

*A conceptual framework for optimizing disease control. (1) The model starts with initial conditions: pathogen dose, genetic diversity, and the spatial location (centrality) of initial infections. (2) These factors, along with a grower's decision on early-season sprays and market demand, are fed into a coupled epidemiological-economic simulation. (3) The model predicts regional disease spread and the resulting crop damage (yield and quality loss). (4) The simulation output reveals an optimal control strategy, showing that profitability is highly sensitive to intervention when initial inoculum is high, but not when it is low. This framework provides actionable insights for both **Growers** (e.g., risk management) and **Policy Makers** (e.g., targeted regional interventions).