

Transcriptomics approaches for gene discovery in plants - a case study in Piper

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The lack of genome sequence information in non-model species limits gene discovery and the generation of expressed sequence tags (ESTs) derived from protein-coding mRNA sequences is considered as the most useful approach for gene discovery. With the advent of next-generation sequencing (NGS) technologies, gene discovery via RNA sequencing (RNA-seq) has become rapid and cost effective approach and provide very high throughput by generating millions of reads in a single sequencing run. Foot rot caused by *Phytophthora capsici* is the most devastating disease of black pepper (*Piper nigrum* L.), the most important spice crop of India. In black pepper- *P. capsici* disease system, the sources for high level of resistance are scarce but, it is found in one of the distant relative of black pepper, *Piper colubrinum*. Denovo sequencing and transcriptome characterization of the leaves of *Piper nigrum* and *Piper colubrinum* challenged with *Phytophthora capsici* were undertaken and detailed analysis of the illumina (Genome Analyzer IIx) derived sequences lead to the identification of large number genes, especially those associated with resistance to the biotic stress factors. The *Piper colubrinum* and *Piper nigrum* transcripts showed maximum hit with *Vitis vinifera* (wine grape) sequences, followed by *Populus trichocarpa* (Poplar) sequences indicating closer relationship of magnoliids (order to which *Piper* belong to) with eudicots. The genes identified include those involved in pathogen recognition and signaling, transcription factors besides NBS - LRR type resistance genes. The transcriptome data analysis also revealed identification of many defense related genes differentially expressed in these two different species of *Piper*. Large number of single nucleotide polymorphisms (SNPs) was also discovered. The value of transcriptome sequencing for identification of genes especially those associated with stress tolerance is demonstrated by this study.

Biography

Johnson George K has completed his Ph.D. (Biotechnology) from Tamil Nadu Agricultural University, Coimbatore. He is presently working as the Principal Scientist in the Division of Crop Improvement and Biotechnology, at Indian Institute of Spices Research, Calicut, Kerala. He has published more than 25 papers in reputed journals. Currently, he is involved in developing genomic resources in black pepper for complex trait dissection especially for resistance to biotic and abiotic stress factors.

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