

Dr Banda Sainath, PhD



Scientist | ICAR Agricultural Research Service

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Profile

Agricultural economist working on environmental and natural resource economics, carbon farming and credit markets, ecosystem services, and livestock economics. Research includes smallholder market integration, irrigation externalities, dairy systems and economy-wide policy analysis. Completed a PhD in Agricultural Economics at ICAR-National Dairy Research Institute, Karnal, in 2026.

Research focus

Environmental impact assessment; valuation of ecosystem services and disservices; carbon farming, carbon markets, and green credits; livestock and dairy economics; water-use efficiency; smallholder livelihoods and market access; trade policy and computable general equilibrium modelling.

Education

2026	PhD in Agricultural Economics ICAR-National Dairy Research Institute, Karnal, Haryana. Thesis: Economic analysis of externalities of urban and peri-urban dairies in Hyderabad.
2019	Master's degree in Agricultural Economics College of Agriculture, GKVK, University of Agricultural Sciences, Bengaluru, Karnataka. Grade: 9.43. Thesis: An economic analysis of different water-use regimes in the Godavari command area of Telangana.
2017	BSc in Agriculture Professor Jayashankar Telangana State Agricultural University, Rajendranagar, Hyderabad, Telangana. Grade: 8.88.

01 Research portfolio

Scientist in Agricultural Economics, ICAR Research Complex for Eastern Region, Patna. Research and policy contributions cover carbon credits, agricultural markets, dairy economics, climate stress and trade shocks.

Student Fellow, Agri-Consortia Research Platform on Water, supported by ICAR-Indian Institute of Water Management, during the master's programme at UAS Bengaluru. Studied irrigation costs, externality costs, water use efficiency and energy costs across groundwater, surface water and conjunctive water use regimes.

Research projects and contributions

Voluntary carbon credit potential in Bihar

Principal investigator

Led "Unlocking Carbon Credit Potential: An Assessment of Voluntary Carbon Credit Potential in Bihar". Used discrete choice experiments with farmers in Climate Resilient Agriculture villages and conditional logit, mixed logit and latent class models to analyse preferences for incentives, payment timing, training and institutional support. Developed a farmer-centred policy framework and initiated extension at farmer producer organisation level.

Ecosystem services of indigenous livestock

Co-principal investigator

Assessment of Ecosystem Services Rendered by Indigenous Livestock and Poultry Species and Breeds. Developed a life-cycle valuation framework for female Murrah buffalo, covering provisioning, socio-cultural, regulating, and supporting services, as well as environmental disservices.

Climate resilience of smallholder dairy systems

Co-principal investigator

Building Resilience Model for Vulnerable Hotspots to Climate Change in Smallholder Dairy Production Systems of the Indo-Gangetic Plain, funded by the National Agricultural Science Fund. Applied GIS and Fuzzy Cognitive Mapping to assess climate vulnerability and heat and cold stress.

Climate Resilient Agriculture Programme

Co-principal investigator

Government of Bihar-funded programme supporting technology demonstrations and farmer engagement in Gaya and Buxar. Contributed to climate-resilient farming demonstrations, carbon-credit awareness and farmer-scientist interactions.

Framework development

Developed a discrete choice experiment-based framework for eliciting smallholder preferences for voluntary carbon credit programmes. Grounded in Random Utility Theory, the framework uses structured face-to-face choice experiments to quantify preferences for programme attributes.

Project development

Submitted an ICAR Young Scientist Project proposal, “Pilot study on Incentives, Institutions, and Impact: A Comprehensive Assessment of the Voluntary Carbon Credit Potential under Different Cropping Systems for Smallholder Farmers in Eastern Region”.

Methods and analytical tools

Discrete choice experiments; conditional logit, mixed logit, and latent class models; econometrics; ecosystem services valuation; CGE modelling; GIS; analytic hierarchy process; time-series analysis. Software: R, Python and SQL.

02 Teaching and development

- Course leader for Agricultural Marketing, Trade and Prices; Fundamentals of Agricultural Economics; and Agricultural Finance and Co-operation, including theory and practical teaching.
- Course leader for Agri-Business Management, a 2+1 elective, including theory and practical classes; course associate for NCC-II/NSS-II.
- Undergraduate Co-Coordinator, IARI Patna Hub: supported admissions, certificate verification, scholarships, course and examination schedules, student records, fund utilisation, invigilation and Academic Management System activities.
- External examiner for an MSc (Agriculture) viva voce examination at Banaras Hindu University, Varanasi.

Professional development

CGE Modelling

- Foundations of Computable General Equilibrium Modelling for Economic Policy Analysis, IFPRI and ICAR-NAARM, Hyderabad, 23-27 June 2025.

Related policy work

- Distributional Consequences of U.S. Tariff Shocks on India's Economy: Insights from a Computable General Equilibrium Model. Policy Paper No. 04/2025 (2025).
- From global trade shocks to rural livelihoods: Sectoral analysis of U.S. reciprocal tariffs on India's agro-economy. Policy Brief RCER/Policy/2025/01 (2025). [View publication](#)
- Iran war supply chain disruptions: Impacts on India's economy. IFPRI policy blog on the Middle East crisis, 25 June 2026. [View publication](#)

Professional attachment and other training

- Professional Attachment Training, International Maize and Wheat Improvement Center (CIMMYT), Hyderabad.
- Foundation Course for Agricultural Research Service (FOCARS), ICAR, 2023.
- Critical Thinking, Karmayogi Bharat programme delivered by ISB Hyderabad, 14 January 2025.
- Developing Competency in Econometrics, ICAR-NAARM, Hyderabad, 22-26 July 2024.
- Six-day workshop on the TechSIM simulation model for technology diffusion, adoption and impact forecasting, NRRI, Cuttack, 30 September-5 October.
- Advanced Analytics in R, covering regression, logit and Tobit models, ARIMA forecasting and multivariate analysis; online courses in Python and SQL for data science.

Awards and fellowships

- Best Presentation Award, PAVER-2025 National Seminar, ICAR-RCER, Patna, for "Carbon Credits for Smallholder Farmers in Eastern India: Opportunities and Challenges in Conservation Agriculture" (February 2025).
- University of Agricultural Sciences, Bengaluru Gold Medal for General Merit and five sponsor medals at the 54th Convocation for the master's degree.
- All India Rank 16 in ICAR-JRF; ICAR fellowship recipient during the master's programme.
- All India Rank 11 in ICAR-SRF (2020); institute scholarship recipient for doctoral studies at ICAR-NDRI, Karnal.
- Qualified UGC-NET in Economics in 2020 and 2022.

03 Publications

Research articles

1. **Sainath, B.**, Kumar, U., Mukherjee, A., Dubey, R., Kumar, A., Das, A., Singh, D. K., Raman, R. K., & Kewal, R. (2026). A discrete choice experiment-based framework for designing farmer-centric voluntary carbon credit programs: A policy perspective. *Journal of Environmental Management*, 404, 129450. [View publication](#)
2. **Sainath, B.**, Bellundagi, V., & Reddy, A. A. (2026). Smallholder market integration and marketing channel choice: Evidence from paddy farmers in Eastern India. *SN Business & Economics*, 6(8). [View publication](#)
3. **Sainath, B.**, & Singh, A. (2026). Prioritizing Strategies for Sustainable Urban Dairy Management: Evidence using the Analytical Hierarchy Process. *Indian Journal of Dairy Science*, 79(4). [View publication](#)
4. Ramanjaneya Reddy, K., **Sainath, B.**, Karra Madhavi Latha, Subrata, B., & Ahuja, K. (2025). Economic analysis of the production and utilization pattern of milk and milk products in Andhra Pradesh. *Agriculture Association of Textile Chemical and Critical Reviews Journal* (2025) 67-72. [View publication](#)
Corresponding author: **Banda Sainath**.
5. Mukherjee, A., Singh, D. K., Kumar, U., Shubha, K., Roy, S., Yadav, V. K., Pradhan, K., Raman, R. K., Kumar, A., **Sainath, B.**, Pal, A. K., Raghav, D. K., Shekhar, S., & Das, A. (2026). Evaluating webinar effectiveness in post COVID digital learning: A multi-stakeholder assessment using Fuzzy-AHP and clustering analysis. *Frontiers in Education*, 11, 1768768. [View publication](#)
6. Mohapatra, S., **Sainath, B.**, K. C., A., Lal, H., K., N. R., Bhandari, G., Nyika, J., & R., S. (2025). Application of blockchain technology in the agri-food system: A systematic bibliometric visualization analysis and policy imperatives. *Journal of Agribusiness in Developing and Emerging Economies*, 15(2), 288-310. [View publication](#)
7. Mukherjee, A., Roy, S., Pradhan, K., Yadav, V. K., Shubha, K., Singh, D. K., Anand, S., Barua, S., Rakshit, S., Raman, R. K., Kumar, U., **Sainath, B.**, Pal, A. K., & Das, A. (2025). Current challenges and solutions for sustainability of Farmers Producer Organisations through grassroots organisational ecosystem. *Current Science*, 128(7), 699-709. [View publication](#)
8. Kumar, A., Kumar, R., Sarkar, S., Singh, D. K., Kumar, U., Sundaram, P. K., Kewal, R., **Sainath, B.**, Raman, R. K., Das, A., Kumar, S., Mukherjee, A., Dubey, R., Meena, V. S., & Jat, R. K. (2025). Comparative assessment of energy-cum-carbon flow of diverse tillage production systems for cleaner and sustainable crop production in the middle Indo-Gangetic Plains of South Asia. *Frontiers in Sustainable Food Systems*, 9, 1597449. [View publication](#)
9. Singh, D. K., Kumar, U., Sarma, K., Raman, R. K., & **Sainath, B.** (2025). Systems, extent and constraints of tenant farming in Bihar: An exploratory study. *Journal of AgriSearch*, 12(1), 49-53. [View publication](#)
10. Sarkar, B., Sundaram, P. K., Jeet, P., Deokaran, Ramkewal, Jeet, I., Anurag, A. P., Bhatt, B. P., **Sainath, B.**, Mukherjee, A., Kumar, U., Kumar, A., Upadhyaya, A., & Das, A. (2025). Custom hiring centres for climate smart agriculture: Profitability, performance and policy outlook. *Journal of AgriSearch*, 12(4). [View publication](#)
11. **Sainath, B.**, & Murthy, P. S. (2021). Economic Analysis of Irrigation Water under Different Water Use Regimes in Godavari Command Area. *Economic Affairs*, 66(2), 305-310. [View publication](#)
12. Roy, A., **Sainath, B.**, & Lakshmipriya, P. (2021). The patterns of livestock products consumption in India: A recent trends and future prospects. *Journal of Pharmacognosy and Phytochemistry*, 10(1), 376-379. [View publication](#)

13. Shilpa, B., Bhopale, P. P., & **Sainath, B.** (2021). Constraints Faced and Suggestions Received by Self Help Group Members of Akola District, Maharashtra. *Asian Journal of Agricultural Extension, Economics & Sociology*, 39(4), 155-158. [View publication](#)

Accepted for publication

1. Milk Flow Accounting in India: Evidence from Mandated NSO-NDRI Study. *Agricultural Economics Research Review*. Accepted for publication. Corresponding author: **Banda Sainath**.
2. Kumar, U., **Sainath, B.**, & Raman, R. K. Enhancing the Socio-Economic Well-Being of Farmers in Eastern India: A Strategic Approach. *Indian Farming*, 76(11). Accepted for publication.

Policy publications and research note

1. **Sainath, B.**, Reddy, A. A., Pal, B. D., Kumar, A., Kumar, U., Das, A., & Rai, P. K. (2025). Distributional Consequences of U.S. Tariff Shocks on India's Economy: Insights from a Computable General Equilibrium Model. Policy Paper No. 04/2025. ICAR-National Institute of Biotic Stress Management, Raipur; ICAR Research Complex for Eastern Region, Patna; and International Food Policy Research Institute, New Delhi. 29 pp. ISBN 978-93-5602-740-4.
2. **Sainath, B.**, Pal, B. D., Kumar, A., Kumar, U., Kumar, A., & Das, A. (2025). From global trade shocks to rural livelihoods: Sectoral analysis of U.S. reciprocal tariffs on India's agro-economy. Policy Brief. RCER/Policy/2025/01. ICAR Research Complex for Eastern Region (ICAR-RCER) & International Food Policy Research Institute. [View publication](#)
3. Pal, B. D., Kumar, A., Sirohi, S., **Sainath, B.**, Sharma, K., & Praveen, K. V. (2026, June 25). Iran war supply chain disruptions: Impacts on India's economy. International Food Policy Research Institute. [View publication](#)
4. Khurana, A., **Sainath, B.**, & Adeeth Cariappa, A. G. (2023). Carbon farming in India: Case studies from Maharashtra and Telangana. TAFSSA Research Note 10. Transforming Agrifood Systems in South Asia. [View publication](#)

Edited books and training manual

1. Mukherjee, A., **Sainath, B.**, Ahmad, S., Kumar, U., & Das, A. (Eds.). (2025). A Training Guide for Newly Recruited Technical and Administrative Personnel: Foundations for Success. ISBN 978-81-954348-7-9.
2. Das, A., Mukherjee, A., Sarkar, B., **Sainath, B.**, Kumar, R., Shubha, K., et al. (Eds.). (2025). Participatory Research Application for Year-Round Income and Agricultural Sustainability (PRAYAS): A Pathway to Bridge Science and Farmers towards Prosperity. ICAR Research Complex for Eastern Region, Patna. ISBN 978-81-954348-6-2.
3. Mukherjee, A., **Sainath, B.**, Kumari, A., Kumar, A., Singh, D. K., Kumar, U., & Das, A. (2025). Training Manual for Newly Recruited Technical and Administrative Personnel: Ready, Skilled and Grow. Training Manual No. TM-9/PAT-9/2025. ICAR Research Complex for Eastern Region, Patna. 101 pp. [View publication](#)

Technical bulletins and extension material

1. **Sainath, B.**, Kumar, A., Mukherjee, A., Dubey, R., Kumar, U., Raman, R. K., Singh, D. K., & Das, A. (2025). Carbon Credits: Opportunities, Challenges and Policy Options. Technical Bulletin No. R-85/Patna-5. ICAR Research Complex for Eastern Region, Patna. 56 pp. [View publication](#)
2. Raman, R. K., Kumar, A., Singh, D. K., Kumar, U., Bharti, V., Mukherjee, A., **Sainath, B.**, Kole, T., & Das, A. (2025). Food Crops Infographic of the Eastern Region of India. Technical Bulletin No. R-87/Patna-P-53. ICAR Research Complex for Eastern Region, Patna. 51 pp.

3. **Sainath, B.**, Kumar, U., Kumar, A., Mukherjee, A., Singh, D. K., Raman, R. K., Dubey, R., Koley, T. K., & Das, A. (2025). Guide for farmers on carbon farming, carbon credits and carbon markets [Hindi extension folder]. E-258/Patna-141.

Book chapters

1. **Sainath, B.**, Asadullah, M., Kumar, U., & Mukherjee, A. (2025). Socioeconomic Implications of Heat and Drought Stress on Indian Agriculture. In Drought and Heat Stress in Agriculture: Implications, Mitigation and Policy Approaches (pp. 483-500). Singapore: Springer Nature Singapore. [View publication](#)
2. Kumar, U., Kumar, A., Singh, D. K., Koley, T., Mukherjee, A., Raman, R. K., **Sainath, B.**, Deokaran, Ramkewal, Harigovind, Shekhar, S., Jeet, I., & Kherwar, D. (2025). Empowering Rural Communities: Social Science Innovations in Agriculture. In ICAR RCER: 25 Years of Glorious Journey of Innovation and Excellence (pp. 141-172). ISBN 978-81-954348-8-6.
3. **Sainath, B.**, Mukherjee, A., & Pal, A. K. Effective financial management for a secure future. In A Training Guide for Newly Joined Technical and Administrative Personnel: Foundations for Success (pp. 78-84). ICAR-RCER, Patna.
4. **Sainath, B.**, Mukherjee, A., & Raman, R. K. Research Data Management and Documentation. In A Training Guide for Newly Joined Technical and Administrative Personnel: Foundations for Success (pp. 85-94). ICAR-RCER, Patna.
5. Thakur, A., **Sainath, B.**, Soumya, S., & Kumar Ganesh, B. Livestock Economy in India: Research Trends, Policy Development and Future Prospects. In Research and Technology Advancements in Agriculture (pp. 439-461). ICAR-NAARM, Hyderabad.
6. Shrivani, S., **Sainath, B.**, & Acharya, K. K. The advent of sustainability in agribusiness. In Income Augmentation through Small Agribusiness (pp. 113-121). NIPA, Genx Electronic Resources and Solution P Ltd., New Delhi.
7. Mukherjee, A., **Sainath, B.**, Shubha, K., & Pal, A. K. Teamwork: The Key to Improve Work Performance. In A Training Guide for Newly Joined Technical and Administrative Personnel: Foundations for Success (pp. 69-77). ICAR-RCER, Patna.
8. Shubha, K., Mukherjee, A., & **Sainath, B.** Workplace Ethics and Professionalism. In A Training Guide for Newly Joined Technical and Administrative Personnel: Foundations for Success (pp. 95-100). ICAR-RCER, Patna.
9. Mukherjee, A., & **Sainath, B.** Getting Acquainted with Digital Tools: Essential Software for Research and Office Work. In A Training Guide for Newly Joined Technical and Administrative Personnel: Foundations for Success. ICAR-RCER, Patna.

10. Conference and souvenir contributions

11. **Sainath, B.**, & Das, A. (2025). Carbon credits in Indian agriculture: Where we are, what's changing, and how to make it work for farmers? 6th International Agronomy Congress, New Delhi, pp. 128-132. [View publication](#)
12. Kumar, U., **Sainath, B.**, & Raman, R. K. (2025). Strategies for Socio-Economic Upliftment of the Farming Community of Eastern India. Lead lecture contribution, 75th ISAS Conference.
13. Kumar, U., Kumar, A., Singh, D. K., Koley, T., Mukherjee, A., Raman, R. K., & **Sainath, B.** (2025). Empowering Resource Poor Farmers through Socio-Economic and Extension Research. In Souvenir of the National Seminar on Progressive Agriculture Viksit Bharat: Preparedness for Eastern Region (pp. 13-15), ICAR-RCER, Patna, 21-23 February 2025.

14. Mukherjee, A., Singh, D. K., Shubha, K., Prakash, V., Saurabh, K., Kumar, R., Kumar, S., **Sainath, B.**, Kumar, J., Kumar, A., & Kumar, U. (2025). Souvenir of the National Seminar on Progressive Agriculture Viksit Bharat: Preparedness for Eastern Region. ICAR-RCER, Patna, in collaboration with the Indian Society of Agronomy, BAU Chapter, 21-23 February 2025. 256 pp.
15. **Sainath, B.**, & Srikantha Murthy, P. S. (2021). Comparative economic analysis of water use efficiency and energy costs under Godavari command area of Telangana. Contributed paper, National Seminar on Strengthening Agricultural Water Use Law, Policy and Management in India. NLSIU, CEERA, UAS Bengaluru and ICAR-IIWM, Bhubaneswar.

Popular articles and commentary

1. **Sainath, B.** (2026, August 18). India's carbon credit programmes must be designed for smallholder farmers. *The Policy Edge*. [View article](#)
2. Pal, B. D., & **Sainath, B.** (2026, August). Middle East crisis: Food crisis redux? *The Global Analyst*, 15(8), 48–53.
3. Singh, A., & **Sainath, B.** (2026). How India's milk flows: National analysis of milk surplus, processing and consumption. *Indian Dairyman*, 78(6), 102-109. [View publication](#)
4. Singh, A., & **Sainath, B.** (2026). Mapping India's Dairy Value Chain: From Farm to Final Consumer. *Dairy Times*, 10(2), 50-52.
5. Uday, K., & Banda, S. (2022). Floriculture: A boost for sustaining Farmers income. *AgroBios*

Manuscripts submitted or under review

1. Irrigation Dynamics of Head and Tail End Farmers: An Exploration of Godavari Command Area. Submitted to The Australian Journal of Agricultural and Resource Economics, 10 March 2026. First author.
2. Beyond Milk: A Comprehensive Ecosystem Services Evaluation of Female Murrah Buffalo. Under review, *Animal*. First author.
3. Do Cash Transfers Promote Inclusive Growth? Evidence from an Economy-Wide Model of India. Under review, *Indian Economic Review*. First author.
4. Livestock Welfare Under Urban Expansion: Insights from Hyderabad's Urban and Peri-Urban Interface. Under review, *Journal of Applied Animal Welfare Science*. First author. Based on doctoral research.

04 Engagement and service

- Expert lecture on “Monetizing carbon credits to agriculture and allied sectors”, webinar organised by MANAGE, Hyderabad.
- Guest lecture on “Growth, Development, and Technological Changes in Indian Agriculture”, ATARI, Patna, 9 August 2024.
- Lecture on “Mechanism of Monetizing Carbon Credits in Agriculture” for summer internship students of Nalanda University, 20 June 2024.
- Panel participation in the policy dialogue on “Accelerating Sustainable and Inclusive Agricultural Growth in Bihar”, convened by IFPRI, Bihar Chambers of Commerce and Industries, and Bihartimes Development Foundation, Patna, 21 May 2025.
- Expert participation in the workshop on extension approaches for climate-resilient dairy farming, including curriculum validation and identification of resilient dairy practices, ICAR-NDRI, Karnal, 12 February 2025.

Conference presentations and international exposure

- Poster presentation, “Differential Access, Heterogeneous Effects: Exploring the Caste Disparities in Agricultural Information Access and Use in India”, international agricultural economics conference, New Delhi, 2-7 August 2024.
- Oral presentations at PAVER-2025, ICAR-RCER, Patna, 21-23 February 2025: “Carbon Credits for Smallholder Farmers in Eastern India: Opportunities and Challenges in Conservation Agriculture” (Best Presentation Award), and “Assessing the Ecosystem Services and Disservices of Indigenous Buffalo: A Multi-Dimensional Valuation Approach”.
- Participant, Geography of Food International Summer School, Slovenia.
- Seminar presentations on Facebook Prophet time-series modelling using Python, and application of the meta-frontier approach in agricultural economics research using R.

Training coordination and mentoring

- Organised the three-day orientation programme “Ready, Skilled and Grow” for newly recruited technical and administrative personnel, ICAR-RCER, Patna, 17-19 September 2024.
- Supervised international student Md Asadullah during a two-month internship on climate impact studies, June-July 2024.

Professional service and institutional contributions

- Member, Agricultural Systems and Management Sectional Committee (FAD 22), Bureau of Indian Standards. Programme coordinator for the 19th FAD-22 meeting, 19 May 2025.
- Rapporteur for the Institute Research Council meeting; contributed to planning, monitoring and evaluation through compilation of the 100-Day Action Plan and Action Plan @2050 report.
- Participated in the institute’s Price Fixation Committee discussions and prepared a note on major ICAR-RCER contributions during 2023-2025 for IMC-2025.
- Scientist expert for Viksit Bharat Sankalp Abhiyan - Lab to Land: conducted eight days of field activities in Buxar, advising farmers on soil-health cards, crop selection, seed varieties and fertiliser use.
- Participated in Swachhata Pakhwada activities promoting clean and green technologies and organic farming.