

This Orchard is on Fire: Travelling Waves in a PDE-ODE Coupled Model of Blossom Blight

Hermann Eberl

Fireblight is a bacterial disease of apple and pear trees and other plants in the roseca family. It can wipe out an entire orchard in a single growing season. Depending on the part of the plant that it affects it sometimes goes by various names, such as trunk blight, shoot blight or blossom blight. We present a model for fireblight during blooming season consisting of two semilinear PDEs for the pathogen and 3 ODEs for the stationary host. Numerical simulations suggest the formation of travelling waves which we then set out to prove. We determine the minimum wave speed and give conditions on parameters that guarantee the existence of such TWs that can be biologically interpreted, with implications for orchard management. Our results are sub-optimal in the sense that TWs can also be obtained for parameter combinations that do not satisfy our conditions.