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## Analysing the influence of landscape characteristics on disease spread and management strategies

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Using modelling, many studies have tried to understand disease dynamics to predict epidemics and improve management strategies (Keeling et al., 2008). Spatially explicit models generally represent disease dispersal using epidemiological and management parameters. They are mostly used in a fixed landscape and rarely account for landscapes characteristics. However, the landscape can influence epidemic dynamics; thus, the impact of management strategies is not necessarily transposable from one landscape to another. Here, we present a generic *in silico* approach which predicts the influence of landscape characteristics on the direct and indirect costs associated with an epidemic. We apply this approach to sharka, the most damaging disease of Prunus trees, caused by Plum pox virus (PPV, family Potyviridae).

PPV epidemics were simulated using a spatiotemporal stochastic model based on an SEIR (susceptible - exposed - infectious - removed) architecture (Rimbaud et al., 2015). This model uses epidemiological and management parameters as inputs, and outputs the number of fully productive trees and the net present value (i.e. an economic criterion balancing the cost of the control measures and the benefit generated by healthy trees).

We simulated various landscapes, differing in plot density and aggregation, by modifying real landscapes and using a T-tessellation algorithm. Then, simulations of PPV dispersal were carried out for the different landscapes, and highlighted that the lower the patch aggregation, the larger the NPV. Sensitivity analyses were undertaken to assess the relative influence of epidemiological and management parameters on each landscape and revealed that 2 parameters related to removals and plantation bans have a strong influence on the NPV. Moreover, we showed that management parameters can be optimized for each landscape but the best management parameter combination differs among landscapes.

This study shows how useful it is to take landscape characteristics into account to predict epidemics. This approach, which is transposable to many epidemics, could thus be used to improve management strategies.