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Innate endophytic fungus, Aspergillus terreus as biotic elicitor of withanolide A in root cell suspension cultures of Withania somnifera.

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Abstract

In the present study, root cell suspension cultures of W. somnifera were elicited with mycelial extract (1% w/v) and culture filtrate (5% v/v) of their native endophytic fungus Aspergillus terreus 2aWF in shake flask. Culture filtrate of A. terreus 2aWF significantly elicits withanolide A at 6H (12.20 ± 0.52 µg/g FCB). However, with A. terreus 2aWF mycelial extract, withanolide A content was higher at 24H (10.29 µg/g FCB). Withanolide A content was maximum with salicylic acid (0.1 mM) treatment at 24H (8.3 ± 0.20 µg/g FCB). Further, expression analysis of withanolide pathway genes, hydrogen peroxide production, and lipid peroxidation was carried out after 48H of elicitation with 2aWF mycelial extract and culture filtrate. The expression levels of withanolides biosynthetic pathway genes, viz. HMGR, DXR, FPPS, SQS, SQE, CAS, SMT1, STE1 and CYP710A1 were quantified by real time PCR at 48H of elicitation. In all the treatments, the expression levels of key genes were significantly upregulated as compared to untreated suspension cells. Hydrogen peroxide was noticeably enhanced in SA, mycelia extract and culture filtrate, at 20% (115 ± 4.40 nM/g FCB), 42% (137.5 ± 3.62 nM/g FCB), and 27% (122.8 ± 1.25 nM/g FCB) respectively; however, lipid peroxidation was 0.288 ± 0.014, 0.305 ± 0.041 and 0.253 ± 0.007 (µM/gm FCB) respectively, higher than the control (0.201 ± 0.007 µM/gm FCB).

KEYWORDS: Elicitor; Endophyte; Suspension culture; Withania somnifera; Withanolide A

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