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Wheat Fusarium Head Blight (FHB) evolution with climate change: an ecological modelling approach of competing fungal species

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Fusarium head blight (FHB) poses a significant threat to wheat production and food safety. Various fungal species within the Fusarium genus are responsible for FHB and compete with each other. Understanding the ecophysiology of these species is crucial for predicting their distribution with climate change in France.

In our study, we analyzed data from an in vitro experiment involving 25 strains from five different Fusarium species, grown under various water conditions and temperatures. By studying the growth probability of these strains in different environmental conditions, we identified species with varying sensitivities to temperature and water conditions. We then developed growth kinetics models for these strains, estimating distinct biological growth parameters and their relationships with environmental factors.

Furthermore, we conducted additional experiments involving the co-culture of different strains within wells. We aimed to model the competitive dynamics within these wells using Lotka-Volterra differential equation systems, incorporating the growth parameters obtained earlier. However, preliminary results revealed a discrepancy between the experimental data and expected outcomes, prompting us to address whether the issue lies in the model , our assumptions, we have or the data itself.

This dilemma underscores a central and long-standing scientific question: when faced with discrepancies between experimental data and model predictions, should we question the validity of the model or the accuracy / quality of the data?

Thématiques

Nonlinear regression ; logistic regression ; CART ; dynamical systems

Auteur principal: Dr MAHMOUD, Rémi (INRAE)

Co-auteurs: Dr FOULONGE-ORIOL, Marie (INRAE);   Mme GARCIA, Marie-Anne (INRAE);   Dr BANCAL, Marie-Odile (INRAE);   Dr BANCAL, Pierre (INRAE)

Orateur: Dr MAHMOUD, Rémi (INRAE)

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