



ST. XAVIER'S COLLEGE (Autonomous), PALAYAMKOTTAI – 627 002.

(Recognized as “College with Potential for Excellence” by UGC & Accredited at A⁺ Grade with a CGPA of 3.66 out of 4 in IV Cycle by NAAC)

Annual Report 2024 - 2025

PLANT MOLECULAR BIOLOGY RESEARCH UNIT (2001)

The **Plant Molecular Biology Research Unit (PMRU)**, established in **2001**, continues its commitment to advancing **plant molecular biology research** through **2024–2025**. Our research portfolio spans several specialized domains, including **advanced molecular characterization** of aquatic and terrestrial plants using techniques such as **marker-assisted selection, gene cloning, and genetic engineering**. We also focus on the **discovery of microbial-derived pharmaceuticals** from plant-associated microorganisms, **enhancement of crop productivity** through beneficial microbial interactions, and the **cultivation and biochemical analysis of microalgae** for biotechnological applications. Other key areas include the **application of bioinformatics and statistical tools** for genomic and metabolomic analysis, **identification of stress-responsive genes** in crops to develop climate-resilient varieties, **investigation of secondary metabolite production** in medicinal plants via transcriptomics, and the **development of eco-friendly biofertilizers and biopesticides** from beneficial microbes.

During this academic year, our laboratory has made **significant progress** in screening **novel azo-dye degrading bacterial strains** and evaluating their **plant growth promotion capabilities** on selected food crops under controlled greenhouse conditions. Particular attention has been given to **monitoring genetic variations** in treated plants and **analysing shifts in microbiome compositions** following supplementation protocols. Two scholars, **Mrs. E. Jebarubi** and **Mr. S. Arokiaraj**, successfully completed their **Ph.D. programmes**, marking significant milestones for the unit. Our research output has been substantial, with **four papers** published in **reputable, Scopus-indexed, and UGC-CARE-listed journals**. Additionally, the unit contributed valuable knowledge to the scientific community through two book chapters: "*GMO in Millet: Advancing Nutrition and Agriculture*" and "*The Role of Ethnobotany in Reducing Carbon Footprints*", both published in an international volume by **Nitya Publications, Bhopal**.

The **PMRU scholars** have been particularly active in academic conferences, presenting **15 research articles** at various international and national events. Their excellence has been recognized through multiple **awards**. **Mr. M. Sathyananth** secured **first prize** for best paper presentations at the *International Conference on Recent Innovations and Emerging Trends in Life Science* at **Kamaraj College, Thoothukudi**, and at the *National Conference on Disappearing Wetland Ecosystems – Emerging Environmental Issues* at **Rani Anna Government College for Women, Tirunelveli**. Similarly, **Sr. S. Lourdu Pouline** won **first prize** at the *Prof. Joy Mohandhas Endowment National Seminar & Paper Presentation Contest on "Green Horizons: Innovations in Botany for a Sustainable Future"* at **St. Mary's College, Thoothukudi**, and at the *International Conference on Recent Trends in Plant Science*

(RTPS-25) at **Sarah Tucker College, Tirunelveli**. She also secured **second prize** at the *International Conference on Recent Innovations and Emerging Trends in Life Science* at **Kamaraj College, Thoothukudi**.

Dr. T. Leon Stephan Raj, the **Director of PMRU**, has extended his academic leadership beyond the unit by serving as **chairperson** for two significant events: the **International Conference on Biodiversity and Climate Change (ICBCC-25)** at **St. Xavier's College, Palayamkottai**, and the **International Conference on Recent Innovations and Emerging Trends in Life Science** at **Kamaraj College, Thoothukudi**. Additionally, he has strengthened the scientific rigour in his field by serving as a **reviewer for several scientific journals**, further solidifying his standing in the academic community.

The **PMRU** remains committed to fostering the next generation of researchers, with **three scholars** currently pursuing **Ph.D. degrees**, including **Ms. Sasi Bharathi**, who joined in **July 2024**. Three manuscripts have been submitted to **high-impact journals** and are currently under peer review. Our research infrastructure, including **advanced microscopy systems, high-speed centrifuges, PCR machines, and a gel documentation system**, is consistently maintained at **peak operational efficiency** and is shared collaboratively among our research team and neighbouring institutions. Through its contributions to **education, research publications, and active engagement** in the scientific community, the **Plant Molecular Biology Research Unit** continues to be a **leading centre for advancements in plant molecular biology**.