

Epigenetic mechanisms regulating post-harvest strawberry quality and aroma

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Host institution: Cardiff University CASE partner: Edward Vinson Ltd

Project description:

There is an urgent need to promote consumption of fresh produce in the UK and world-wide as it is associated with a protective role against several types of cancer and cardiovascular diseases. However, soft fruit such as strawberries which are high in beneficial metabolites have a very short shelf-life after harvest. This results in substantial food waste both in the supply chain and by consumers. Chilled transport and storage which is used to delay decay of strawberry fruit also affects quality, in particular reducing flavour and aroma. The aroma is composed of a cocktail of volatile organic compounds (VOCs) which is unique for each strawberry variety and changes postharvest. Transcriptomic analyses have also revealed at >800 genes change in expression during strawberry fruit chilled storage. Biosynthesis genes are responsible for VOC changes and their expression also changes during fruit storage. Recent work in the Cardiff lab has shown that some of these changes are under epigenetic control through histone methylation, and this is important information for future breeding. Most strawberry breeding has targeted fruit quality including aroma, but further breeding could improve aroma retention during storage. This project will exploit previous work in the Cardiff lab and at the industrial partner, Edward Vinson, an established soft fruit breeder, to study the epigenetic control of aroma and postharvest quality and generate new lines with improved aroma retention.

The project will therefore address fundamental aspects of postharvest biology including analysis of epigenetic changes through pull down assays and next generation sequencing in the fruit, and how these mechanisms affect gene expression and VOC profiles. In a complementary approach the student will be involved in breeding new strawberry lines with improved aroma retention during storage, phenotyping them through biochemical, sensorial, molecular, and physiological assays. The project will therefore equip the student with a suite of molecular, biochemical and breeding skills. Edward Vinson will moreover provide the student with insights into the commercial priorities for optimising fruit quality and how to integrate results from the project into breeding programmes. This suite of skills can be applied widely across the horticultural and food industries.

Our aim as the SWBio DTP is to support students from a range of backgrounds and circumstances. Where needed, we will work with you to take into consideration reasonable project adaptations (for example to support caring responsibilities, disabilities, other significant personal circumstances) as well as flexible working and part-time study requests, to enable greater access to a PhD. All our supervisors support us with this aim, so please feel comfortable in discussing further with the listed PhD project supervisor to see what is feasible.