Springer Link

Published: 21 January 2016

Correlation of Phenylalanine ammonia lyase (PAL) and Tyrosine ammonia lyase (TAL) activities to phenolics and curcuminoid content in ginger and its wild congener, *Zingiber zerumbet* following *Pythium myriotylum* infection

G. Ganapathy, D. Keerthi, R. Aswati Nair ✉ & Padmesh Pillai

European Journal of Plant Pathology **145**, 777–785(2016) | Cite this article

1114 Accesses | **13** Citations | Metrics

Abstract

The biochemical basis of resistance exhibited by a wild *Zingiber* species, *Zingiber zerumbet* (L.) Smith, towards the economically devastating soft-rot disease caused by necrotrophic *Pythium myriotylum* was investigated. Quantification of phenolic compounds revealed higher total phenolic (TP), total flavonoid (TF) and total tannin (TT) content in the uninfected susceptible ginger (*Z. officinale*) cultivar compared to the resistant taxon. However systemic induction in activities of rate-limiting enzymes of phenolic biosynthetic pathway, phenylalanine ammonia lyase (PAL) and tyrosine ammonia lyase (TAL), were observed in the resistant wild taxon. In the ginger cultivar, even though the inherent PAL specific activity was observed to be higher (24.2 ± 1.9 U mg $^{-1}$) compared to the wild taxon (4.2 ± 0.8 U mg $^{-1}$), a subsequent gradual decrease in both PAL and TAL activities were observed following infection of rhizomes with *P. myriotylum*. This was in contrast to the gradual increase in PAL (13.1 ± 0.8 U mg $^{-1}$) and TAL (442.5 ± 35.1 U mg $^{-1}$) specific activity after 5 days post infection (dpi) in the wild taxon. Subsequent HPLC analysis of rhizomes showed an increase in total curcuminoid content in the wild taxon compared to the ginger cultivar. Results are indicative of phenylpropanoid pathway regulation in a manner such that the induced defense metabolites contribute to restrict pathogen invasion in the resistant wild taxon.