# Project 5_1 Drosophila melanogaster as an In Vivo Platform for Defining the Efficacy and Mechanisms of Protected Crop Phytochemicals

| **PC Hub Theme (see list here)** |
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| Theme 5: Plant bioactives |
| **Principal supervisor** |
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The project aims to rapidly screen and validate the therapeutic potential of novel plant extracts—particularly those derived from agricultural waste or high-value crops grown in Controlled Environment Agriculture (CEA)—and to elucidate their underlying molecular mechanisms of action using the highly efficient *Drosophila melanogaster* model system.
A major knowledge gap is the slow, costly, and resource-intensive nature of pre-clinical validation for plant-derived therapeutics. We lack a high-throughput pipeline to quickly confirm the efficacy of purified bioactives and understand how they benefit health.

The project will use techniques such as:

- Extract Preparation and Chemical Profiling using LC-MS to identify key compounds.
- High-throughput Behavioral Assays in established Drosophila human disease models (e.g., neurodegeneration) to screen for phenotypic rescue (e.g., improved lifespan and motor function).
- Molecular Validation via qPCR and targeted Drosophila genetic tools (GAL4/UAS) to confirm the regulation of conserved human pathways (e.g., oxidative stress and inflammation).

The project aims to address industry bottlenecks:

1. **Validating Therapeutic Potential (Bioactives)**: The project screens plant extracts from protected cropping—including those from waste biomass—to confirm their efficacy in a whole-organism setting. This moves the extracts beyond simple chemical characterization and demonstrates their potential as functional ingredients.

2. **Elucidating the Molecular Basis (Mechanisms of Action)**: By using genetically defined Drosophila disease models and molecular techniques (qPCR, GAL4/UAS), the project identifies the precise conserved human pathways (e.g., anti-inflammatory, neuroprotective) that the plant compounds target. This provides the strong mechanistic data required for commercial claims.

3. **Accelerating Translation and Creating IP (Hub Impact)**: Crucially, this project will provide an economical, rapid, and translational pre-clinical validation platform for plant-derived therapeutics, addressing a major bottleneck in the industry. By de-risking lead compounds and providing strong mechanistic data, the work creates high-value intellectual property for PC Hub partners, ultimately enhancing Australia's capacity to produce premium functional foods and plant-based medicines from sustainable protected cropping practices.

## How to apply

The PC Hub offers a limited number of competitive scholarships.
To apply, please email the following documents to pchub@latrobe.edu.au by **15 February 2026:**

- Application form completed
- Up-to-date CV
- University transcripts

*Only shortlisted applicants will be contacted.*