O.49 - WHEATPEST, a simulation model of yield losses caused by multiple injuries for wheat in Europe

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It is necessary to diagnose damages caused by multiple pests in order to design efficient cropping systems less dependent on pesticides. These diagnoses should quantify and classify hierarchically yield losses caused by various pests (pathogens, weeds, and insects) in order to help design crop management plans, or cropping systems, less vulnerable to the most detrimental pests. However, there is a lack of data on the incidence, severity and damages of various pests in European commercial fields. In order to address this issue, WHEATPEST, a production situation-based simulation model for wheat, was developed to incorporate drivers of variable production situations and their related injury profiles. It is a simple mechanistic agrophysiological model which incorporates damage mechanisms to simulate the physiological effects of several injuries (caused by pathogens, pests, and weeds) on crop growth and yield. Model inputs consist of weather data (daily temperature and radiation) and drivers for production situation and for injury profiles. Model outputs are series of dynamic variables over time: development stage, dry biomass of organs, Leaf Area Index, and final yield. Simulation drivers were derived from published reports, in particular through a meta-analysis of highly detailed farmers' field surveys in the United Kingdom and the Netherlands. Preliminary analysis of the model's performances indicates that WHEATPEST conforms with available published reports in a range of production situations and injury profiles. This work highlights the need for the collection of standardised data on both production systems characteristics and multiple pest injuries at the European scale, and the usefulness of modeling tools for basic research and policy.