

The regulation of flower opening in lilies, and how to control it to improve post-harvest quality

Supervisory team:

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Host institution: Cardiff University

Project description:

How do lily flowers open? This is the central question that this project addresses. Flower opening is a key developmental stage and we know that it is regulated through responses to light, nutrients and water, but the precise mechanism varies amongst different species. Lilies are an important ornamental flower in which bud opening is a particular problem. Flowers are harvested as buds to allow for transport time, but premature opening or failure to open makes the product unsaleable. This leads to a waste of resources as cut flowers have a very short shelf-life, and there is substantial waste in the supply chain. Understanding mechanisms regulating flower opening in different species also has implications for understanding evolutionary developmental biology and pollination ecology. Recent developments in high throughput sequencing have made it possible to analyse the genes that are involved in regulating processes such as flower opening even in non-model species such as lily for which there is no genome sequence information. In this project the student will use a combination of confocal microscopy, analytical techniques (e.g. HPLC) and transcriptome analyses (RNAseq) to build up a model of the changes occurring during flower opening. This stage of the project will aim to develop testable hypotheses and potential treatments that might be applicable in the flower industry. The student will work closely with a company involved in flower care products and a leading UK supermarket chain to test potential regimes for their applicability to the flower supply chain. In parallel the student will develop further the data obtained, to gain a fuller mechanistic understanding of flower opening: this will be driven by the student's interests developed over the course of the project. Ornamental flowers are an important crop providing employment both in the UK and in developing countries. This project will provide a valuable experience of the fresh cut industry increasing the student's employability in this sector (a sector which also includes the supply chain of fresh fruit and vegetables). It will also equip the student with an excellent suite of laboratory and bioinformatics skills that can be applied to plant biotechnology, developmental biology, plant cell biology and functional ecology.