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Optimisation of deployment strategies of plant resistance to pathogens

Loup Rimbaud¹, Julien Papaix², Luke G. Barrett¹, Jeremy J. Burdon¹, Peter H. Thrall¹

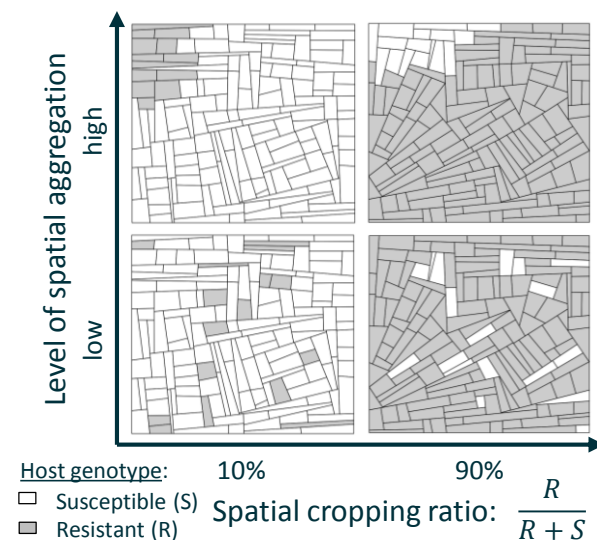
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Genetically controlled plant resistance allows reduction of damage caused by pathogens. However, pathogens have the ability to evolve and overcome such resistance, resulting in significant crop losses. We developed a spatially explicit model to investigate the potential for different resistance gene deployment strategies to provide both efficient (ability to reduce disease impact) and durable (ability to limit pathogen adaptation) disease control^a.

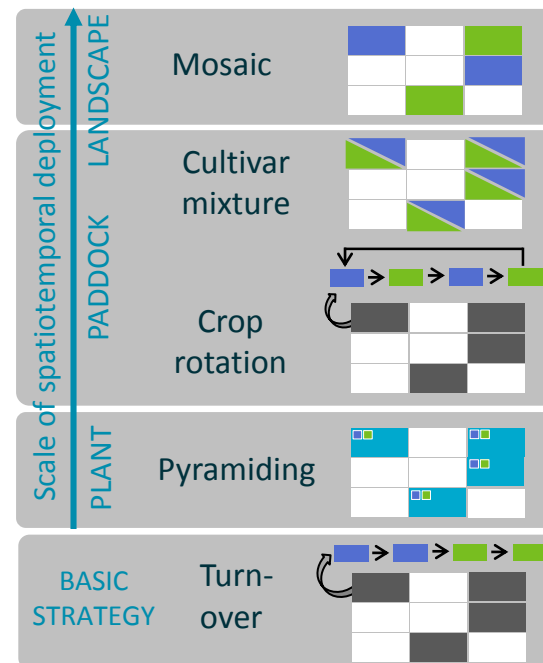
Explicit landscape

1. Generation of a landscape of 155 paddocks using a T-tessellation algorithm
2. Allocation of different cultivars in controlled proportions and spatial aggregation

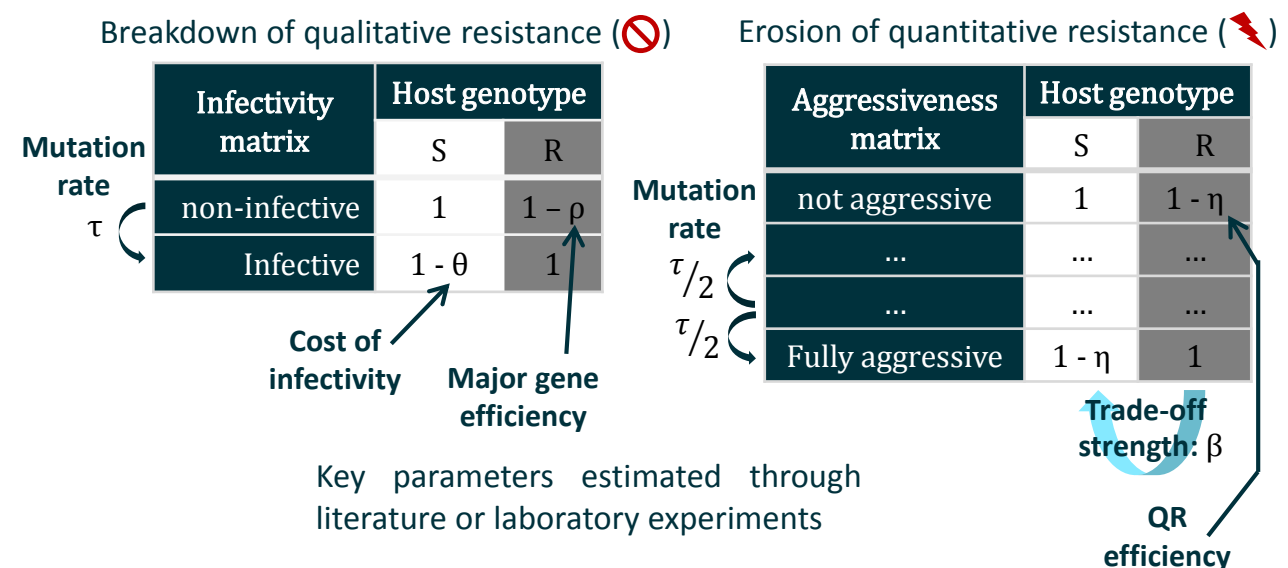


Deployment strategies

Example with 2 resistance sources



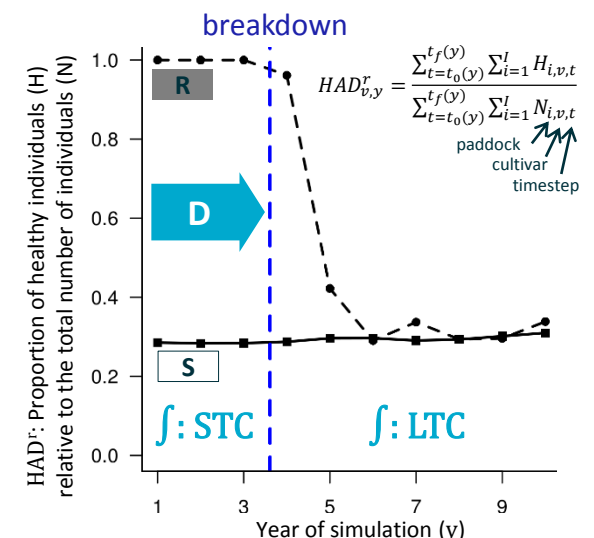
Pathogen adaptation



Evaluation criteria

Example of a mosaic with 1 resistant cultivar^b

- Evolutionary
- Durability (D)
- Epidemiological
- Short-term control (STC)
 - Long-term control (LTC)



Host response to disease

