Development of a method for crown rust inoculation for use in grass breeding in N. Ireland

Crown rust caused by *Puccinia coronata* is an important disease of perennial ryegrass. This disease is becoming more and more prevalent in the British Isles, and although normally found in greater abundance at lower latitudes, such as in central Europe, it is spreading further and further north. Climate change and increasing average global temperatures is accelerating the relevance of this fungus in the agricultural economy and the importance of researching ways to minimise its impact.

In the summer of 2016 I was granted the opportunity to carry out a project in the plant pathology department at the Agri Food and Biosciences Institute under the supervision of Dr Gillian Young. The lab I worked in looks at a range of diseases which affect crops from within Northern Ireland and further afield, across the British Isles and into Europe, including potato, wheat, barley and linseed. This project allowed the first step towards working in a new area of plant pathogen research in this department of the AFBI; forage grasses. In the 10 weeks, sandwiched between the second and third years of my degree in Biological Sciences, this work has also provided me with a solid basis for a future project within the university. As a first step into research in a new crop, the aim of my project was simple but fundamental to future work: development of a method for crown rust inoculation for use in grass.

The first stage of my project was researching past work on the pathogen, getting to know its life cycle, hosts, the infection process, symptoms of the disease and its effects. With this knowledge, I was then able to proceed with picking a host for inoculation – two cultivars of perennial ryegrass with differing resistance. Seeds were sourced, planted, seedlings transferred and grown on to a mature enough point where sufficient leaf surface was available for infection – approximately 8 weeks. *P. coronata* spores were suspended in a water solution containing tween and sugar, and sprayed on all surfaces of the plants to be infected. The plants were then stored under high humidity at 18°C and light/dark cycle of 16/8 hours using light controlled growth chambers. At approximately 5 days after inoculation, the first signs of successful fungal growth begin to show – a patchwork of chlorosis on the leaves. These continued to develop into orange masses on the surface of the leaves, called uredinia. Within these structures, the uredinospores were produced. After approximately 2 weeks, the uredinia began to change appearance from smooth and shiny to more powdery and dull, leading to the release of the mature spores. A small amount of infected plant tissue was agitated in tween and water solution to suspend spores. This solution was then applied to fresh plants as with the initial inoculation solution – this established a continual supply of spore producing plants.

Nigel with his plants

I would like to extend my gratitude to the BSPP for providing me with the opportunity to undertake this project, and to the whole team in the plant pathology lab in the Agricultural Food and Biosciences Institute, especially the supervisor of my project, Dr Gillian Young, and the industrials which aided me in carrying out the work. The experience was enjoyable, and should continue to pay dividends throughout the beginning of my scientific career.

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