

## Preface

The role of pathogens in the process of natural selection of plants was put on the agenda of plant ecologists by John Harper (1977). Jeremy Burdon took over the message publishing an outstanding book about the role of diseases in plant population biology in 1987. The role of pathogens in plant communities became a major subject in plant ecology. Remarkably, knowledge about plant disease epidemics obtained in agriculture is nearly used in plant ecology. This textbook should bring a glimpse of this knowledge to an audience of plant ecologists. In addition, evolutionary biologists may profit from this book dealing with the major topic of evolutionary dynamics of pathogens.

We follow a bottom-up approach starting at the cellular level. We look at the process of plant infection. Subsequently, we go to the level of individual plants estimating key epidemiological parameters. These will be used to understand epidemiological processes at the population level. At the population level, we enter the subject of modeling epidemics. We focus on modeling the spatial dynamics of pathogens. We explore the possibilities of such modeling to understand evolutionary dynamics of pathogens, and more specifically, the role of pathogen competition in such a dynamics.

Having knowledge about the, spatial, dynamics of pathogens we turn to the impact of pathogens on wild plants. Again, we follow a bottom-up approach describing first the impact of pathogens on individual plants. Subsequently, we look at the impact on plant populations. We touch a bit the impact pathogens might have on plant communities.

We do not only follow a bottom-up approach. We also adopt an approach of theory going hand in hand with empiricism. This seems necessary to understand thorny phenomena like epidemics and their impact on plant

populations. Finally, we shall look at biological weed control as a tool to validate ecological theory.

This book certainly reflects own scientific interests. The choice of the model system, balancing in between theory and practice, the focus on a reaction-diffusion based ‘epidemic’ model, the role of pathogen competition in evolutionary dynamics of pathogens, and biological weed control came all out of own research and interests. Interestingly, but not surprisingly, I share some of these interests with my former supervisor Jan Carl Zadoks. His textbook ‘Epidemiology and Plant Disease’ (Zadoks & Schein, 1979) was certainly a suitable ‘model’ for this textbook. In addition, he gave critical comments on a former version of this book. I am a lot indebted to him for his wise advice throughout the last 20 years.

I am also a lot indebted to Jacco Wallinga. He is my friend and former colleague at Plant Research International in Wageningen. We, both, turned from plant research to medicines. He went to the Dutch national institute of infectious, human, diseases, and I to the Free University Medical Centre managing research on urological diseases. I had many chats with him about research and, more specifically, about infectious diseases the last 20 years. He also read a draft of this textbook.

My wife Kirsten could not understand the importance of writing a textbook along my job in medicines, childcare, and housekeeping. However, she tolerated that I even took holidays to finalize this book.

Finally, I am grateful to my father who passed away too early. He was at the start of my academic career. He did not participate my PhD-defense, neither my habilitation at the University of Fribourg, nor my masters in medical epidemiology. However, he would have been proud to see this book.

*Jos Frantzen*