#075

Effects of model parameter uncertainty in predicting severity of phoma stem canker epidemics in UK winter oilseed rape crops

Bruce Fitt

Department of Biological Sciences, School of Life and Medical Sciences, University of Hertfordshire, Hatfield, UK

Phoma stem canker, caused by the pathogens Leptosphaeria maculans and L. biglobosa, leads to yield losses in oilseed rape crops across the world. The UK model for predicting severity of phoma stem canker epidemics at the end of the growing season (Evans et al., 2008) consists of three linear regression equations describing the dependence of three successive stages in epidemic development on weather. The first equation predicts the date in autumn when 10% of oilseed rape plants in a crop are affected by phoma leaf spotting; the second predicts the date in spring when stem canker symptoms first appear and the third predicts stem canker severity at crop maturity. Measurements of optimal temperatures for growth in vivo of the pathogens showed that the relation of growth rate to temperature was linear under current and near-term UK climatic conditions. The dates when 10% of oilseed plants were affected by phoma leaf spotting and when first phoma stem canker symptoms agreed reasonably well in most years with those predicted by the model. However, canker development in planta under controlled conditions was not linearly related to temperature; correspondingly the model gave poor predictions of phoma stem canker severity ratings at maturity. To assess the uncertainty in prediction of phoma stem canker development stages during the growing season due to model uncertainty, model parameter values were perturbed using Monte Carlo simulations. This technique provides a methodology for translating the confidence intervals of model parameters into a measure of precision in predictions.