Control of ovule number in Brassica species

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Submit applications for this project to the University of Bath

Project description:

Seeds are the most important agricultural product, accounting for at least 70% of the world's food supply. At the same time, they constitute the main propagule for plant growth. With a rising population and diminishing agricultural land, it is increasingly urgent to improve crop yields. Increasing seed size and number in seed crop species are important routes to achieving this goal and improving food security. In situations where seeds are the most important part of the crop, e.g. oil-seed rape, wheat, maize, and rice, the best way to increase yield is to produce plants that have a higher number of seeds with no concomitant decrease in seed size or quality. In plants, such as oilseeds, where seeds are produced in pods, seed number per pod is often positively correlated with seed yield (Siles et al, 2021).

Within our group, we have successfully generated Arabidopsis lines that produce more seeds per pod. This was possible by manipulating the developmental pathways to produce more ovules, the precursors to seeds. We are in the process of optimising these lines to maximise yield benefits. In this new study, we hope to translate our exciting new findings to closely related crop species, such as oilseed rape. In addition to detailed analyses of the Arabidopsis and crop plants, we will also perform RNA-Seq analyses to uncover gene pathways that have been harnessed by these genes to result in increased seed yield. The interplay of hormones, especially gibberellins and brassinosteroids are known to control ovule development. We hope to gain further insights into the molecular mechanisms that are in play in our increased seed yield lines and assess whether these hormones are key players in this process.

The project will use a combination of molecular, developmental, and cell biological techniques and provide training in the disciplines of plant genetics, physiology, genomics as well as bioinformatic, statistical, and microscopy techniques.