

Kunal Ranjan

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EDUCATION

- **Ph.D.** (Host- Prof. Marcio Jose Poças-Fonseca) (2017-2021)
Molecular Pathology programme, University of Brasilia, Brasilia, Brazil.
Title: Combined strategies for *Cryptococcus* sp. growth control: antifungal drugs, epigenetic modulators, photodynamic therapy and actinobacteria-derived metabolites.
- **M.Sc. Microbiology** (8.21/10 CGPA) (2011-2013)
Department of Microbiology, Pondicherry Central University, India
- **B.Sc. Biotechnology** (75.4%) (2008-2011)
Department of Biotechnology, St. Xavier's College, Ranchi, Jharkhand, India

SKILLS AND TECHNIQUES

Microbiology

Experienced in basic microbiology techniques. Skilled in handling opportunistic fungal pathogens. Minimum inhibitory concentration assay, checkerboard assays. Experienced in microbial diversity analysis by Denaturing Gradient Gel Electrophoresis (DGGE).

Molecular biology

Skilled in gene cloning, large-scale in vitro DNA isolation and purification. Proficient with molecular techniques applied in DNA studies such as PCR, quantification of the gene by Real-Time PCR, Double-joint PCR, Immunological assays, photodynamic therapy technique, Protein extraction, SDS-PAGE etc.

Bioinformatics skills

Basic R- programming. Basic theoretical & practical knowledge of Sequence Databases, Sequence search, Sequence Identification (BLAST, FASTA), Sequence Alignment (Multiple Sequence Alignment), Phylogenetic analysis.

EXPERIENCES

- Worked as Junior research fellow on a project entitled "**Soil microbiome modulation strategies to enhance nitrogen acquisition efficiency in rice**" under the supervision of Dr. B. Ramakrishnan, Principal Scientist, Division of Microbiology, ICAR- Indian Agricultural Research Institute, Pusa, New Delhi – 110012 from March 2016 to January 2017
- Worked as Junior research fellow on a project entitled "**Archaeal- and anaerobic ammonium oxidative process from nitrogen cycling in oxic and anoxic soil**" under the supervision of Dr. B. Ramakrishnan, Principal Scientist, Division of Microbiology, ICAR- Indian Agricultural Research Institute, Pusa, New Delhi – 110012 from date February 2014 to October 2015.

PUBLICATIONS (Total citations: 390, h-index: 12)

- **Ranjan, K.,** Brandão, F., Morais, J. A. V., Muehlmann, L. A., Silva-Pereira, I., Bocca, A. L., Matos, Ma. F. & Poças-Fonseca, M. J. (2021). The role of *Cryptococcus neoformans* histone deacetylase genes in the response to antifungal drugs, epigenetic modulators and to photodynamic therapy mediated by an aluminium phthalocyanine chloride nanoemulsion *in vitro*. Journal of Photochemistry and Photobiology B: Biology, 216, 112131.

- Kaur, S., Egidi, E., Qiu, Z., **Ranjan, K.**, Macdonald, C. A., & Singh, B. K. (2021). Ecology and performance of rhizosphere and endosphere microbiomes. In *New and Future Developments in Microbial Biotechnology and Bioengineering* (pp. 125-136). Elsevier
- Oliveira, R. K. D. M., Hurtado, F. A., Gomes, P. H., Puglia, L. L., Ferreira, F. F., **Ranjan, K.**, Albuquerque, P., Poças-Fonseca, M.J., Silva-Pereira, I., & Fernandes, L. (2021). Base excision repair AP-Endonucleases-Like genes modulate DNA damage response and virulence of the human pathogen *Cryptococcus neoformans*. *Journal of Fungi*, 7(2), 133.
- Morais, J. A. V., Rodrigues, M. C., Ferreira, F. F., **Ranjan, K.**, Azevedo, R. B., Poças-Fonseca, M. J., & Muehlmann, L. A. (2020). Photodynamic therapy inhibits cell growth and enhances the histone deacetylase-mediated viability impairment in *Cryptococcus* spp. *in vitro*. *Photodiagnosis and photodynamic therapy*, 29, 101583.
- **Ranjan, K.**, & Poças-Fonseca, M. J. (2019). Genetic diversity of pathogenic yeasts. *Microbial Diversity in Ecosystem Sustainability and Biotechnological Applications*, 593-615.
- Simranjit, K., Kanchan, A., Prasanna, R., **Ranjan, K.**, Ramakrishnan, B., Singh, A. K., & Shivay, Y. S. (2019). Microbial inoculants as plant growth stimulating and soil nutrient availability enhancing options for cucumber under protected cultivation. *World Journal of Microbiology and Biotechnology*, 35(3), 1-14.
- Simranjit, K., **Ranjan, K.**, Prasanna, R., Ramakrishnan, B., Kanchan, A., & Shivay, Y. S. (2019). Exploring Crop–Microbiome Interactions Towards Improving Symbiotic Performance of Chickpea (*Cicer arietinum*) Cultivars Using Cyanobacterial Inoculants. *Journal of Plant Growth Regulation*, 38(1), 55-69.
- Kanchan, A., Simranjit, K., **Ranjan, K.**, Prasanna, R., Ramakrishnan, B., Singh, M. C., Hasan, M. & Shivay, Y. S. (2019). Microbial biofilm inoculants benefit growth and yield of chrysanthemum varieties under protected cultivation through enhanced nutrient availability. *Plant Biosystems*, 153(2), 306-316.
- Thapa, S., **Ranjan, K.**, Ramakrishnan, B., Velmourougane, K., & Prasanna, R. (2018). Influence of fertilizers and rice cultivation methods on the abundance and diversity of phyllosphere microbiome. *Journal of basic microbiology*, 58(2), 172-186.
- Prasanna, R., Saxena, G., Singh, B., **Ranjan, K.**, Buddhadeo, R., Velmourougane, K., Ramakrishnan, B., Nain, N., Mam, C., Hasan, M. & Shivay, Y. S. (2018). Mode of application influences the biofertilizing efficacy of cyanobacterial biofilm formulations in chrysanthemum varieties under protected cultivation. *Open Agriculture*, 3(1), 478-489.
- Prasanna, R., Ramakrishnan, B., Simranjit, K., **Ranjan, K.**, Kanchan, A., Hossain, F., & Nain, L. (2017). Cyanobacterial and rhizobial inoculation modulates the plant physiological attributes and nodule microbial communities of chickpea. *Archives of microbiology*, 199(9), 1311-1323.
- Ramakrishnan, B., Kaur, S., Prasanna, R., **Ranjan, K.**, Kanchan, A., Hossain, F., Shivay, Y. S. & Nain, L. (2017). Microbial inoculation of seeds characteristically shapes the rhizosphere microbiome in desi and kabuli chickpea types. *Journal of Soils and Sediments*, 17(8), 2040-2053.
- Thapa, S., Prasanna, R., **Ranjan, K.**, Velmourougane, K., & Ramakrishnan, B. (2017). Nutrients and host attributes modulate the abundance and functional traits of phyllosphere microbiome in rice. *Microbiological research*, 204, 55-64.
- Manjunath, M., Kanchan, A., **Ranjan, K.**, Venkatachalam, S., Prasanna, R., Ramakrishnan, B., Hossain, F., Nain, L., Shivay, Y.S., Rai, A.B., & Singh, B. (2016). Beneficial cyanobacteria and eubacteria synergistically enhance bioavailability of soil nutrients and yield of okra. *Heliyon*, 2(2), e00066.
- Prasanna, R., Kanchan, A., Kaur, S., Ramakrishnan, B., **Ranjan, K.**, Singh, M. C., Hasan, M., Saxena, A.K. & Shivay, Y. S. (2016). Chrysanthemum growth gains from beneficial microbial interactions and fertility improvements in soil under protected cultivation. *Horticultural Plant Journal*, 2(4), 229-239.

- Prasanna, R., Kanchan, A., Ramakrishnan, B., **Ranjan, K.**, Venkatachalam, S., Hossain, F., Shivay, Y.S., Krishnan, P., & Nain, L. (2016). Cyanobacteria-based bioinoculants influence growth and yields by modulating the microbial communities favourably in the rhizospheres of maize hybrids. *European Journal of Soil Biology*, 75, 15- 23.
 - **Ranjan, K.**, Priya, H., Ramakrishnan, B., Prasanna, R., Venkatachalam, S., Thapa, S., Tiwary, R., Nain, L., Singh, R. & Shivay, Y. S. (2016). Cyanobacterial inoculation modifies the rhizosphere microbiome of rice planted to a tropical alluvial soil. *Applied Soil Ecology*, 108, 195-203.
 - Venkatachalam, S., **Ranjan, K.**, Prasanna, R., Ramakrishnan, B., Thapa, S., & Kanchan, A. (2016). Diversity and functional traits of culturable microbiome members, including cyanobacteria in the rice phyllosphere. *Plant Biology*, 18(4), 627-637.
 - Prasanna, R., Ramakrishnan, B., **Ranjan, K.**, Venkatachalam, S., Kanchan, A., Solanki, P., Monga, D., Shivay, Y.S., & Kranthi, S. (2016). Microbial inoculants with multifaceted traits suppress Rhizoctonia populations and promote plant growth in cotton. *Journal of Phytopathology*, 164(11-12), 1030-1042.
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Publications in preparation/Review

- **Kunal Ranjan**, José Athayde Vasconcelos Morais, Mandeep Dixit, Lourival Carvalho Nunesa, Fernando Pacheco Rodrigues, Luís Alexandre Muehlmann, Pratyosh Shukla, Marcio José Poças-Fonseca (2021). Aluminium-phthalocyanine chloride nanoemulsion-mediated photodynamic therapy inhibitory effect on *Cryptococcus* spp. and *Candida* spp. growth is enhanced by extracts of new actinobacteria isolates from the rhizosphere of Indian traditional medicine plants. *Photodiagnosis and Photodynamic Therapy* (**Submitted**)
 - **Kunal Ranjan**, Camila Bontempo Nunes, Fernando Pacheco Rodrigues, Anamélia Lorenzetti Bocca, Marcio José Poças Fonseca. Investigation of the antifungal and immunomodulatory properties of the Brazilian Savannah *Solanum lycocarpum* tree-associated *Streptomyces* species. (**In preparation**)
 - **Kunal Ranjan**, Marcio J. Poças-Fonseca. Epigenetic interplay in the plant-fungal endophyte interactions and in the production of bioactive compounds. Springer (**Under review**).
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Conference presentations

- **Kunal Ranjan**, Camila Suguiura, José AV Morais, Marcio José Poças-Fonseca. Evaluation of the combined effect of epigenetic modulators, antifungal drug and photodynamic therapy in *Cryptococcus* in vitro. Second International conference of Nanoscience and Nanobiotechnology, 26-28 May, 2021, Virtual (**Poster presentation**)
 - **Kunal Ranjan**, Camila Suguiura, José AV Morais, Dileep Kumar, Marcio José Poças-Fonseca. Evaluation of the interaction amongst antifungal drugs, epigenetic modulators and photodynamic therapy in *C. neoformans*. 17th Infocus and 1st ISHAM LATAM Congress, 13-16 November, 2019, Salvador, Bahia, Brazil (**Poster presentation**).
 - **Kunal Ranjan**, Camila Suguiura, José AV Morais, Dileep Kumar, Marcio José Poças-Fonseca. Evaluation of the role of histone deacetylase genes of *C. neoformans* in response to antifungals, epigenetic modulators and photodynamic therapy. 4th Symposium of the Graduate Program in Molecular Pathology at the University of Brasilia, 23-25 October 2019, Brasilia, Brazil (**Oral presentation**).
 - **Kunal Ranjan**, Ramakrishnan B., A.K. Patra. Abundance and Activity of Anammox Bacteria in Indian Rice Soils. 56th Annual conference of Association of Microbiologists of India. 7-10 December 2015, New Delhi, India (**Poster presentation**).
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Conference/Workshops participations

- Workshop on **Laboratorial Diagnosis of the Endemic Systemic Mycosis and Cryptococcosis**. Organized by 17th Infocus and 1st ISHAM LATAM Congress, 13-16 November 2019, Salvador, Bahia, Brazil, on 16 November 2019.
 - Workshop on **Molecular Methodologies for Epidemiology and Diagnosis of Invasive Fungal Infections (theoretical and practical)**, organized by The Oswaldo Cruz Foundation, through the National Institute of Infectious Diseases Evandro Chagas, Rio de Janeiro, Brazil, on 26 October 2018 – 01 November 2018.
 - Workshop on **Renovating Bacterial Taxonomy with Bioinformatics**, organized by ICAR-NBAIM and Department of Zoology, University of Delhi, India, on 14-15 May 2015.
 - National seminar on **Probiotics in sustainable food production: Current status and future prospects**, organized by Faculty of Agriculture and animal husbandry, Gandhigram Rural Institute, Tamil Nadu, India.
 - National Conference on **Drug Discovery and cellular dynamics**, organized by the Department of Biochemistry and Molecular Biology, Pondicherry University, on 21-22 March 2013.
 - Participated in **Science Exhibition-2009**, organized by St. Xavier's College, Ranchi, Jharkhand, on 14-15 September 2009.
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Online Courses

- Bacterial Genomes: Antimicrobial Resistance in Bacterial Pathogens, 2020 (15 h).
 - Bacterial Genomes: Accessing and Analyzing Microbial Genome Data, 2020 (15 h).
 - The Science of Medicines, 2020 (18 h).
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OTHER ACHIEVEMENTS

- **Agricultural Scientists Recruitment Board-NET-2015 (ASRB-NET)** qualified in the field of Agricultural microbiology
 - **GATE 2013** score 387.
 - **GATE 2016** score 391
 - Member of **The International Society for Human and Animal Mycology (ISHAM)**
 - Member of **The Association of Microbiologist of India (AMI)**
 - Member of **The Indian Science Congress Association (ISCA)**
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Awards

- National Council for Scientific and Technological Development (**CNPq**) doctoral fellowship, Brazil (2017-2021)
 - Received best abstract award 17th Infocus and 1st ISHAM LATAM Congress, Brazil (2019)
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