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Genetically-controlled plant resistance can reduce the damage caused by pathogens. However, pathogens have the ability to evolve and overcome such resistance. This often occurs very quickly after resistance is deployed, resulting in significant crop losses and a continuing need to breed new resistant cultivars. To tackle this issue, several strategies have been proposed to constrain the evolutionary potential of pathogen populations and thus increase the durability of resistance deployment. These strategies mainly rely on using different combinations of resistance sources in time, space, or both. In time, such combination consists of crop rotations. In space, resistance sources can be deployed in the same cultivar (pyramiding), in different cultivars within the same field (cultivar mixtures) or in different fields (mosaics). However, experimental assessment of the efficiency (i.e. ability to reduce disease impact) and the durability (i.e. ability to limit pathogen evolution and delay resistance breakdown) of different deployment strategies presents a major challenge.

Therefore, we developed a spatially-explicit stochastic model to assess the epidemiological and evolutionary outcomes of the major deployment options described above, for both qualitative (major resistance genes) and quantitative resistance. In addition, we analysed the impact of landscape organisation (as defined by the proportion of fields cultivated with a resistant cultivar, and their spatial aggregation) and epidemiological or evolutionary parameters (e.g. dispersal abilities, mutation probability, cost of infectivity) through sensitivity analyses and polynomial regression.

The model has been parameterised for wheat resistance to rusts, caused by fungi of the genus *Puccinia*, but can be applied to many other pathosystems. Our results show that evolutionary and epidemiological control are not necessarily correlated, and that no deployment strategies is universally optimal.

Key words: deployment strategy, durable resistance, gene-for-gene resistance, plant disease, rust of wheat, spatially-explicit modelling