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Resistance and adaptation

Direction

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Keywords

Allee effect

Mate limitation

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Reaction-diffusion

Sexual reproduction

Travelling waves



# Propagation phenomena of plant parasitic fungi

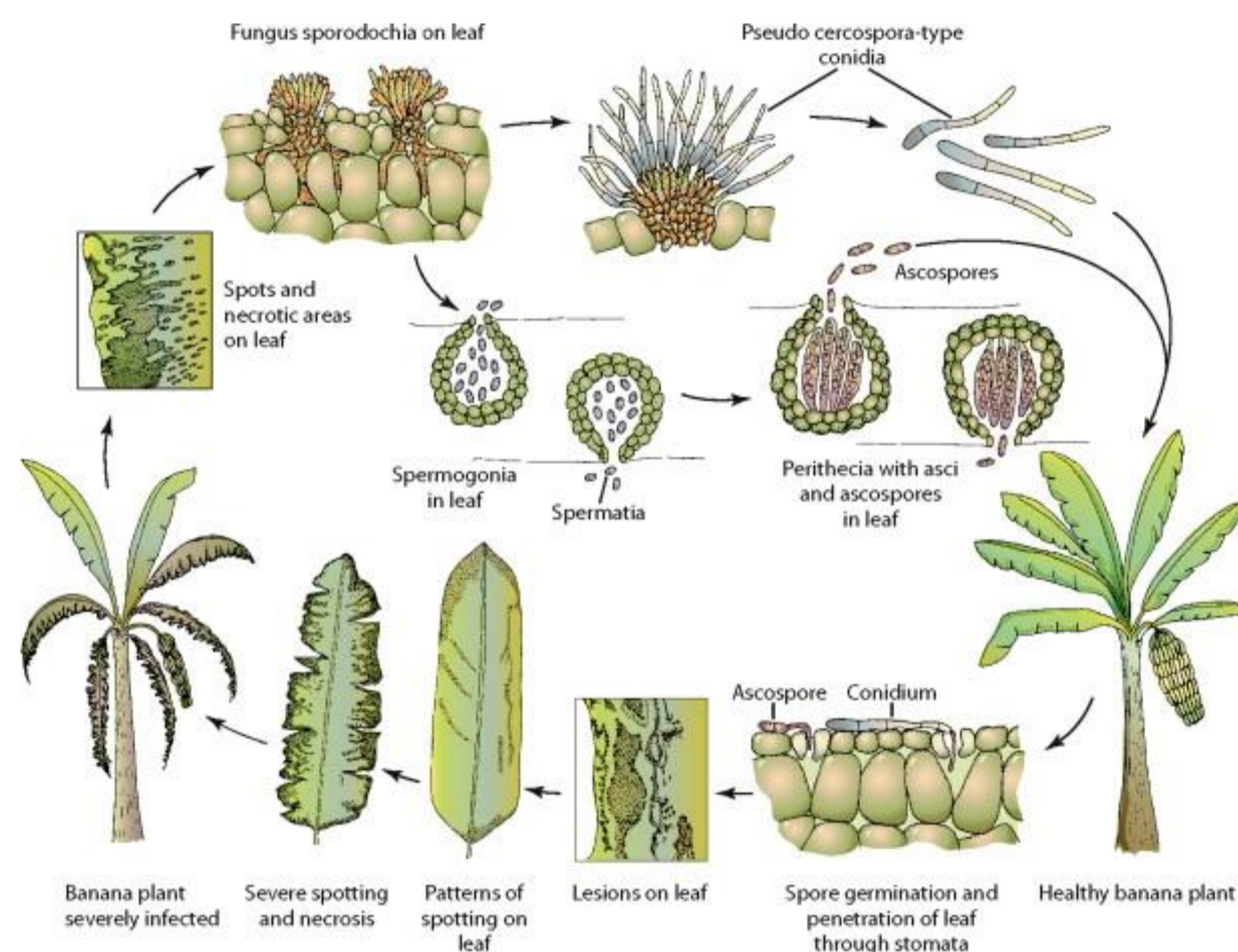


## Scientific context

Mark Lewis, Frederic Hamelin and co-authors have lately proposed simple propagation models of parasite fungi of plants, which are based on a coupling between pure diffusion and propagation by sexual way. Our model which has been studied here is the Black Sigatoka of banana stress, a fungal plant parasite disease, which were observed in Costa Rica in 1977.

## Objectives

The aim is to obtain realistic propagation models, and to explain the role of the coupling mentioned above in the involved phenomenons. In particular, they notice that a pure diffusion model, without taking into account the sexual aspect, clumsily overestimate the propagation speeds with respect to those real observed. Their analysis are based on a SI model type in one dimensional space, which leads to two coupled parabolic PDE. In this system, a formal asymptotic analysis is realized, which is based on a long time and small diffusion assumption, which leads to research traveling wave fronts in a one dimensional elliptical model.



## Results

The original model converges to the integrodifferential model, which gives a good approximation of the first one, This leads us to look for a travelling wave front type solution according ti the good approximation of the simplest model.

## Perspectives

- Exploring traveling wave solutions in the integrodifferential model with non-linear dispersal and comparing with the linear theory.
- Extending our study to a 2-dimensional spatial domain and exploring how the critical patch size depends on the ratio of sexual to asexual reproduction.
- Including stochastic mating in the model as it may have important consequences even under a balanced sex-ratio.

