PLANT HEALTH UNDERGRADUATE STUDENTSHIPS 2019

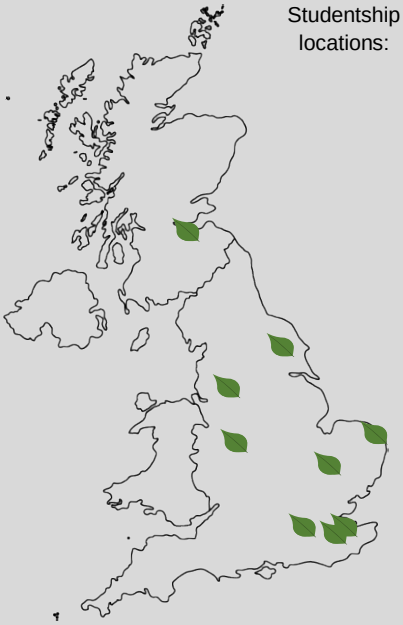
AT A GLANCE

Number of studentships: **9**

Project proposals received: **21**

Students considering further research as a result of the studentship: **88%**

Studentship locations:



Funding per project: **£3000**

Student applications received: **198**

Supervisors would recommend scheme or apply again: **9/9**

Funders:

Department for Environment Food & Rural Affairs

BSPP

N8 AgriFood

The David Colegrave Foundation
Supporting students in horticulture

SUMMARY

We arranged nine summer placements in summer 2019, through the Plant Health Undergraduate Studentships (PHUGS) programme, now in its third year. These placements provide 10-week summer research projects for undergraduates, in line with priorities in plant health identified by Defra. PHUGS aims to address skills and capacity challenges in plant health science, provide training opportunities, generate plant health research outcomes and build networks of research groups, scientists and employers. The PHUGS scheme is run by the UK Plant Sciences Federation (UKPSF), a special advisory committee of the Royal Society of Biology (RSB).

Defra, BSPP, N8 AgriFood and the David Colegrave Foundation funded placements in this year's programme. Scientists applied for competitive funding, and successful applicants supervised the studentships.

In 2019, 21 researchers applied to host the nine available studentships. We received 198 student applications for these places. We offered students the chance to attend and present posters about their projects at the BSPP Presidential Meeting, and seven students took up the opportunity. Following their placements, supervisors and students gave very positive responses in an evaluation of their experiences (shown in Appendix I).

The following projects took place in the PHUGS 2019 programme:

Supervisor	Institution	Project	Student Applications
Agnes Ardanuy and Mathilde Chomel	University of Manchester	Below-ground controls of oak decline	34
Helen Cockerton MRSB	NIAB EMR, Kent	Safeguarding UK hop production: validating race-specific diagnostics tools for *Verticillium albo-atrum*	14
Sebastian Eves-van den Akker MRSB	University of Cambridge	Stop them in their tracks: disrupting the temporal regulators of cyst nematode parasitism	31
Ville-Petri Friman	University of York	Development of combination phage therapy against *Ralstonia solanacearum* plant pathogenic bacterium	30
Fiona Highet MBE	Science and Advice for Scottish Agriculture (SASA), Edinburgh	Assessment of Psyllid vectors of Lso in the UK and their potential risk to agriculture	23
Hayley Jones	RHS, Wisley	Life cycle and biology of an emergent pest, the agapanthus gall midge	15
Graeme Kettles	University of Birmingham	Microbial profiling of the oak tree phyllosphere in response to changing atmospheric carbon dioxide levels	24
Matevz Papp-Rupar	NIAB EMR, Kent	Towards curbing the ash dieback epidemic	16
Diane Saunders MRSB	John Innes Centre, Norwich	Using a multi-disciplinary approach to tackle a formidable foe - wheat stem rust	11

FUNDING

Four partners funded studentship placements in 2019: Defra supported four, the British Society for Plant Pathology (BSPP) three, N8 AgriFood one and the David Colegrave Foundation, a new funder for 2019, also supported one placement. Defra contributed separately towards the RSB's costs in administering the scheme.

The BSPP stipulated that the funding they provided was to be awarded to researchers within their membership; 12 eligible applications were received. Funding from N8 AgriFood was provided by the University of Manchester with the condition that it be awarded to a project with a supervisor or co-supervisor working there. As we received only one project proposal that met this condition, this element of the scheme was not competitive.

Funders paid £3000 per studentship. We allocated £500 towards costs for host institutions for each placement, and the remainder to a stipend for the student of £250 per week for 10 weeks. Last year (2018), student stipends were £200 per week with an extra contribution of £500 towards expenses available. The total paid to students is unchanged, but the arrangement last year avoided paying higher stipends than the BSPP undergraduate vacation bursary fund. The BSPP increased its stipend to £250 per week in 2019, and we did likewise.

In contrast to previous rounds, this year RSB paid stipends directly to all students in the programme to reduce administration for host institutions.

PROJECT AND STUDENT APPLICATIONS

We opened the online call for project proposals from 5-26 March 2019, inviting applications on themes aligned with Defra's research priorities in plant health (see Box 1). We promoted the opportunity on Twitter, in newsletters, and by direct email to contacts in relevant committees, societies, institutes and universities. Twenty-one researchers applied, from diverse locations around the UK.

To review applications, we convened a panel, chaired by Celia Knight, which represented the programme's funders along with one independent member. The panel comprised Geraint Parry (UKPSF), Laura Pinney (Defra), Andy Salisbury (Royal Horticultural Society), David Johnson (N8 AgriFood) and Gail Preston (BSPP).

Box 1. Themes for PHUGS 2019

- Detection or Control
- Data & Modelling
- Trade
- Host plants / earth observations
- High-risk pests or pathogens
- Knowledge Exchange
- Oak Health

The panel used the RSB grant portal to view and score proposals according to the criteria in Box 2. We convened a teleconference at which the panel discussed the proposals and determined which should receive funding. The David Colegrave Foundation indicated their preferred project by email in advance, but declined to join the teleconference. The panel awarded funding to projects based at a range of institutions around the country (see map on page 1 and summary table). The widespread coverage of studentship opportunities across the UK provided undergraduates with greater opportunity to find an accessible placement.

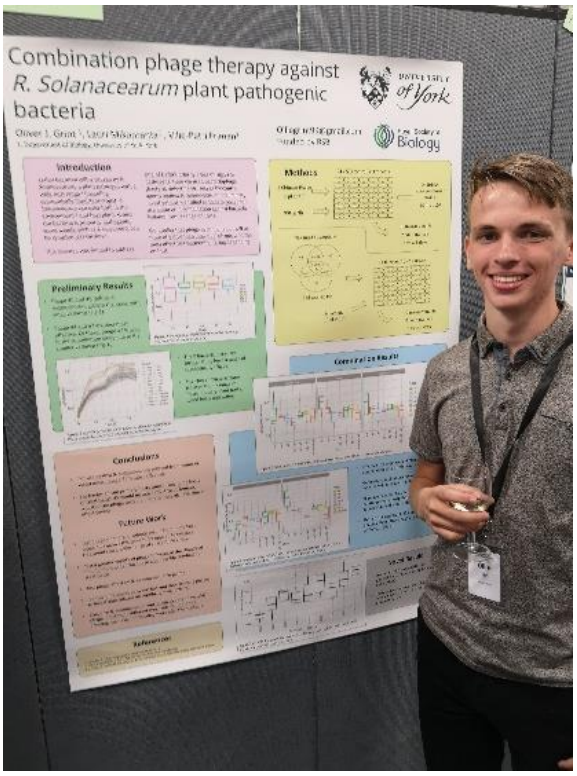
Box 2. Criteria for reviewers

We asked the review panel to assign the proposals a score between 0-10 for the criteria below, and invited them to submit any general comments and to state any conflicts of interest.

Criterion	Weighting
Is the proposal built on satisfactory evidence and suitable for an undergraduate studentship?	40%
Would the student have adequate supervision?	35%
Does the research address one or more of the priority themes? (see Box 1)	10%
Could the project engender interdisciplinary collaboration?	15%

Between 15 April and 8 May 2019, we advertised to students the opportunity to apply for the nine projects. We received 198 applications – a slight increase from last year's 181 – once again indicating the large demand from students for placements (see summary on page 2 for the numbers of applications for each project). Students submitted applications online, including a personal statement, and their CV. The researchers whose projects were funded (the supervisors) reviewed applications using the RSB portal and selected a student for their placement. We provided guidance notes to supervisors on selecting a student, with the aim of ensuring the process was fair for all applicants. The guidance suggested that supervisors consider training in recognising unconscious bias before reviewing applications, recommended a process for making the selection, and offered potential interview questions.

PLACEMENTS AND EVALUATION



The 2019 BSPP Presidential Meeting took place in early September at the University of the West of England. In advance of the event, the BSPP offered to waive fees for PHUGS students to attend the first day of the meeting and present at the poster session. We advised supervisors of this opportunity during students' placements, to provide the option to inform their students. No additional funding was available to support students' travel and accommodation costs, but we suggested supervisors consider covering this using part of the £500 we provide for hosting a project. Supervisors enthusiastically supported the idea, although three mentioned that this would use a large portion of the £500. Seven students presented their posters at the meeting.

At the end of their placements, we asked students to provide personal statements outlining how the studentship was useful to them, and posters about their project work; we encouraged students to use the posters they displayed at the BSPP meeting if applicable. All students submitted a poster, and six sent personal statements.

Students and supervisors completed online evaluations. We received feedback from all nine supervisors, and eight students. All of the responding students stated that the studentship had helped them understand how plant health research is carried out; seven of the eight respondents said that the it improved their understanding of the needs of plant health research; six said that it encouraged them to study plant health topics on return to university, and seven said that they are considering further research (e.g. Masters or PhD) as a result of the studentship. Furthermore, all eight agreed that the studentship had given them new skills and helped with their career planning.

Of the supervisors, all agreed that the funding application and student selection processes were clear, although some mentioned some minor issues with the online system. All said that they would apply again, or recommend the scheme to others. The supervisors also rated the student applications they received very highly, and the value and usefulness of the studentship very favourably. Appendix I shows responses in greater detail.

POTENTIAL IMPROVEMENTS FOR 2020

Several supervisors mentioned minor issues with the online application and selection system; this will need to be looked at to identify improvements that can be made.

Both students and supervisors highlighted that the opportunity for students to attend and present posters at the BSPP meeting was a valuable part of the experience. If offered in future, sourcing additional funds to cover students' travel and accommodation expenses in attending the meeting would be beneficial. With these funds and the arrangement with the BSPP in place earlier in the process, we could ask students to confirm their attendance early, giving the meeting organisers the chance to group students' posters together.

Reducing the length and complexity of the application process for researchers could encourage more project proposals, and reduce the time needed to review them.

APPENDIX I: SUPERVISOR AND STUDENT FEEDBACK

SUPERVISORS: 9 RESPONSES RECEIVED (100% RESPONSE RATE)

Funding application:

Was the funding application process clear?

Yes: 100%

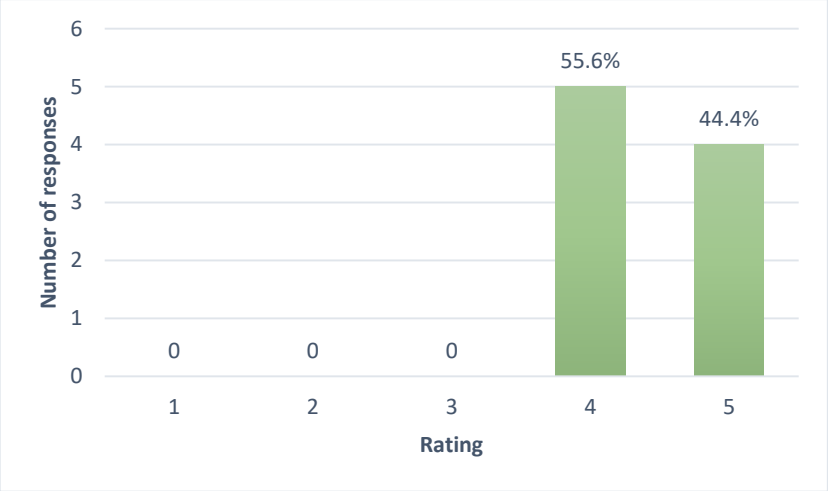
Student selection:

Was the student selection process clear?

Yes: 100%

- For some reason, the online selection system did not work in my online portal and I had to ask help and RSB to do selection for me.
- I expected a review screen on the website and was surprised when the application disappeared - this could have been a little clearer but was noted to Jonathan [RSB staff member] at the time.
- The online system for reviewing the applications was quite confusing - it would be better if you could mark each applicant as shortlisted or not without them disappearing.

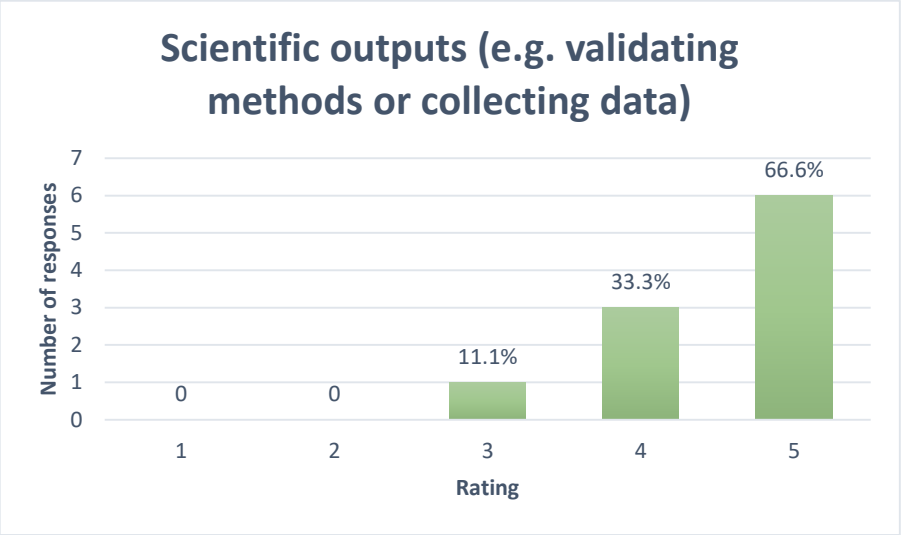
How would you rate the quality of applications you received?

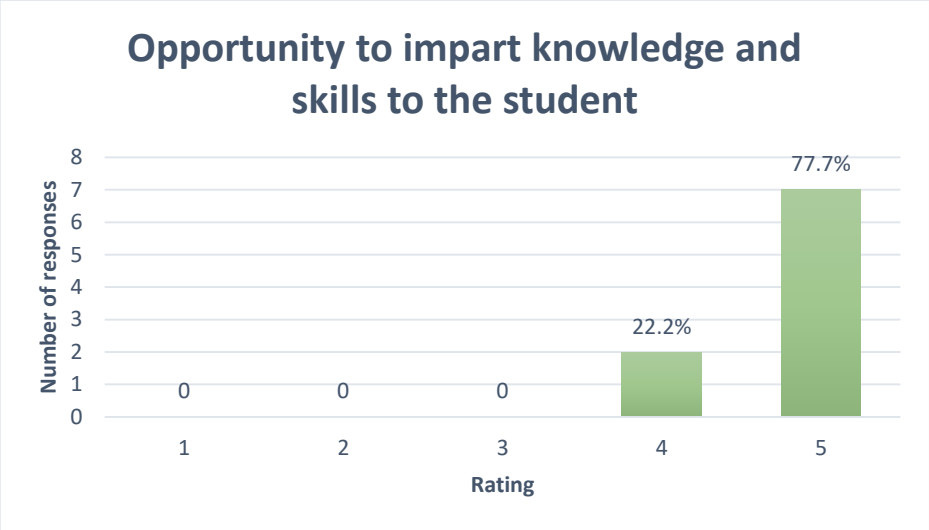


Additional comments:

- Some applicants seemed to have sent a generic application to multiple institutes which suggested they were applying for 'any' placement, which was a little disappointing.
- Some very high quality applicants but also a few who had clearly copied and pasted the same application into every project without adjusting for the project - particularly noticeable for me because my project had no disease or molecular work.

Please rate the value of the studentship for the following:

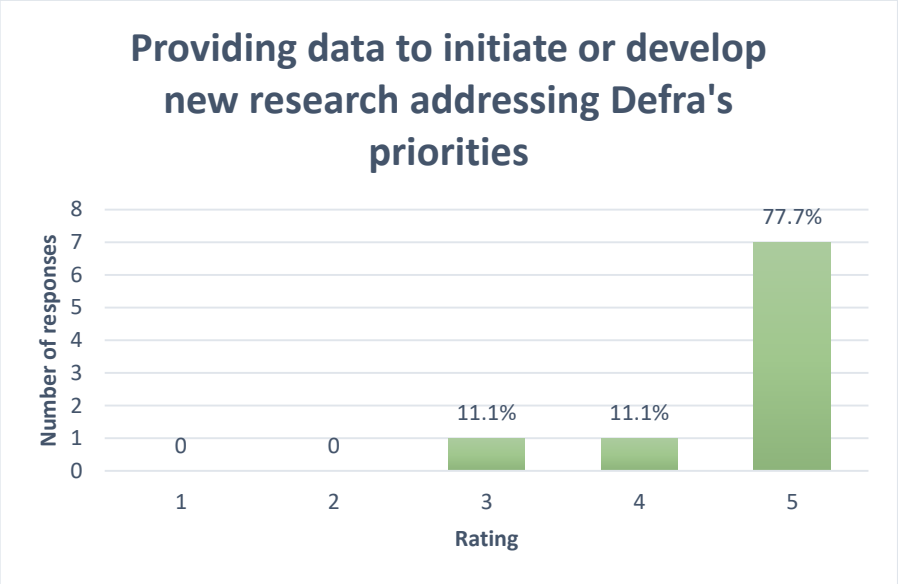


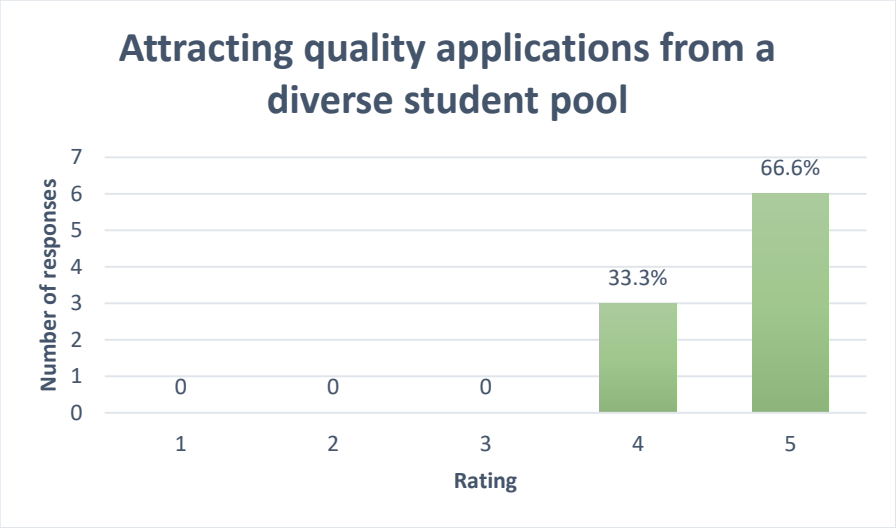


Additional comments:

- Very student dependent.
- It is great to have a funded summer student - they can achieve so much because they get to focus on the one project!

Please rate how useful you consider the Plant Health Undergraduate Studentships scheme is to the following:





Would you apply for, or recommend to others, a Plant Health Undergraduate Studentship in future?

Yes: 100%

Additional comments:

- Definitely! However, we usually plan to submit only one application from our organisation so we are not competing with each other for funding.

Do you have any suggestions for how we can increase the value of these opportunities of students in future?

- Opportunity for the students to present results in BSPP meeting was great.
- I think the link with the BSPP conference was a good idea, but would suggest to supply additional funding to cover it.
- There was small miscommunication regarding funding. The £500 provided was (I thought) for materials and costs for the studentship, but it was later revealed that it should be used for the student to create a poster and attend the BSPP conference. It would be good if it was clearer from the beginning how these funds should be used so we can plan which costs we need to absorb.
- Probably the most stressful for the student and myself was finding them accommodation. Call a bit earlier in the year would be beneficial to have enough time to arrange accommodation. The last week

of the studentship should be focused on writing a short paper (Intro / M&M / result with discussion) max 3 pages to motivate the students to take accurate notes and think about how to summarise their work.

Do you have any further comments about the organisation of the studentships, or your experience of supervising a studentship?

- Fantastic scheme!
- Very good.
- The studentships were very well organised and overall the system worked really well. My student was great and achieved so much in her ten weeks. It is a great opportunity and very rewarding to have a summer student and I hope the RSB continues to fund them!
- Organisation was very smooth and without issues. The only think I could improve would be to simplify the downloading of applicant CVs and cover letters as a file.

STUDENTS: 8 RESPONSES RECEIVED (89% RESPONSE RATE)

Did the studentship help you to understand more about how plant health research is carried out?

Yes: 100%

- I was given the training to enable me to carry out plant health research and gained valuable skills.
- It taught me more about how data is collected in the field and what sort of analysis is required to gain an insight into the possible issues disease could bring to our crops.
- Yes in great detail as I was the sole researcher on my project, I was able to experience the full research process from experimental planning to data analysis. This included background literature research to better inform my project plans, speaking with the public and other members of staff regarding the research topic and data collection even when experimental set ups go wrong. I also aided the research of my supervisor throughout the studentship where I learned experimental techniques to improve data credibility which I had not previously considered, and adjusted my own experimental set up to suit.
- Throughout the research I did understand how to carry a plant research and that the plant research can be not directly on plant but also with plant parasites.
- I was able to work on a range of activities, shadowing more advanced students until I was able to take more ownership of my project and work independently, growing confidence in culturing my fungi (*Verticillium nonalfalfae*) extracting DNA, performing PCR reactions and running electrophoresis gels. I was expected to do my own background reading and I was able to expand my project with the resources I found. I was also taken to a *Verticillium*-free hop farm to learn about breeding and growing techniques.
- I got to see the various steps in plant health research, from planning the experiments to writing up the results it was great to be able to see the project through to the end. I also witnessed the great diversity of types of research carried out in this field.
- I had no previous experience in plant health and was clueless as to what to expect. This was my very first extended hands-on experience.
- I got an interesting insight into science in action. By planning and carrying out my own experiments I now understand how a wider range could be run and have many ideas of my own to try out.

Did the studentship improve your understanding of the needs of plant health research?

Yes: 87.5% (7)

No: 12.5% (1)

- This studentship gave me a greater insight in to agricultural science and its importance, particularly in Scottish agriculture.
- I understand more about the lengths that scientists have to research in order to keep food on our shelves, especially with the number of diseases affecting our crops.

- I now understand how important the public is in both funding plant health research and as a recipient of the benefits of its discoveries. Without the help of plant health research, many plant species would be under serious threat from pests and pathogens. The BSPP conference in particular has taught me that multiple of these include plants of high importance to both our agricultural and horticultural industries, and it is through plant health research that we are able to solidify their security.
- My understanding about the importance of plant research did not change, because I understood the importance of that before.
- My project was demanding and it showed me the vast amount of work that could have followed on from what I was studying. Before doing the placement I was worried about going into a field that is already so well researched, however now I see there is plenty of potential and need for original work and new creative solutions.
- I saw especially during the BSPP conference what areas of research are particularly important and how much there is left to discover.
- We focussed on alternative research questions in order to progress towards curbing ash dieback disease, to which there is no effective cure at the moment.
- By researching the affect of my bacteria, I understood the scale of plant disease and the work that is needed in this area.

As a result of the studentship, are you considering studying topics relevant to plant health on return to university?

Yes: 75% (6)

No: 25% (2)

- In particular I would like to continue research regarding plant-vector relationships.
- I am studying plant sciences as a module and my dissertation is about achieving food security through crops.
- I had chosen this studentship due to wanting to explore plant health out of personal interest but also due to the lack of content in this area within my university degree. The studentship has allowed me to better understand this area of research but as my course in Biology is so wide ranging, I will be exploring other areas of the field on my return to university.
- I have already chosen some modules related to plant science, and I am still willing to explore other fields.
- I was already intending to study plant pathology further however my placement reinforced my interests. Sometimes my confidence that this was the right path for me was challenged by the difficulties I faced, but I am grateful I was able to experience these setbacks before graduating.
- Although there are limited plant health-related topics available to study at my university, I'm planning on doing those modules which follow this theme in the coming year. This studentship has also made me consider doing a Masters which includes plant health topics.
- I loved plant science already and enjoyed plant pathology in particular.
- I hope to carry on looking at pathogenic microbes (specifically to plants) and hope to specialise in them in future.

As a result of the studentship, are you considering further research, e.g. a PhD or Masters?

Yes: 87.5% (7)

No: 12.5% (1)

- If funding was available, I would consider undergoing a PhD
- I am considering doing a PHD, however I think I would do this after a few years of my degree finishing
- I had already been considering undertaking a PhD prior to my studentship. I do not think I was particularly swayed either way, but the studentship has certainly given me insight into what undertaking a PhD would be like. This will help better inform me in my decision.
- I am applying to PhD positions.

- Before my placement I didn't even think I would be capable of a PhD and now I'm determined to do one.
- The studentship has confirmed that I would like to complete a Masters in the plant sciences field so I can continue to work in plant science research in the future.
- I now have a better understanding of what science research entails and have come to the conclusion that this is what I want to do
- I am eager to work in an industrial context.

Do you think the studentship has given you new skills?

Yes: 100%

- It has given me skills in Plant DNA extraction, and helped me to build my skills of PCR, Gel electrophoresis, Real-Time PCR and data analysis.
- Before my studentship I had never really been taught properly how to even use a microscope, which I can now confidently do.
- Yes, I continually used flexible skills such as time management, project design, and data interpretation and analysis throughout the project. I also learned multiple niche skills, such as insect pinning, live specimen collecting, microscope camera configuration and many more which I enjoyed developing.
- I have learned so many new lab skills and also communication skills.
- Absolutely, I had never done a DNA extraction or a PCR before and now I can plan and carry out both on my own. I was able to solve problems and keep hold of my motivation while my supervisor was away for a couple of weeks, which was a really big skill for me to learn, as someone with anxiety making use of technical support in the lab was a lesson I had to learn the hard way and my communication has improved as a result. I also learned some bioinformatics which I would not have otherwise had the inspiration to do.
- Having done a mix of semi-field and lab work I learned a lot of new skills, particularly in soil analysis. I now have experience making a research poster and presenting it as well which is a great skill to have.
- Skills both specific to the project (e.g. microbiome isolation, DNA extraction, PCR) and to science research more generally (planning, self-motivation, time management).
- I am now proficient in a lab, as well as with experimental design and data analysis.

Has the studentship helped your career planning?

Yes: 100%

- With the skills I have gained, I can now construct a CV which will have suitable experience in molecular biology and would be useful across a range of potential employers.
- I now know that I am fully capable of working in a lab and am keeping options open to do a PHD.
- During my studentship I spoke with my supervisor and other academic individuals, particularly during my attendance to the BSPP conference, regarding going into research as I had my doubts regarding my career path. Their advice has really opened my eyes to the variety of career prospects within the field of plant health research, and if it would be suitable for myself.
- I am sure I want to do my PhD now.
- Being surrounded by industry researchers it is difficult to avoid being given advice and I learned about many different ways of ways to get where I want to go some of which I hadn't considered.
- Being able to talk to researchers, post docs and PhD students every day gave me the opportunity to see the various ways to get into research. This has made it clear what steps I can take next to continue in this field.
- I loved it!
- I had an amazing time doing the studentship, it was a great opportunity.

Do you have any other feedback about the organisation of the studentship, or your experience?

- The staff members at SASA are supportive and patient with students. I liked that once I was trained in the procedures used, I was left to work independently which I think is a useful skill to gain. I would return to work at SASA if the opportunity arose.
- I would like to say a big thank you for providing me with this opportunity and I believe I speak for many students out there that you have given us vital experience in the field of research and we really appreciate the guidance the studentship provides us with.
- The poster session at the BSPP conference was a really good experience, for many reasons but the best part was meeting other students who had done the studentship and I really think this element should be kept in the future even if not in the form of an official research conference. One thing I think I lacked was the kind of support network that would be found at a university, such as mental health services and accommodation advice, and perhaps this should be considered when undergrads are working in industrial placements. However the people I worked with created a relaxed atmosphere unlike anything I was expecting and I found it to be one of the most productive places I've learned/worked at.
- I had a really enjoyable time and learned so much over the two months. It was great inspiration and I feel more ready to take on the final year of my degree and hopefully a Masters!