# O.60 - A mathematical approach towards durable deployment of host resistance

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Plant pathogens overcoming host plant resistance are a recurring problem in crop protection. Durable deployment of host plant resistance is therefore a challenge requiring custom-made solutions for different types of pathogens and host resistance. Examining the efficiency of various scenarios, mathematical modelling can provide an intelligent spatio-temporal deployment of resistant cultivars carrying different types of resistance (major resistance genes vs QTLs) and combinations thereof. Here, we present an integrated framework of the RA4.2 modelling group coupling three modelling approaches (WU, INRA, AU) and empirical biological data (AU, CNR, INRA, IHAR, RRES) on differential selection exerted by host resistance. The ultimate goal of the RA4.2 modelling team is to identify effective strategies of durable resistance deployment in time (crop rotation) and/or space (field and landscape scales) allowing durable cultivation of resistant cultivars by a significant reduction of pathogen population density. The numerical experiments testing the effectiveness of R-gene and QTL deployment in time and space will be based on qualitative information of the fitness balance within pathogen populations provided by empirical studies. The proposed integrated approach provides theoretical support for studying the rapid emergence and spread of novel plant pathogenic genotypes carrying multiple virulence factors. It has practical applicability for designing innovative strategies for the most appropriate deployment of disease resistance genes of plants as related to the population dynamic characteristics of the particular pathogens.