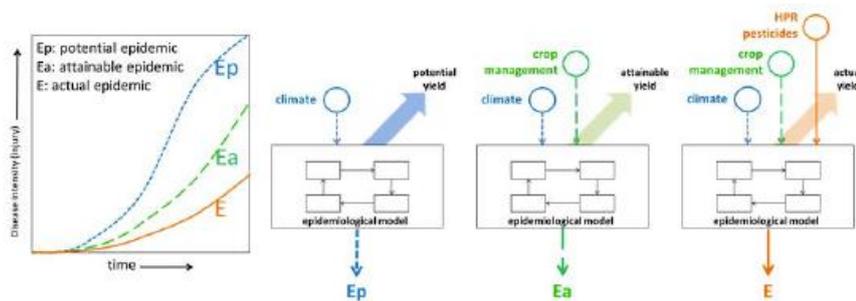




Our emphasis is on generic epidemiological and generic crop loss modelling structures. We provide first a very brief overview of epidemiological modelling, in terms (1) of epidemiological structures (monocyclic; polycyclic; mixed monocyclic-polycyclic; poly-etic), (2) of spatial coverage (explicitly or implicitly spatialized models), and (3) of inclusion of genetic diversity of the pathogen. We then provide a very brief overview of crop loss simulation modelling, with an emphasis on crop (agrophysiological) growth models incorporating damage mechanisms. In this framework, guiding concepts are the levels of yield (potential, attainable, and actual), the factors (defining, limiting, reducing) generating these levels, and a limited series of (seven) damage mechanisms associated with crop diseases and pests. This framework is illustrated by GENEPEST, a general model for generic modelling of yield losses caused by pests and diseases.



To address the shortage of field data that quantify the dynamics of injury (e.g., disease levels), we present a framework to model the dynamics of epidemics – potential, attainable, actual – which, each in turn, account for the accumulated effects of (1) epidemic defining factors (e.g., climate), (2) epidemic limiting factors (e.g., cropping practices), and (3) epidemic reducing factors (e.g., host plant resistance and chemicals). This framework is designed to be congruent with agrophysiological models. A research agenda for modelling crop diseases includes:

- generic simulation models for disease epidemics;
- focusing on crop health (multiple diseases, pests);
- the development of crop health scenarios (set of injury levels caused by different diseases, pests) and
- which in turn are driving functions for crop growth models, to model crop losses, and gains from management.

A main challenge we put forward is that complicated, sophisticated, models are not required to address crop health – on the contrary: a simple, transparent, and generic structure may contribute much progress towards understanding and management.