Eur J Plant Pathol (2018) 152:957–976
https://doi.org/10.1007/s10658-018-1496-6

SI: PLANT PATHOLOGY FOR INNOVATIVE AGROECOLOGY

Transcriptome profiling helps to identify potential and true molecular switches of stealth to brute force behavior in *Pectobacterium atrosepticum* during systemic colonization of tobacco plants

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Accepted: 27 April 2018 / Published online: 9 May 2018

Abstract In the present study, we have monitored the process of systemic plant colonization by the plant pathogenic bacterium *Pectobacterium atrosepticum* (*Pba*) using RNA-Seq analysis in order to compare bacterial traits under *in planta* and in vitro conditions and to reveal potential players that participate in switching from stealth to brute force strategy of the pathogen. Two stages of tobacco plant colonization have been assayed: i) the initial one associated with visually symptomless spread of bacteria throughout the host body via primary xylem vessels where bacterial emboli were formed (stealth strategy), and ii) the advanced stage coupled with an extensive colonization of core parenchyma and manifestation of soft rot symptoms (brute force strategy). Plant-inducible genes in *Pba* and potential players switching the pathogen's behavior were revealed. Genes from the *cfa* locus responsible for the production of coronafacic acid displayed the strongest induction in the asymptomatic zone relative to the symptomatic one and were shown experimentally to act as the true strategy "switchers" of *Pba* behavior *in planta*. Surprisingly, *cfa* genes appeared to be unnecessary for establishment of the asymptomatic stage of plant colonization but were required for the transition to soft-rot-associated symptomatic stage coupled with over-induction of jasmonate-mediated pathway in the plant.

Keywords Plant-microbe interactions · *Pectobacterium* · Soft rots · Virulence factors · Transcriptome profiling · Coronafacic acid · Bacterial emboli

Electronic supplementary material The online version of this article (https://doi.org/10.1007/s10658-018-1496-6) contains supplementary material, which is available to authorized users.

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Introduction

Diseases caused by plant pathogenic bacteria result in large crop losses all over the world. Members of SRE (soft-rot *Enterobacteriaceae*) group, that includes *Pectobacterium* and *Dickeya* genus, are among the most devastating plant pathogens known to date (Charkowski et al. 2012; Mansfield et al. 2012). They deploy multiple plant cell wall (PCW) degrading enzymes (PCWDEs) that destroy plant tissues and are considered to be the major tool of brute force of SRE for successful plant host colonization (Perombelon 2002; Charkowski et al.