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MODELLING THE GERMINATION TIMING OF *Sclerotinia sclerotiorum* SCLEROTIA TO PREDICT DISEASE RISK IN THE FIELD. Z. GARAJOVA[1,2]; J.P. CLARKSON[1]; A. MEAD[2]. [1]Warwick Crop Centre, School of Life Sciences, University of Warwick, Wellesbourne, UK / [2]CAS, Rothamsted Research, Harpenden, UK. E-mail: zofia.garajova@warwick.ac.uk

Control of sclerotinia disease relies mainly on fungicides to kill ascospores released by apothecia produced following carpogenic germination of sclerotia surviving in the soil from previous crop infection. The success of these applications depends on identifying the best timing of the limited number of allowed sprays. Hence, a reliable forecasting model for germination timing would improve the efficacy and sustainability of chemical crop protection. Temperature was identified as the key environmental factor influencing the timing of sclerotial germination when moisture is not limiting, with observations suggesting a combination of two consecutive phases, conditioning and germination (Clarkson at al., Phytopathology 97, 621-631, 2007). The conditioning phase appears to require colder temperatures but cannot be directly observed, while the germination phase appears to require warmer temperatures and culminates in the production of apothecia. However, different *S. sclerotiorum* isolates may vary in their temperature requirements for conditioning, even at a local (field) scale as well as between different climatic zones. Despite this, in temperate zones, synchronized germination of mixed isolate populations is commonly observed in the field in the spring following cold conditioning over winter. To explore this system further, and provide data for model development, two primary experiments recording stipe occurrence were carried out to determine the effect of different temperature durations and combinations on the distribution of germination times for two UK *S. sclerotiorum* isolates with contrasting cold conditioning requirements. In addition, samples of sclerotia were dissected and assessed for internal development changes through microscopy. Initial summaries of the germination data show clear differences in temperature response between the two isolates. For isolate L5 the optimal temperature range was 4-8˚C for conditioning and 8-14˚C for germination. Furthermore, 20˚C was limiting for germination without at least 29 days conditioning at lower temperature. The shortest mean germination times of 57-59 days were achieved for treatments with transfers from 0-8˚C followed by 11-14˚C with higher germination temperatures requiring a longer duration of low-temperature conditioning. In contrast the optimal temperatures for isolate L6 were 4-17˚C for conditioning and 11-17˚C for germination. Furthermore, isolate L6 achieved germination of more than 95% for treatments with conditioning at 17˚C for 29 or 56 days before transfer to 25˚C in contrast to less than 60% germination when conditioned at 4˚C. The shortest germination times of 35-44 days were achieved for treatments with transfers from 11-17˚C to 20˚C with the initial temperature duration as short as 7 -14 days. The preliminary dissection results for isolate L5 have provided a new insight into the organization of the processes leading to apothecial production, where primordia (apothecia/stipe initials (Saito, Trans. Mycol. Soc. Japan 14, 343-351, 1973)) were observed after 28 and 70 days at 20˚C but not at 4˚C (no stipe germination in the 70 days for either of the treatments). The primordia are linked to the actual stipe/apothecia production - germination, and the occurrence in 20˚C without any conditioning and an absence in 4˚C suggests that the germination and conditioning processes are more independent and rather simultaneous than consecutive processes as initially thought. The germination data are now being modelled to quantify the impact of temperature on the distributions of times for the conditioning and germination processes to be completed where the aim is to understand and model the distribution of times for the whole population rather than time to germination of a certain percentage of the population.

Keywords: Forecasting model; Carpogenic germination; Conditioning of sclerotia; Germination timing;

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