

# Differences in epicuticular wax layer in tulip can influence resistance to *Botrytis tulipae*

Antonio Leon Reyes, Theo W. Prins, Jean-Paul van Empel & Jaap M. van Tuyl

## Introduction

Tulips (Genus *Tulipa* L.) belong to the *Liliaceae* family and they are the most important ornamental bulb crop in the world. *Botrytis tulipae* is one of the major diseases of this crop. Several defence strategies are required to counter attack this aggressive invader. The interaction between the pathogen and the host starts in the phyllosphere, where the conidia germinate on the plant cuticle in a layer of water containing nutrients (plant exudates). The plant cuticle consists of an epicuticular wax layer and is the first barrier that the invader encounters (see Figure 1). Epicuticular waxes have demonstrated to influence germination and virulence of several plant pathogenic fungi. In tulip, a thick wax layer has been distinguished among different species. Does the difference in epicuticular wax layer in tulip can influence *Botrytis tulipae* resistance?

## Material and methods

Two experiments were designed: A) Wax layer test with control plants, B) Wax layer test in different *Tulipa* species.

In experiment A, using the control cultivars Ile de France, Leen van den Mark and Christmas Marvel, the removal of the epicuticular wax layer was the main variable. Wet inoculation method with removal of wax layer and Dry inoculation with no removal of wax layer was performed. After inoculation and leaving the plants in special conditions for 7 days, the percentage of resistance plants in the population was calculated.

In experiment B several species from the genus *Tulipa* were scored for their leaf hydrophobicity. This was done by spraying tap water over the plants and scoring with a subjective scale (1 for less water leaf coverage, 5, 10, 25 and 50 for the highest water leaf coverage) for the water retention over the leaf surface (relative amount of wax layer).

## Results

Experiment A showed that the level of resistance of Christmas Marvel, Leen van den Mark and Ile de France was from low, medium and high respectively with the standard method (wet inoculation). However, when dry inoculation method was applied the level of resistance changed. The result yielded to an increase of the level of resistance in Christmas Marvel, a decrease in Ile de France and equal for Leen van der Mark when compared with the wet inoculation method (see Figure 2).

In experiment B, a significant difference in the epicuticular wax layer between species in the genus *Tulipa* (see Figure 3) was found. This dissimilarity was mainly due to the high value of leaf coverage presented in the *T. fosteriana* species.

## Conclusions

- Epicuticular wax layer in tulips influence *Botrytis* resistance in different ways.
- There is a strong difference in the relative amount of epicuticular wax layer in tulips especially in *T. fosteriana*. This property could be linked to its susceptibility to *Botrytis tulipae*.

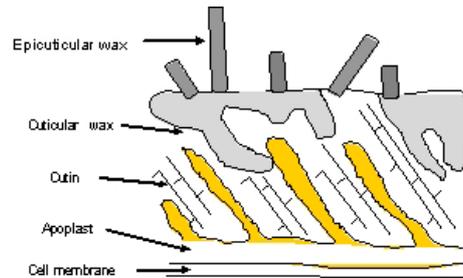


Figure 1. Transsectional view of an idealized cuticle.

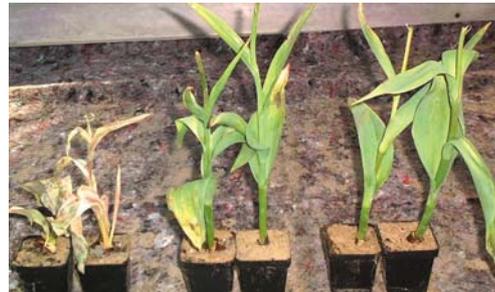


Figure 2. Cultivars control used in the experiment. On the left (a) Christmas Marvel (Susceptible), middle (b) Leen van der Mark (partial resistant) and right (c) Ile de France (Resistant cultivar) after a treatment with the disease test.

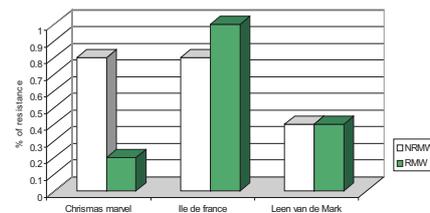


Figure 3. Percentage of resistance with the removal of the wax layer method (RMW) and not removal (NRMW) in three tulip cultivars.

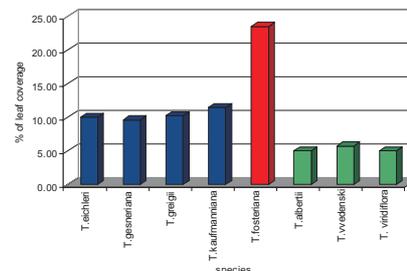


Figure 4. General results on leaves hydrophilicity test in different *Tulipa* species.