Mate limitation and the spread of plant pathogenic fungi

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SESSION 5

O2 – MATE LIMITATION AND THE SPREAD OF PLANT PATHOGENIC FUNGI

Sexual reproduction and dispersal are often coupled in facultative parthenogens such as water fleas and fungi, which are major biological invaders. As a consequence, mate limitation can slow down their spreading spead. In this study, our aim was to obtain an explicit spreading speed expression from a model accounting for sexual reproduction in facultative parthenogens, with a focus on plant pathogenic fungi. Starting from a 2-dimensional reaction-diffusion equation, we took advantage of the fact that we are interested in the dynamics over large spatial and temporal scales to reduce the model to a single, but degenerate, reaction diusion equation. We were unable to find an exact solution, yet we obtained a simple expression providing a very good approximation of the spreading speed. Taking the Black Sigatoka disease of banana as a case study, the model provides a reasonable upper bound to the actual spreading speed (approximately 100 km per year), whereas a similar model without mate limitation predicts a wave speed one order of magnitude greater. We discuss the implications of these results to control ash dieback disease and other parasites in which mating conditions dispersal.