

## Lady Emily Smyth MScR Project Feedback from Matthew Turk



*Matthew Turk*

### **Lady Emily Smyth MScR studentship - Saving Cassava: A novel gene in a deadly virus 2021-2022**

I am very grateful to have been one of three graduates selected to be a recipient of the Lady Emily Smyth Studentship award for 2021-22, funded by the Bristol Centre for Agricultural Innovation (BCAI). This studentship supported a year's worth of research into a timely and important agriculturally relevant topic - covering my tuition fees and research expenses, as well as a stipend for the year. My BCAI-funded project sought to investigate the critical biology of Cassava brown streak disease (CBSD) caused by two related viruses: Cassava brown streak virus (CBSV), and Ugandan cassava brown streak virus (UCBSV), collectively known as U/CBSVs. CBSD is one of the seven most devastating biotic threats to global food security, severely impacting production of cassava (*Manihot esculenta*), by causing yield losses of as much as 70%. Cassava is a key staple crop in regions between 30°N and 30°S (in particular in Sub-Saharan Africa, India, Indonesia, and the Philippines) and is responsible for providing critical calories to 800 million people, including many people living in countries experiencing extremely alarming hunger indices.

A large portion of my research sought to further attempts to construct a functional UCBSV infectious clone that could be reconstituted in planta – successfully highlighting areas of instability that were hindering construction, and, hopefully, enabling construction of functional clones in the future. Functional UCBSV infectious clones would be invaluable in enabling future reverse genetics approaches, increasing understanding of infection and symptom development and informing resistance research. My project also investigated the genetics of the family that host U/CBSVs – the Euphorbiaceae which contains a number of biologically-diverse plants with immense socioeconomic importance. These plants have previously been found to have a novel genetic modification which may potentially function as a mechanism for mitigating the impacts of pathogenic viruses and, which, therefore, may provide a target for resistance breeding. This understanding, however, is derived from a very limited selection of sequenced Euphorbiaceae (~0.06%) plants, with many important taxonomic groups being excluded. In my project, I attempted to begin to explore presence and variation of this unusual genetic modification in Euphorbiaceae from previously unexplored genera to help broaden understanding of its evolution and diversity. Finally, my project initiated exploration of the host-range of CBSV – examining susceptibility of diverse plant species – which will be valuable in informing future phytosanitary measures and CBSD management in the face of expanding cassava production and diversifying African agribusiness.

As someone whose undergraduate education was heavily disrupted by the COVID-19 pandemic, my MScR project provided me with an invaluable opportunity to continue to develop and refine my laboratory skills and my research methods. These ranged from fundamental techniques such as gel

electrophoresis and plasmid extraction to more complex skills such as RNA extraction, agroinfiltration, and yeast recombination. Outside of the laboratory, I was able to develop both my computational and analytical skills, as well as my scientific writing skills during the creation of my final thesis. Development of these skills was supported by my supervisors, my enthusiastic and supportive research group, and by extracurricular classes hosted by the University of Bristol and the School of Biological Sciences over the course of the year (including training covering statistics, plagiarism, and funding, as well as many more).

I will carry these skills forward into my BBSRC-funded PhD research which will continue to explore the fundamental genetics of U/CBSVs in the Molecular Plant Pathology Lab at the University of Bristol under the supervision of Dr Andy Bailey and Professor Gary Foster. I am grateful to BCAA and the Lady Emily Smyth Studentship for supporting me to develop so that I am now in a position where I feel equipped and comfortable in this role, enabling me to achieve a goal I had aspired to since childhood. Working on a project that challenges and stimulates you – such as those offered by BCAA – is a truly unique experience that I would not hesitate to recommend to anyone who is considering applying.

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