



HAL
open science

A MEDIUM-CHAIN 3-HYDROXY FATTY ACID TRIGGERS INDUCED SYSTEMIC RESISTANCE IN ARABIDOPSIS

Matthieu Touchard, Schellenberger Romain, Marion Cordier-Demissy, Sandra Villaume, Christophe Clement, Fabienne Baillieull, Florence Mazeyrat-Gourbeyre, Sandrine Dhondt-cordelier, Jérôme Crouzet, Stephan Dorey, et al.

► **To cite this version:**

Matthieu Touchard, Schellenberger Romain, Marion Cordier-Demissy, Sandra Villaume, Christophe Clement, et al.. A MEDIUM-CHAIN 3-HYDROXY FATTY ACID TRIGGERS INDUCED SYSTEMIC RESISTANCE IN ARABIDOPSIS. ISMPMI, 2019, GLASGOW, United Kingdom. hal-03123808

HAL Id: hal-03123808

<https://hal.univ-reims.fr/hal-03123808v1>

Submitted on 28 Jan 2021

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

A MEDIUM-CHAIN 3-HYDROXY FATTY ACID TRIGGERS INDUCED SYSTEMIC RESISTANCE IN ARABIDOPSIS

Matthieu Touchard¹, Romain Schellenberger¹, Marion Cordier-Demissy¹, Sandra Villaume¹, Christophe Clément¹, Fabienne Baillieul¹, Florence Mazeyrat-Gourbeyre¹, Sandrine Dhondt-Cordelier¹, Jérôme Crouzet¹, Stephan Dorey¹ and Sylvain Cordelier¹

¹ Résistance Induite et Bioprotection des Plantes, EA 4707, SFR Condorcet FR CNRS 3417, Université de Reims Champagne-Ardenne, Reims, 51100, France

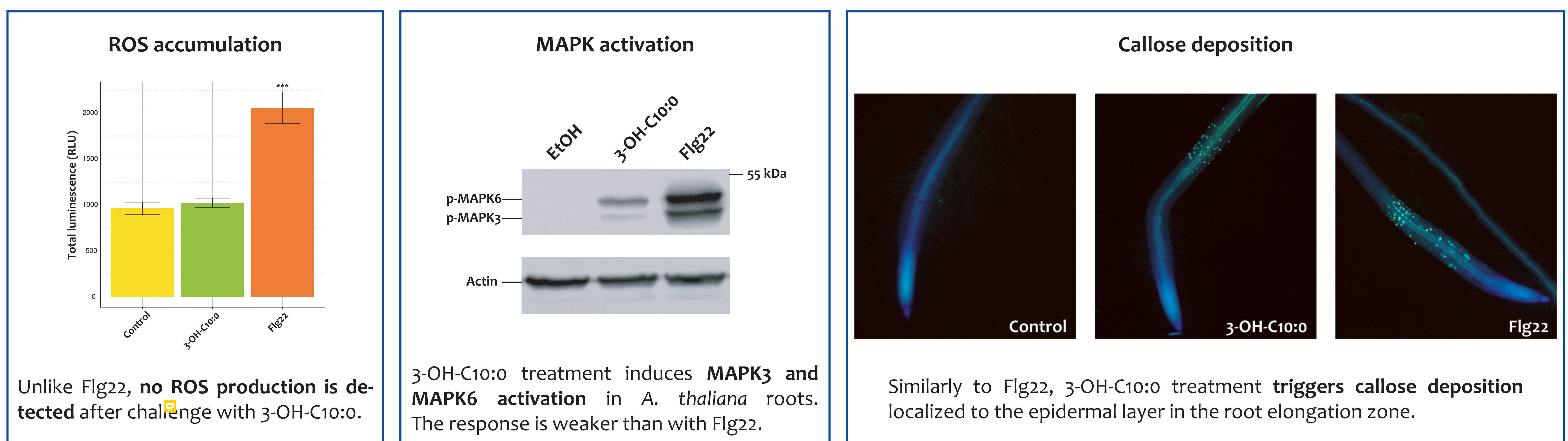
INTRODUCTION

In their environment, plants are frequently challenged by pathogenic microorganisms. To deal with these pathogens, plants possess an arsenal of defence mechanisms, quickly activated after perception of the microorganism. This perception involves Microbe-Associated Molecular Patterns (MAMPs) that are recognized by plant cells through Pattern Recognition Receptors (PRRs) resulting in plant innate immunity (MTI, MAMP-Triggered Immunity). Rhamnolipids (RLs), produced by *Pseudomonas aeruginosa*, are highly effective to induce foliar local resistance against phytopathogenic microorganisms on several plants^{1,2,3}. Recently, medium-chain 3-hydroxy fatty acids (mc-3OH-FAs), building blocks of *P. aeruginosa* RLs, are inducing plant immunity on *A. thaliana* leaves through the bulb-type lectin receptor kinase LORE⁴. Among these mc-3OH-FAs, bearing 8 to 12 carbons, the 3-hydroxydecanoic acid (3-OH-C10:0) represent the strongest immune elicitor⁴. The immune response activated upon 3-OH-C10:0 sensing was characterized in leaves, but currently there is no information on the perception in roots.

The aim of this study is to investigate whether 3-OH-C10:0 is perceived by *A. thaliana* roots and if this perception triggers a systemic resistance against the necrotrophic fungus *Botrytis cinerea*.

3OH-C10:0 TRIGGERS IMMUNITY MARKERS IN ROOTS

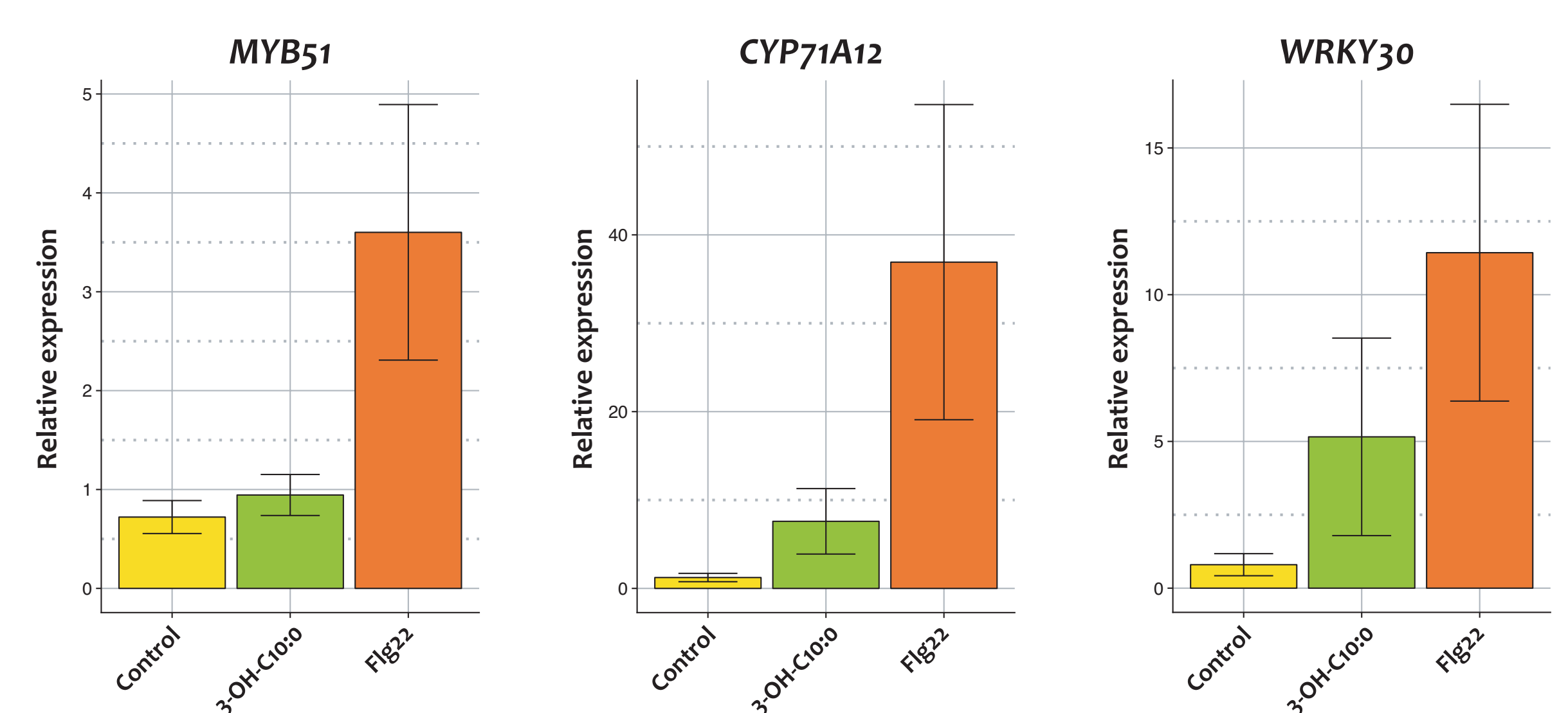
In the following experiments, 3-OH-C10:0 was used at 10 μ M. The flagellin-derived Flg22 peptide was used as positive control at 1 μ M.



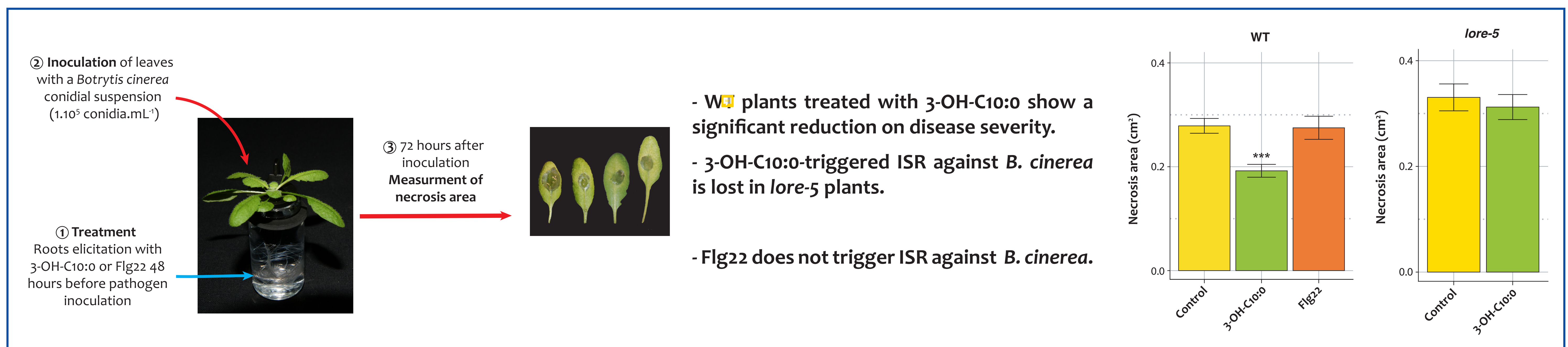
3-OH-C10:0 TRIGGERS TRANSCRIPTIONAL CHANGES IN ROOTS

Expression pattern of the root MTI marker genes, MYB51⁵, CYP71A12⁵ and WRKY30⁶ was followed by qRT-PCR in roots 3h after treatment.

- MYB51 gene expression is significantly induced after Flg22 treatment but not with 3-OH-C10:0.
- CYP71A12 and WRKY30 genes are up-regulated by both 3-OH-C10:0 and Flg22.



3-OH-C10:0 INDUCES SYSTEMIC RESISTANCE AGAINST B. CINEREA



CONCLUSION

Our results show that the 3-OH-C10:0 building block of RLs is perceived by *A. thaliana* roots and triggers a LORE-dependent systemic resistance against *B. cinerea* in *A. thaliana* leaves.

We are grateful to S. Ranf team (Technical University of Munich) for collaboration, helpful discussions and for *Arabidopsis lore-5* mutants seeds.

REFERENCES

- ¹Varnier et al. Plant Cell Environ., 32, 178-193 (2009)
- ²Sanchez et al. Plant Physiol., 160, 1630-1641 (2012)
- ³Monnier et al. Front. Plant Sci., 9, 1170 (2018)
- ⁴Kutschera et al. Science, 364, 178-181 (2019)
- ⁵Millet et al. Plant Cell, 22, 973-990 (2010)
- ⁶Stringlis et al. Plant J., 93, 166-180 (2018)