The link between β-aminobutyric acid-induced resistance of tomato harvest and fruit quality

During my summer studentship, I have worked with Dr Estrella Luna-Diez on the control of *Botrytis cinerea* (grey mould). This is a devastating necrotrophic fungus which afflicts over 200 plant species, including important vegetable and soft fruit species. The use of pesticides is currently the only control method for this species and protective alternatives are not completely effective. However, the environmental risks associated with pesticides are leading to the development of integrated disease management strategies. This includes the exploitation of the plant immune system to provide induced resistance. Tomato, *Solanum lycopersicum*, is a major crop worldwide and *B. cinerea* can cause the loss of over 50 % of the harvest. It is particularly damaging to tomato production because it infects both green tissue and fruit. Previous research has shown that different methods of application of β-aminobutyric acid (BABA) can induce long-lasting resistance against *B. cinerea* in the green tissue of tomato plants. Last summer, a BSPP-funded student working with Dr Luna-Diez demonstrated that BABA-induced resistance (BABA-IR) in tomato plants persists into the fruiting stage, providing durable post-harvest protection. The next step, and the aim of my research, was to determine the effect of BABA-IR on the fruit quality. This was investigated through a targeted metabolomic analysis using Ultra Performance Liquid Chromatography - Mass Spectrometry (UPLC-MS).

Lycopene, β-carotene and Linolenic acid were chosen as indicators of fruit quality for their roles in taste, colour and 'healthiness'. Standard serial dilutions of these metabolites were run through UPLC-MS. Quantification and calibration curves were done through UV as the pigments allowed for a better detection using UV than in the MS. Calibration curves were used to calculate the concentration of the metabolites in samples of fruit which had been treated either with BABA or water at the seedling stage. With the help of my supervisor I prepared samples and developed a method to optimise the separation and sensitivity of the UPLC, which included making adjustments to the suspensions, solvents and gradient. I also learnt how to use the MassLynx software to analyse the data and construct the calibration curves. We found that the metabolites were not discernible in many of the samples. Several factors could have been responsible, including the degradation and over-dilution of the samples, therefore the method will undergo further optimisation in the next few months. Nevertheless, this project was essential for establishing a protocol for the detection of these metabolites using UPLC which will be used to guide those future analyses.

Also, I was involved with several other experiments which equipped me with a new set of skills. Moreover, as part of my studentship, I produced a poster with the results of my summer project and showcased it at the research symposium held by the Society of Spanish Researchers in the United Kingdom (9-10th July, London). This gave me the opportunity to discuss my work with researchers from a variety of fields across the country and I was awarded first place in the poster competition.

The research I have undertaken in this studentship has been at the forefront of plant pathology. I have been fortunate to work on such an exciting project and one which will support future research into the protection of plants against disease through induced resistance. In addition, I have gained invaluable experience and a new set of skills that will help me to pursue a career in research. My sincere thanks go to my supervisor, Dr Estrella Luna-Diez, for her continued support and guidance. I would also like to thank the BSPP for funding this project and making it possible.

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