More roses for less: Balancing between crop growth, fungal diseases and energy use in greenhouses

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Background

Powdery mildew costs rose growers a lot of money because of plant damage and prevention. Mildew development depends on the climate and the crop. However, the crop and the climate both influence each other. This shows that there is a tight interplay between the crop, the pathogen and the greenhouse climate. Determining how these plant-climate-pathogen interactions play out at the level of crops is a major plant scientific challenge and will importantly contribute to optimizing greenhouse management.

Objectives

Quantify the feedback relationships between rose plant, microclimate and powdery mildew.

1. Develop and validate an integrated model approach that **quantifies the feedbacks** in the plant-climate-pathogen system
2. Increase **fundamental understanding** of the feedbacks in this system
3. Design **optimal management strategies** to increase rose production at **minimal energy and fungicide use** in greenhouse rose production.

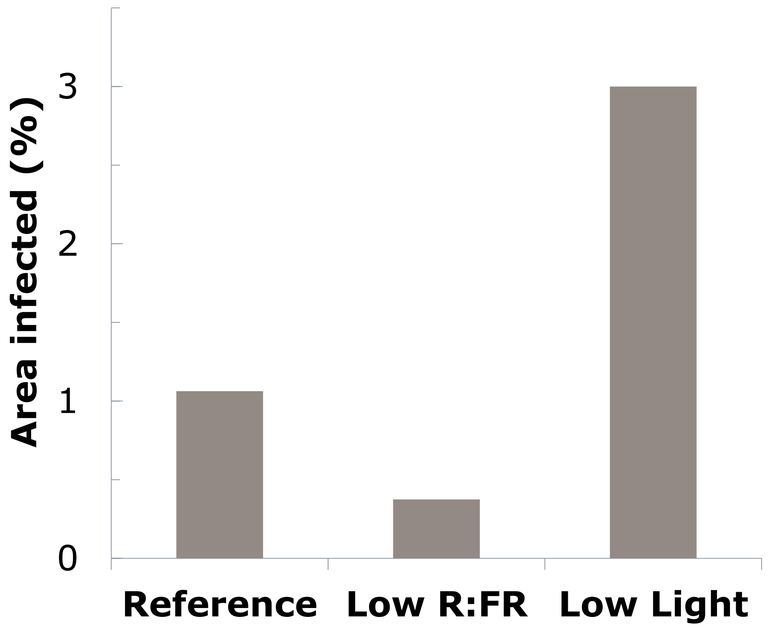


Figure 1. The effect of Red:Far Red ratio and low light on % of leaf area infected by powdery mildew.

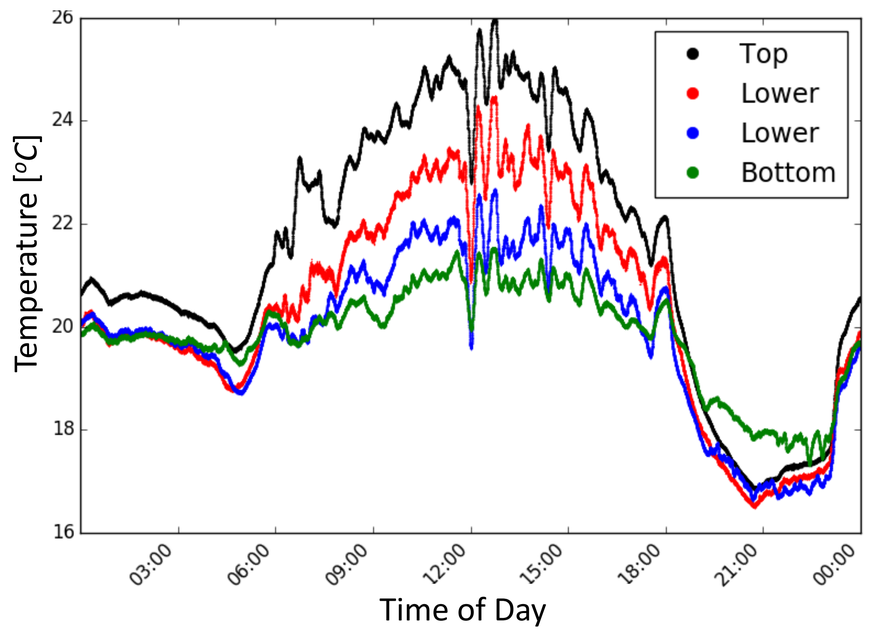
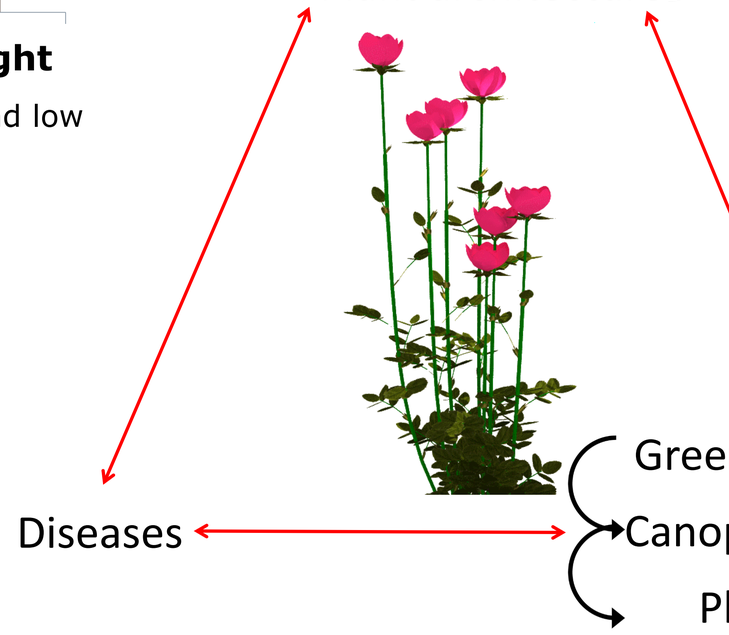


Figure 3. Temperature within the rose canopy at different heights over time for April 30, 2017.

First Results - 1

Lower Red:Far Red ratio decreases infection

Low light increases infection



First Results - 2

The microclimate changes considerably from top to bottom inside the canopy.

Figure 2. Profile of PAR sensors in a rose greenhouse. Next to PAR, also temperature and relative humidity are measured.

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