

Impact of Flavescence dorée on plant growth, productivity and fruit quality of *Vitis vinifera* cv. 'Loureiro' from the 'Vinho Verde' region



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PORTO



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Introduction

Flavescence dorée (FD) is a quarantine disease caused by a phytoplasma. FD is transmitted to healthy plants by an insect vector, *Scaphoideus titanus* Ball. FD symptoms are characterized by plant decline, stunted growth and abnormal lignification, flower abortion, leaf rolling and discoloration, unripened shoots and shriveled grapes.

This disease is a serious problem to the stability and sustainability of 'Vinho Verde' region, where FD is present since 2008 leading to severe harvest losses or even the death of the infected plants.

This study, conducted in 'Vinho Verde' region, aimed to:

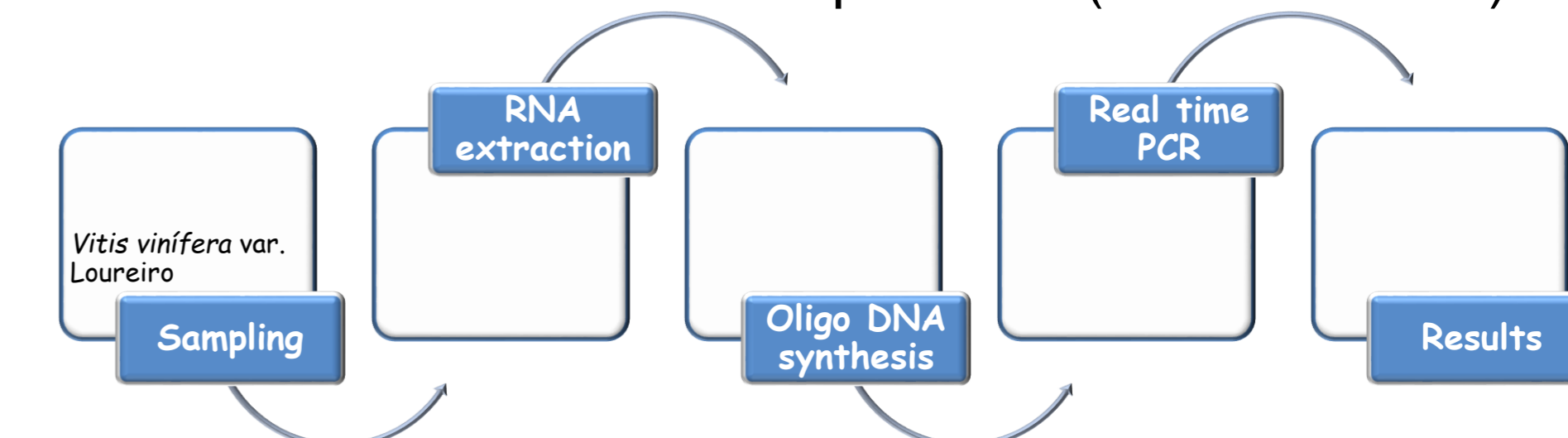
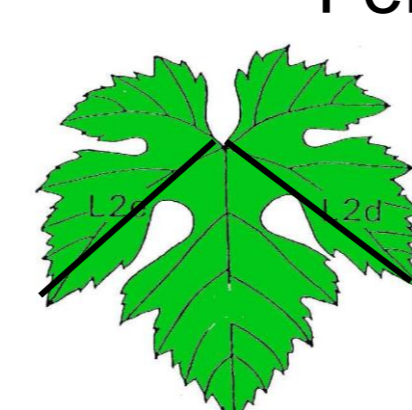
- quantify the impact of FD on plant growth and development;
- evaluate the impact of FD productivity and fruit quality;
- evaluate the expression of PAL, STS, PIN and PGIP genes linked to the secondary metabolism and plant defense.

Materials and Methods

- Plant material: 20 year-old vineyard (Fafe; Portugal)
- Treatments: Healthy (FD⁻) and FD infected (FD⁺) grapevines cv. 'Loureiro'

Measurements:

- Leaf area,
- Chlorophyll content (SPAD values)
- Phenological stage
- Sprouting percentage
- Fertility rate
- Productivity
- Fruit quality (total acidity, degree brix)
- Gene expression (real time PCR)

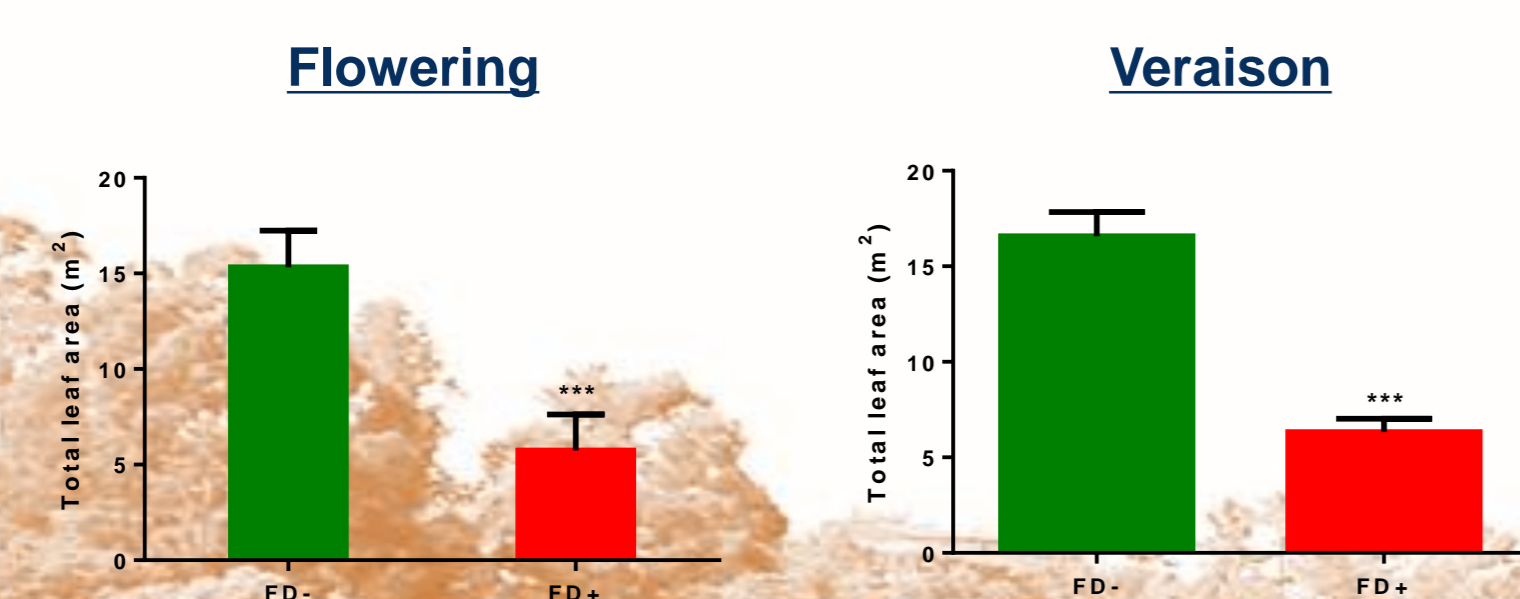


Results

■ FD⁻ ■ FD⁺

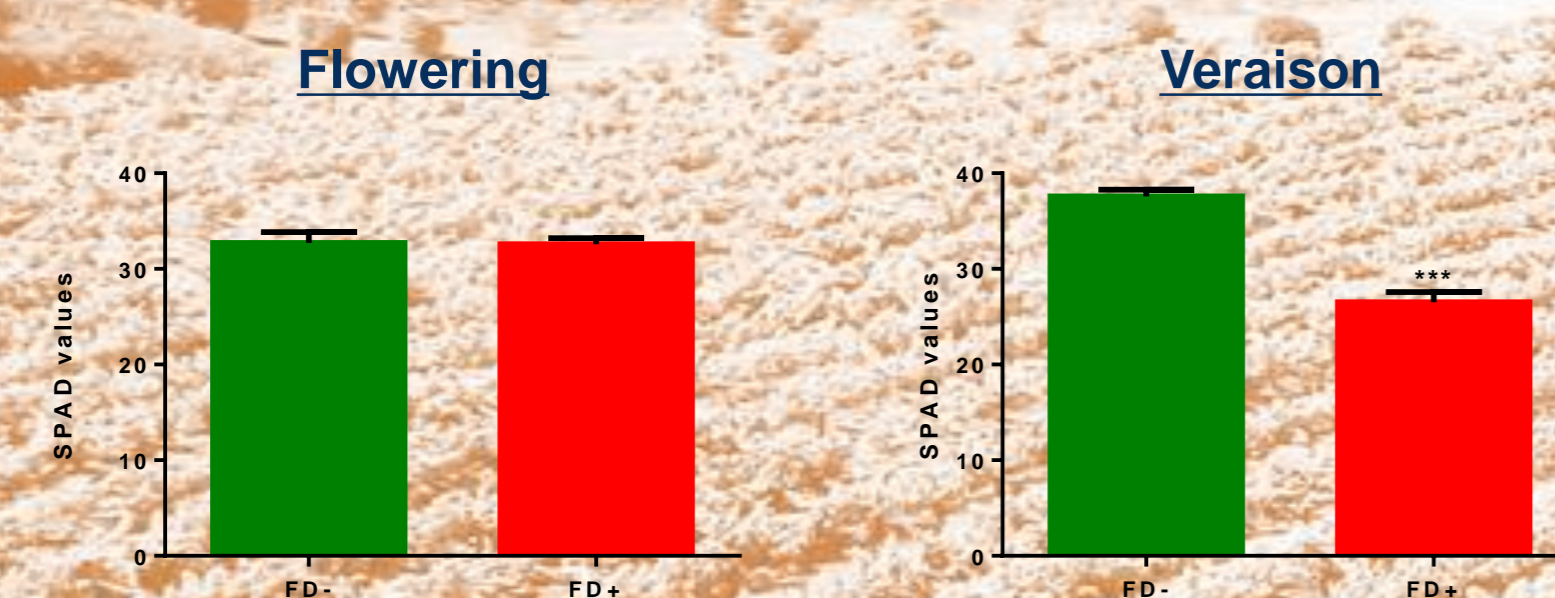
Plant growth and development

Leaf area



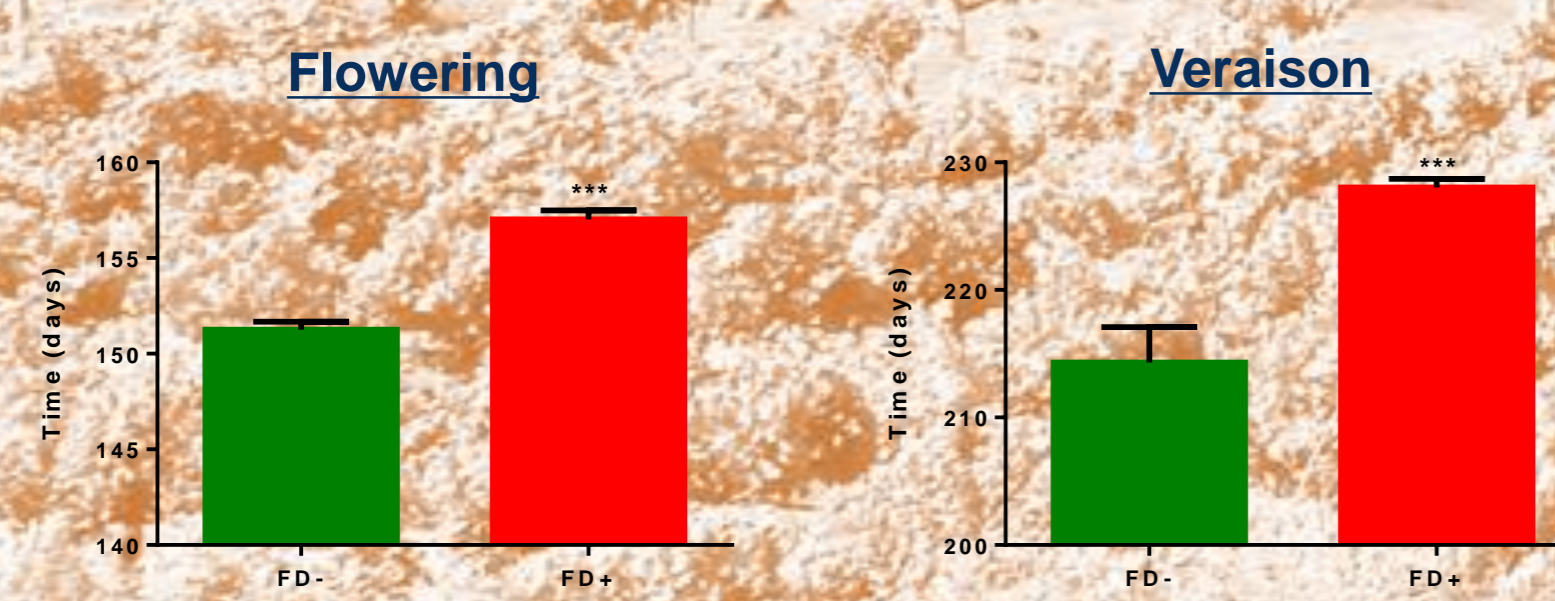
Diseased plants had lower leaf area (40%)

SPAD values



FD⁺ plants had lower chlorophyll content (9%), in veraison

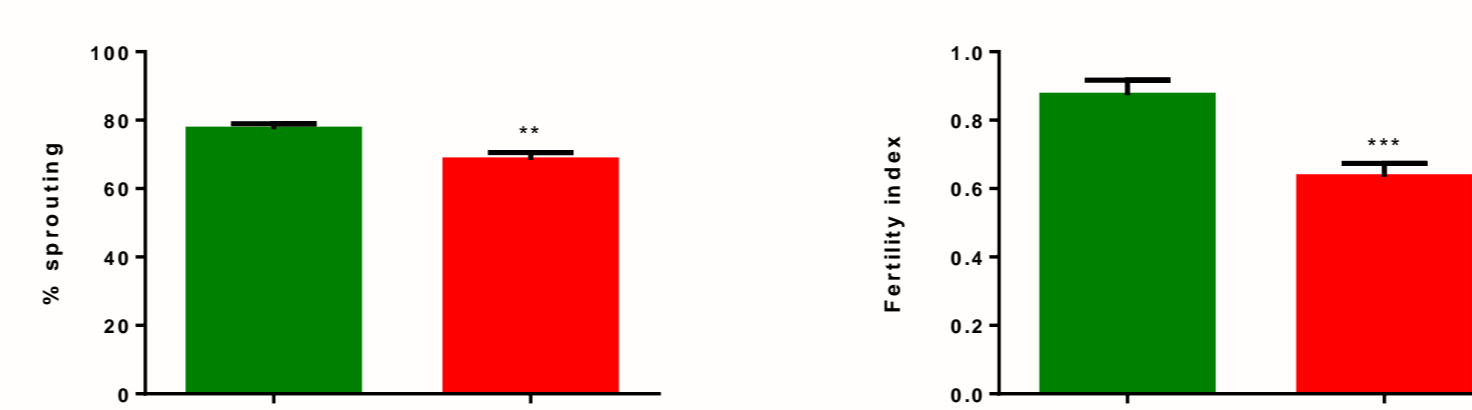
Phenological stage



FD⁺ plants took longer to reach flowering and veraison stage (~15 days)

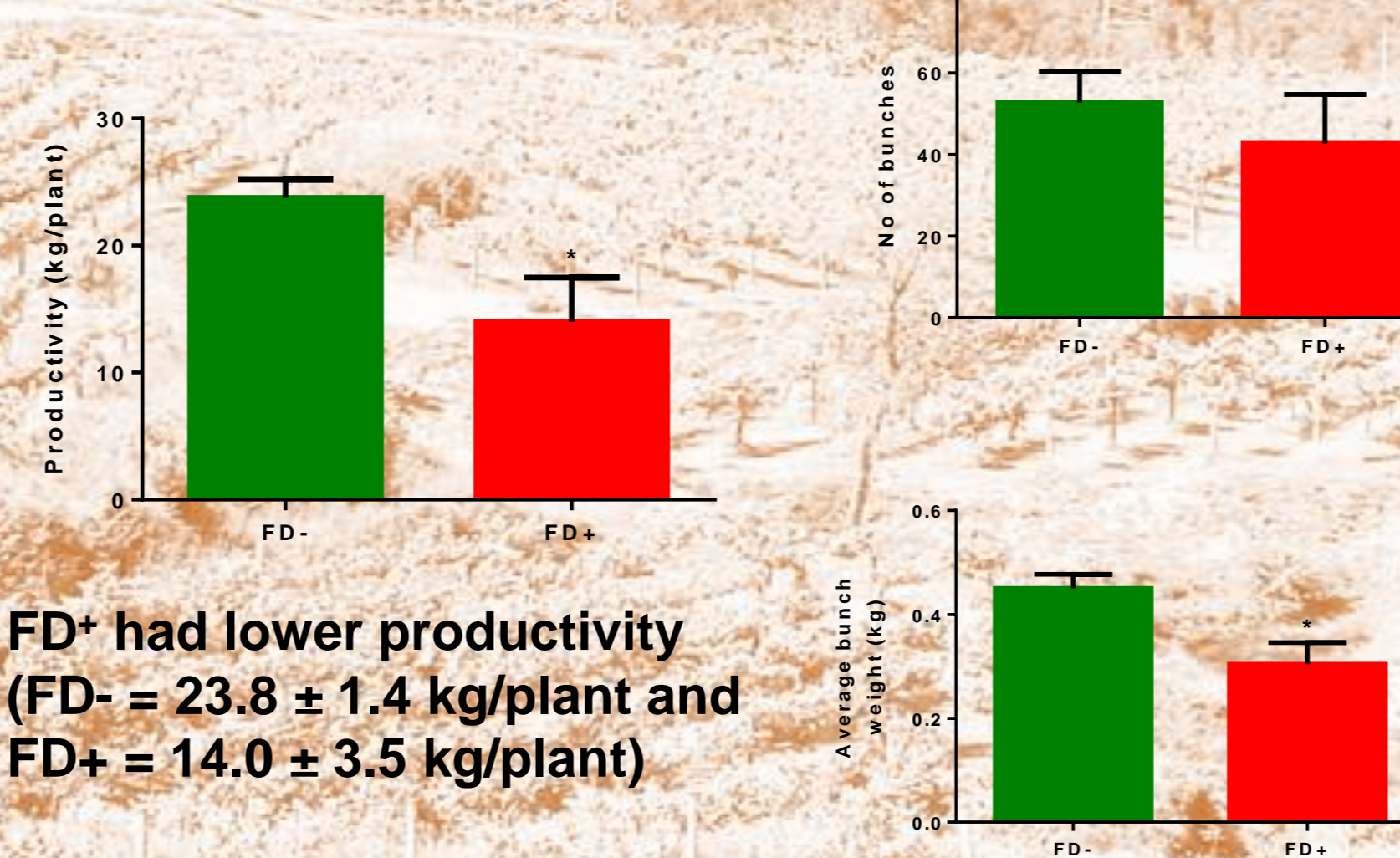
Productivity and fruit quality

% of sprouting and fertility index



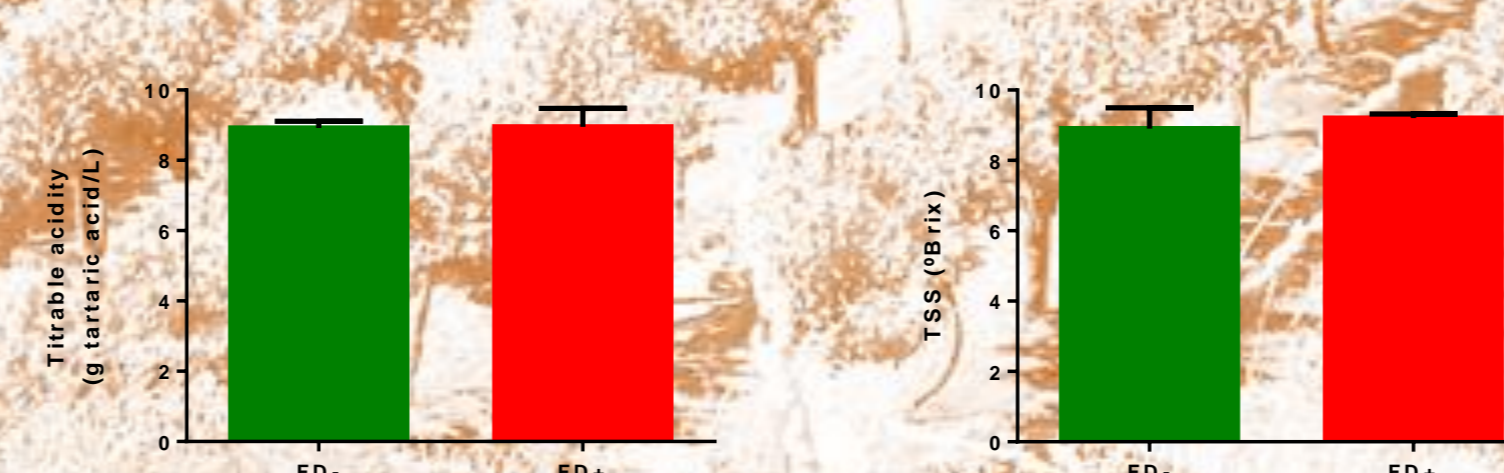
FD⁺ plants had lower % of sprouting (15%) and fertility rate (20%) than FD⁻ plants

Productivity



FD⁺ had lower productivity (FD⁻ = 23.8 ± 1.4 kg/plant and FD⁺ = 14.0 ± 3.5 kg/plant)

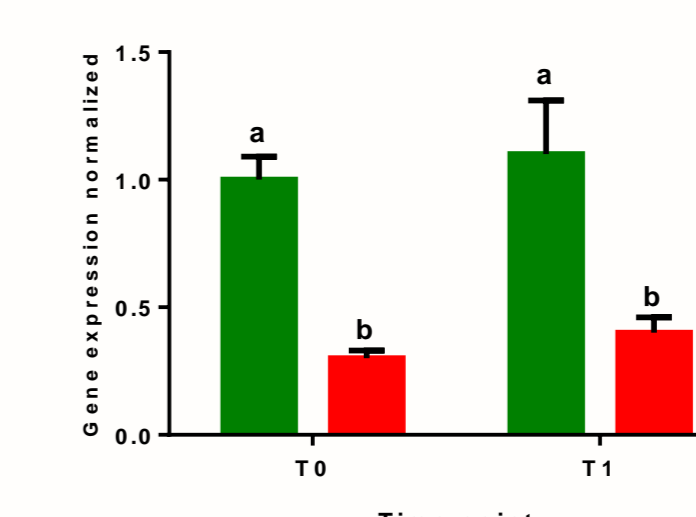
Titrate acidity and Total soluble sugars



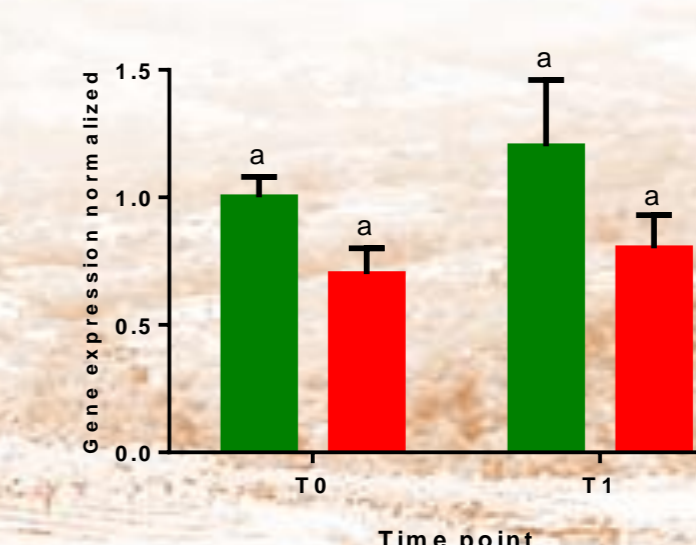
FD⁺ plants didn't have significant differences to FD⁻ plants about fruit quality parameters

Gene expression

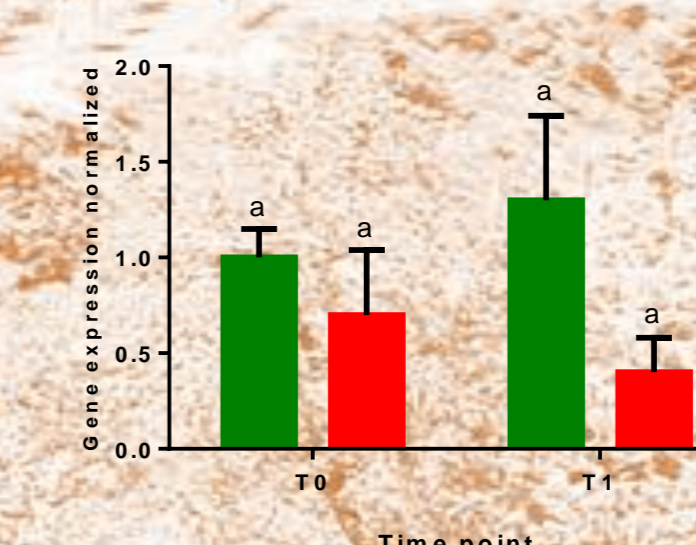
STS



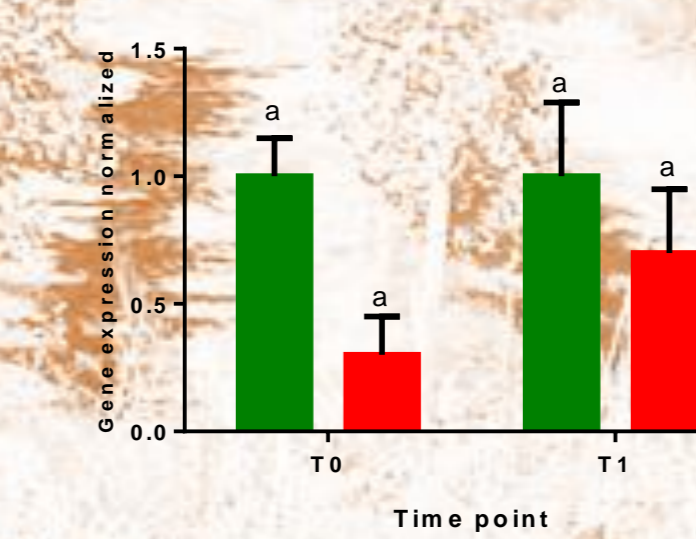
PAL



PIN



PGIP



FD⁺ plants signaling pathways were activated, with an upregulation of STS gene.

Conclusions

- FD delayed plant development when compared to healthy plants (on average 15 days) and FD infected plants presented less leaf area and chlorophyll content;
- FD led to a significant production loss. Although, fruit quality (titrate acidity and total soluble sugars) is not influenced by disease;
- FD triggers gene expression of secondary metabolism pathways, particularly STS gene.

Acknowledgements

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