

Faculty CV

Name

Rajagopal Subramanyam

Designation

Professor and Head

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Profile photo (1 photo upto 10 MB)



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Broad areas of research (only keywords)

Chloroplast Bioenergetics, Abiotic Stress, Omics Biology

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Professional Experience

Prof. Rajagopal has been working for over 25 years in the field of biophysics and bioenergy and published 135 research articles in peer-reviewed international journals. Asst Prof at Department of Biochemistry, Assoc Prof at Department of Plant Sciences, University of Hyderabad 2005 to 2016; Professor, University of Hyderabad since 2016; Head, Dept of Plant Sciences, since 2022 -; Director & Coordinator, BioNEST, University of Hyderabad, since 2020 -.

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Education/Training

B.Sc (Botany, Zoology, and Chemistry) and M.Sc (Biochemistry) were awarded at Sri Venkateswara University, Tirupati. PhD from Sri Venkateswara University, Tirupati 1999; Postdoctoral fellow at Biological Research Center, Szeged, Hungary from 1999-2000; Res Scientist/Post-Doc at University of Quebec (Canada) from 2000 to 2003; Postdoctoral fellow from 2003 to 2005 at Arizona State University (USA)

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Detailed research interests (Upto 2 paragraphs or 10 bullet points)

Professor Rajagopal's research focuses on the activity and components of the photosynthetic apparatus in cyanobacteria, algae, and higher plants during adaptation to abiotic stress. His group has extensively studied the structural and organizational dynamics of photosystems (PS) and their light-harvesting complexes (LHC) – specifically, PSII-LHCII and PSI-LHCI – in *Chlamydomonas reinhardtii*, *Pisum sativum*, and *Arabidopsis thaliana* under moderate stress conditions such as light, temperature, salt, and iron deficiency. He discovered that under fluctuating light conditions, the light-harvesting complex II (LHCB2) undergoes phosphorylation, leading to the dissociation of the entire LHCII from PSII and its subsequent migration to PSI. His group also reported that temperature and salt stress-induced state transitions (which balance energy transfer between PSII and PSI) in *C. reinhardtii* and *A. thaliana* are essential protective strategies under these stress conditions. Additionally, his group has investigated the role of the PGR5 and PGRL1 (cyclic electron transport mutants) dependent cyclic electron transport pathway in acclimation to high light conditions, demonstrating that PGR5 operates independently of LHCSR3 (a stress-related protein) expression in high light conditions in *C. reinhardtii*. Their recent work also shows that high polyethylene glycol (osmotic stress) induces non-photochemical quenching independent of LHCSR3, and low osmotic stress leads to increased biomass in *Chlamydomonas*.

Professor Rajagopal's group has also studied the impact of iron deficiency on the ultrastructural organization of the photosynthetic apparatus and proposed a structural model of PSI from *C. reinhardtii*. They highlighted the nature and significance of thylakoid protein aggregation under abiotic stress in *C. reinhardtii* and *P. sativum*. Furthermore, his group has conducted research on various other photosynthetic organisms, such as *Dunaliella salina* and *Rhodobacter* species tolerant to alkaline conditions. For instance, *D. salina*, which thrives in marine environments, could provide insights into adaptation mechanisms that may be applicable to land plants or other algae. Their efforts have led to numerous discoveries through transcriptome and proteome analyses, revealing an efficient retrograde signaling mechanism-mediated remodeling of the photosynthetic apparatus. Similarly, his group has explored how *Rhodobacter* species adapt to extreme conditions under anaerobic environments.

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Selected publications (upto 5)

1. R. M. Yadav, N. Chouhan, J. Xavier, S. K. Madireddi, A. Nerusu, R. Subramanyam (2025) The interplay between LHCSR and PSBS proteins provides photoprotection in *Chlamydomonas reinhardtii* pgr5 mutant under high light J. Photochem. Photobiol (Biol). 261:113060(Impact factor : 6.25).
2. Pandey, J., Devadasu, E., Saini, D., Dhokne, K., Marriboina, S., Raghavendra, R.S and Subramanyam, R. (2023) Reversible changes in structure and function of photosynthetic apparatus of pea (*Pisum sativum*) leaves under drought stress. Plant Journal. 113(1):60-74 doi: 10.1111/tpj.16034 (Impact factor : 7.1).
3. N. Chouhan, R. M. Yadav, J. Pandey, R. Subramanyam (2023) Macromolecular structural changes of thylakoids in high light from pgrl1 and pgr5 mutants of *Chlamydomonas reinhardtii* Biochim. Biophys. Acta (Bioenergetics). 1864: 148917. doi: 10.1016/j.bbabi.2022.148917 (Impact factor: 4.5).
4. K. Dhokne, J. Pandey, R. M. Yadav, P. Ramachandran, J. R. Rath, R. Subramanyam (2022) Change in the photochemical and structural organization of thylakoids from pea (*Pisum sativum*) under salt stress. Plant Physiol and Biochem 177:46-60. doi: 10.1016/j.plaphy.2022.02.004 (Impact factor: 5.4).
5. E. Devadasu, J. Pandey, K. Dhokne, R. Subramanyam (2021) Restoration of photosynthetic activity and supercomplexes from severe iron starvation from *Chlamydomonas reinhardtii*. Biochim. Biophys. Acta (bioenergetics) 1862, Issue 1, 148331 doi: 10.1016/j.bbabi.2020.148331 (Impact factor: 4.5).

Selected projects (upto 5)

1. Uncovering Novel Photosynthetic and metabolic traits and gene circuits in a robust Stress-resilient desert Microalga *Coelastrella* sp. for improving Photosynthetic efficiency and biomass Productivity (SNAPP-Micro), DST/INT/ISR/P-37/2023 (G) with I. Khozin-Goldberg (BGU), 34 lakhs, 2024-2026.
2. Role of non-photochemical quenching during acclimation to osmotic stress in *Chlamydomonas reinhardtii*. SERB, 32 lakhs, 2021-24
3. Environmental stress responses in protein structure and metabolism of a plant and algal chloroplasts. Joint UGC - ISF Research Grant in collaboration with Nathan Nelson, Tel Aviv University Biochemistry (2018-2021), 1.74 crores.
4. A combined approach of metabolomics, proteomic, transcriptomic and organization of photosynthetic apparatus from *Chlamydomonas reinhardtii* under various light intensities with different growth conditions. DBT (2017-2020) ~70 lakhs.
5. "Gene expression and structural organization of photosynthetic antenna under high light and moderate temperature in *Chlamydomonas reinhardtii*" CSIR, (2015-18). ~ 23 lakhs

Selected patents (a paragraph or upto 5 bullet points)

Current PhD scholars and broad research topics

1. Kunal Dhokne, entitled: Change in the photochemical and structural organization of thylakoids from pea (*Pisum sativum*) under salt stress
 2. Pavithra Ramachandran, entitled: Novel mechanism of photosynthetic machinery of *Dunaliella salina* under hypersaline: a retrograde signalling mechanism in the chloroplast
 3. Jyoti Ranjan Rath, entitled: Temperature-induced reversible changes in photosynthesis efficiency and organization of thylakoid membranes from pea (*Pisum sativum*)
 4. Jerome Xavier Gunasekaran: Engineering of autophagy genes to enhance lipid production from *Chlamydomonas reinhardtii*
 5. Sailaja Sadineni, entitled: Biopesticides to Improve the Photosynthesis Efficiency in Crop Plants
 6. Lavudiya Vijay Srinivas, entitled: Engineering of metabolomic genes to enhance the Polyhydroxy butyrate in Bacterial photosynthetic organisms.
 7. Shriya Sharma, entitled: Bioengineering of thioredoxin genes to understand the photoprotection mechanism in *Chlamydomonas reinhardtii*
 8. Namrata Dubey, entitled: Bioengineering of thioredoxin genes to understand the photoprotection mechanism in *Chlamydomonas reinhardtii*
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