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Comparative transcriptome analysis of different chemotypes of *Withania somnifera* to elucidate withanolide biosynthesis

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Withania somnifera (L.) Dunal (Family, Solanaceae), is one of the most valuable medicinal plants synthesizing large number of pharmacologically active secondary metabolites known as withanolides. Despite of having great pharmaceutical activities, there is no information about the genes responsible for biosynthesis of these compounds. Phytochemical profiling suggests that withanolide biosynthesis may take place differentially in leaf and root of different chemotypes with differences in the content and/or nature of major withanolide moiety. To identify genes involved in chemotype and/or tissue-specific withanolide biosynthesis as well as to manipulate the pathways to produce withanolide of pharmacological interest, we established transcriptome sequences of leaf and root tissues of three distinct chemotypes using 454 pyrosequencing. The transcriptome data obtained was in the range of 172 to 260 MB with at least 598000 ESTs in each library. For digital differential expression analysis, reads from each library were tagged, pooled and assembled into 43287 contigs with an average length of 617 bps. Molecular markersin leaf and root tissue of three different chemotypes were identified, which will help in the dissection of the complex genetic background of Withania in relation to distinct chemotypes and marker assisted breeding in future. All the genes involved in biosynthesis of the precursor molecule (24-methylene cholesterol) for withanolides were identified. This study also identified a number of differentially expressing transcripts encoding members of cytochrome P450s, glycosyltransferases, and methyltransferase and transcription factor gene families. On the basis of identified genes, their expression patterns and molecular docking studies, involvement of putative candidate genes have been proposed to elucidate the biosynthetic pathway for withanolide biosynthesis.

Biography

Parul Gupta has completed her PhD in Biochemistry in 2014 from Banaras Hindu University, Varanasi, India. She has published more than 6 papers in reputed journals and two more manuscripts are under preparation. She has presented posters in more than 5 national/international conferences.

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