

# Genotypic variation in the stomatal characteristics of cut roses grown at high relative air humidity

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## Introduction

High relative air humidity (RH > 85%) during cultivation decreases the vase life of cut roses, in a strongly cultivar dependent manner. The reason for this genotypic variation is unknown.

## Aim

Understanding the mechanisms explaining genetic variation in tolerance to long-term high RH in cut roses.

## Material and methods

- Four treatments, combination of:
  - Contrasting cut rose cultivars, 'Frisco' (tolerant) and 'Prophyta' (sensitive)
  - Moderate (60%) and high (90%) RH level
- Evaluations:
  - Stomatal density
  - Stomatal responses to desiccation and abscisic acid (ABA) feeding
  - Stomata and pore dimensions ('Frisco')



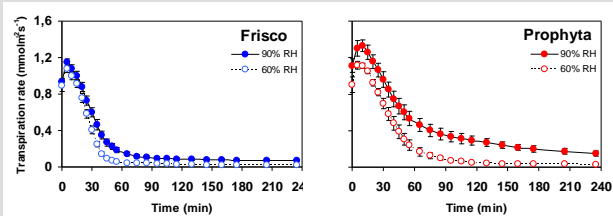
## Stomatal density

- High RH significantly increased the stomatal density in both cultivars (stronger effect in the tolerant one, 14% versus 8%).
- 'Frisco' also showed a higher stomatal density at moderate RH (53 stomata/mm<sup>2</sup>) as compared to the sensitive cultivar 'Prophyta' (43 stomata/mm<sup>2</sup>).

## Stomatal responses to desiccation

High RH decreased the degree and speed of stomatal response to desiccation. This effect was more pronounced in the sensitive cultivar. E.g. Leaf transpiration rate of 'Prophyta' after 4 h of desiccation when grown at high RH was:

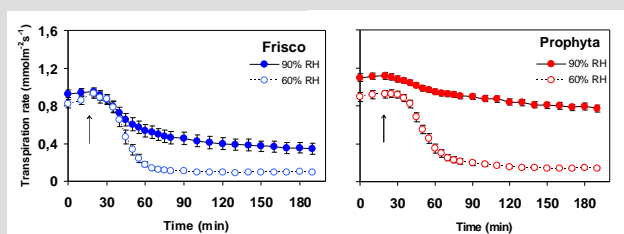
- six times higher than in plants of moderate RH (the respective increase in 'Frisco' was only a factor two);
- did not stabilize (whereas in 'Frisco' it stabilized after 90 min).



## Stomatal responses to ABA application

High RH also decreased the degree and speed of stomatal response to ABA feeding, with a stronger effect in the sensitive cultivar. E.g. Leaf transpiration rate of 'Prophyta' after 2.8 h of ABA feeding when grown at high RH was:

- 4.8 times higher than in plants of moderate RH (respective increase in 'Frisco' was only a factor three);
- no stabilization (whereas 'Frisco' did stabilize).



## Relationship between guard cell dimensions and pore dimensions

Poor relationships were found between:

- pore length and stomata length ( $R^2=0.36$ );
- pore width (aperture) and stomata width ( $R^2=0.40$ ).



## Conclusions

- 1) The degree to which stomatal physiology was affected (i.e. responses to the closing stimuli) explains the contrasting cultivar behaviour;
- 2) Stomatal density is apparently an irrelevant character for the tolerance mechanisms;
- 3) Guard cell dimensions are not representative for the pore dimensions.

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