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The severity of bacterial canker of kiwi (*Actinidia chinensis* var. *deliciosa*)

Abstract #325

under conditions of abiotic stresses



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Introduction

Symptoms of bacterial kiwi canker



Causal agent :

P. syringae pv. *actinidiae* (Psa) biovar 3 (phylogroup 1)

High agro-economic costs (2010-2014)

- 360 – 989 million \$ in New-Zealand
- > 20 000 € / ha / year in Italy

No efficient means to cure kiwi plants from Psa infections

Crop health has to be managed in the presence of the disease

Disease severity and damages are variable across time and environmental conditions and remains hardly predictable

(Donati et al., 2014, 2020; Vanneste, 2017)

Objective

- What are the effects of abiotic factors (temperature and relative humidity) on symptoms severity and plant health ?

Methods

240 female *Actinidia chinensis* var. *deliciosa* cv. Hayward plants



Inoculation on the petiole of two leaves :

- 'Mock' plants : 10 µl of solution with no bacteria
- 'Inoculated' plants : 10 µl of a suspension containing 10⁷ bacteria of a Psa Biovar 3 strain (CFBP 7286)



Four growing conditions (14 hrs daylight, 70-80% relative humidity)

- Growth chambers : 25/18, 25/22, 22/18 °C (day/night)
- Greenhouse : regulated but variable temperature

- 30 'Mock' plants and 30 'Inoculated' plants per condition

Measured variables

- Number of inoculated leaves showing symptoms (wilting and fall)
- Length of necrosis (cm) at inoculation point
- Plant height (cm)

Experiment performed twice

Statistical analyses (nlme package, R version 4.1.1)

- Linear or generalized linear models to test for differences between 'Inoculated' and 'Mock' plants
- Linear (mixed effects) models to assess the difference in averaged measure between 'Inoculated' and 'Mock' plants as a function of climatic variables

Results - Conclusions

Cool temperatures and lower relative humidity favor bacterial kiwifruit canker severity

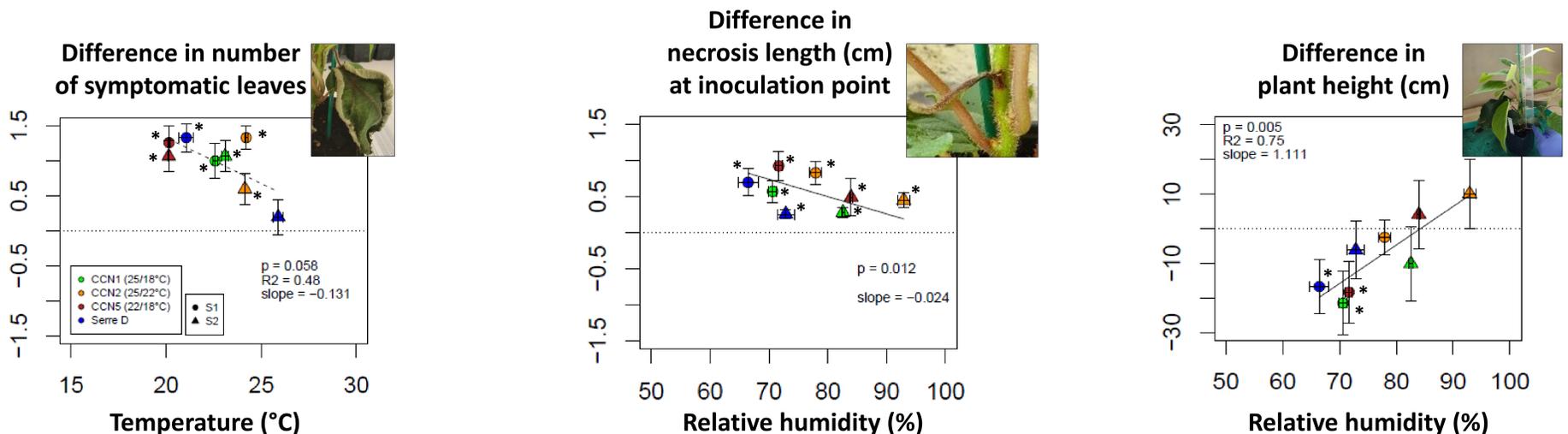


Fig. 1. Disease severity as a function of mean temperature (°C) and relative humidity (%) 28 dpi.

- Each data point : difference between 'Inoculated' and 'Mock' plants.
- Errors bars : standard error of the difference between two means on the y axis, and the standard error of the mean on the x axis.
- Black asterisks : significant difference between 'Inoculated' and 'Mock' plants on the basis of a p < 0.05 threshold.
- Significant relationships with climatic variables : — p < 0.05, - - - - - p < 0.01 threshold.

The difference between 'Inoculated' and 'Mock' plants :

- in the average number of inoculated leaves showing symptoms was highest at lower temperatures
- In the mean necrosis length at inoculation point and plant height (cm) was highest at lower relative humidity

Perspectives Similar analyses will be performed on other plant traits (e.g. number of leaves; leaf area and fresh weight) to get a more global evaluation of the effects of disease and climatic variables on plant health. The knowledge derived from these data will yield highlights on how to adjust crop practices (e.g. timing of application of control methods to lower bacteria population size, and of pruning to limit dissemination and damages) for a better management and preservation of plant health.

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