

International Conference on **Transcriptomics**

July 27-29, 2015 Orlando, USA

Transcriptome analysis of nematode-trapping fungi during infection of plant-parasitic nematodes

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Tematode-trapping fungi are a group of soil living carnivorous microorganisms that form unique infection structures called traps to capture and kill the vermiform nematodes. Majority of nematode- trapping fungi belong to a monophyletic group consisting of single family of the order Orbiliales (Ascomycota). We studied the transcriptome expressed by Arthrobotrys oligospora forming adhesive networks, Monacrosporiumcionopagum forming adhesive branches and constricting ring forming species Arthrobotrys dactyloides during infection of root-knot nematode Meloidogyne hapla and sugar beet cyst nematode Heterodera schachtii. Comparative transcriptome analysis during infection process including trapping, penetration and digestion of nematode host by nematode-trapping fungi showed that the divergence in gene expression patternassociated with fungal species was significantly larger than that related to the host nematode species. Genes that were highly expressed in all nematode-trapping fungi encoded endopeptidases such as peptidase S8, peptidase M3 and aspartic proteases; cell-surface proteins containing the carbohydrate-binding domain WSC; stress response proteins; membrane transporters; transcription factors and cell singling genes containing the Ras domain. Transcripts containing the Ricin-B lectin and Atg8 domain were also highly expressed in all nematodetrapping fungi. Differentially expressed transcripts among the fungal species encoded various lectins such as the fungal fruit-body lectin and the D-mannose binding lectin; transcription factors; cell-signaling components; proteins containing a WSC domain and proteins containing a DUF3129 domain. Interestingly, DUF 3129 was highly expressed in M. cionopagum but not expressed at all in A. dactyloides. Differentially expressed transcripts during infection of different host nematodes; including peptidases, WSC domain proteins, tyrosinases and small secreted proteins with unknown function.

Biography

Dharmendra Kumar has completed his PhD from Banaras Hindu University, Varanasi, India in year 2003 on Predacity and bio-control potential of a nematode-trapping fungus *Arthrobotrys* dactyloides. He is working as Assistant Professor of Plant Pathology in Narendra Deva University of Agriculture and Technology, Kumarganj, Faizabad, India. He also worked as DST BOYSCAST Fellow at Microbial Ecology, Department of Biology, Lund University, Sweden under guidance of Professor Anders Tunlid and Dr Dag Ahren in the year 2011. He has published 19 papers in refereed scientific journals.

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