Abstract

Plant cell wall acts as a primary barrier for microbial pathogens during infection. A cell wall degrading enzyme (CWDE) thus may be a crucial virulence factor, as it may aid the pathogen in successful host invasion. In the genome of the cereal-blast fungus *Magnaporthe oryzae*, nine genes coding for feruloyl esterases (Fae) likely involved in plant cell wall degradation have been identified. However, role of any Fae in pathogenicity of *M. oryzae* remains hitherto under explored. Feruloyl esterases (Fae), a subclass of carboxylic acid esterases, are group of enzymes that hydrolyses ester bonds between ferulic acid and the xylan and pectin polymers in the plant cell wall, to release the polysaccharide and ferulic acid. *In silico* analysis show that seven out of nine Fae in *M. oryzae* contains a conventional secretory signal peptide. Interestingly, components of the rice leaf extract induced the overall extracellular Fae activity (> 5-fold) as compared to the untreated culture. Moreover, *FAE* genes show differential expression in response to the plant cell wall components, with majority of them accumulating >1.5-fold. However, the transcript levels of majority of the *FAE*s show upregulation at different phases of pathogenic life cycle. Importantly, *FAE1* gene (MGG_08737) was significantly upregulated during host penetration and subsequent colonisation stages of infection. While *FAE1* deletion did not affect the vegetative growth and asexual development, the *fae1*Δ mutant showed significantly reduced pathogenesis on rice plants, mainly due to impaired host invasion and colonisation. Very few (<10%) *fae1*Δ appressoria that formed the primary invasive hyphae, failed to elaborate from the first invaded cell to the neighboring plant cells. Interestingly, exogenously added glucose, as a simple carbon source, or ferulic acid, a product of the Fae activity, significantly supported the invasive growth of the *fae1*Δ mutant. Altogether, these shows that Fae1-based feruloyl esterase activity, by targeting the plant cell wall, plays an important role in accumulating

ferulic acid and/or sugar molecules, as a likely energy source, to enable host invasion and colonisation by *M. oryzae*. Given its role in plant cell wall digestion and host colonisation, *M. oryzae* Fae1 could be explored as a potential target for a novel antifungal strategy and also for biotechnological application in biofuel production.