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Evaluating type III polyketide synthase (PKS) and terpene synthase (TPS) expression in incompatible interactions of *Zingiber zerumbet* to *Pythium myriotylum* Drechsler

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ABSTRACT

Pythium species are aggressive soil-borne necrotrophic oomycetes causing soft-rot disease of ginger. Disease severity indices determined following infection with *P. myriotylum* Drechsler in ginger cultivar, *Zingiber officinale* cv. Varada and a wild congener, *Z. zerumbet* at varying zoospore concentrations (10^4–10^{12} spores/ml) revealed high disease severity (100%) in ginger cultivar whereas *Z. zerumbet* displayed resistance. Absence of positive correlation between *Z. zerumbet* resistance and polyphenolic content indicates role of polyketides and zerumbone in preventing pathogen ingress, as reported earlier. Towards elucidating this, *Z. zerumbet* specific polyketide synthase (PKS) and terpene synthase (TPS) gene sequences designated *ZzTPS* and *ZzPKS* respectively were characterised. Phylogenetic analysis clustered *ZzTPS* with TPS-b sub-family and *ZzPKS* with non-chalcone forming PKS. *ZzTPS* and *ZzPKS* showed biphasic expression with first at 6 hours post infection (hpi) and then at 8 hpi, indicative of rapid induction followed by reinforcement to sustain resistance mechanisms in the wild taxon.

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Zingiber zerumbet; terpene synthase; polyketide synthase; disease severity

Introduction

Soft-rot disease caused by soil-borne necrotrophic oomycetes of the genus *Pythium* are responsible for serious losses in yield of various crops. Wide host range, ubiquitous distribution, survival over extended time period and various modes of pathogen dispersal namely through soil, irrigation water or contaminated planting material, all contribute to

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