IMPACT

Developed and applied water–nitrogen production functions, pedotransfer functions and a decision-support system for soil physical health to improve resource-use decisions.

Integrated satellite, proximal-sensing and machine-learning approaches for soil moisture, evapotranspiration, land-surface temperature and soil organic carbon assessment.

Generated influential evidence on direct-seeded rice, no-tillage, conservation agriculture and integrated nutrient management, linking soil structure and roots with water use, productivity and carbon stabilization.

Led multi-institutional and donor-funded projects with national systems, CGIAR centres and development partners; coordinated research and training in India, Central Asia, North Africa and South Asia.

Trained more than 100 scientists and extension professionals in soil and water management, conservation agriculture, GIS and digital tools.

SELECTED PROGRAMME LEADERSHIP

CGIAR From Fragility to Resilience (CWANA) • ICAR Regional Root-Zone Soil Moisture Mapping • NASF rapid soil-health assessment using hyperspectral reflectance • DST land-use planning and participatory geoinformatics programmes.

REPRESENTATIVE RESEARCH THEMES

Conservation agriculture and sustainable intensification • Soil structural resilience and root functioning • Water and nutrient-use efficiency • Digital soil diagnostics and MRV • Climate impacts on soil–plant processes.

SELECTED PUBLICATIONS

Ghosh, T., Chakraborty, D., et al. (2026) Open data synergy for near-real-time field-scale irrigation: Integrating evapotranspiration and root-zone soil moisture. *Agricultural Water Management* 333, 110531.

Chakraborty, D., Ladha, J.K., Das, B., et al. (2025) Global insights into nitrogen losses and efficiency in rice, wheat, and maize cultivation. *Field Crops Research*, 334, 110138.

Das, B., Rathore, P., Roy, D., Chakraborty, D., et al. (2023). Ensemble surface soil moisture estimates at farm-scale combining satellite-based optical-thermal-microwave remote sensing observations. *Agricultural & Forest Meteorology* 339, 109567.

Mondal, S. & Chakraborty, D. (2022). No-tillage effects on soil structure and porosity: a global meta-analysis. *Geoderma* 405, 115443.

Jat M.L., Chakraborty, D., et al. (2020). Conservation agriculture for sustainable intensification in South Asia. *Nature Sustainability* 3, 336–343.

Chakraborty, D., et al. (2017). Global analysis of alternative tillage and crop establishment for rice production. *Scientific Reports* 7, 9342.