Exogenous ferulic acid treatment increases resistance against *Botrytis cinerea* in tomato fruit by regulating nitric oxide signaling pathway

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Abstract

This study was to explore the effect of ferulic acid (FA) treatment in response to *Botrytis cinerea* (*B. cinerea*) infection of tomato fruit and potential mechanisms of action. The results showed that fruit treated with 100 μM FA increased resistance against *B. cinerea* as revealed by decreased disease incidence and lesion area. In addition, the activities of phenylalanine ammonialyase (PAL), polyphenol oxidase (PPO), chitinase (CHI) and β-1,3-glucanase (GLU) were significantly higher in tomato fruit treated with 100 μM FA. The increase of disease resistance was accompanied by a higher expression of genes (*PR1*, *NPR*1, *MYC2*, *LoxD*) related to salicylicacid (SA) and jasmonic acid (JA) signaling pathway. Furthermore, the activity of nitric oxide synthase (NOS) also enhanced by FA treatment and consequently increased the content of nitric oxide (NO). However, the simultaneous addition of 0.2 mM N^{ω}-nitro-*l*-arginine (l-NNA), a specific inhibitor of NOS, abolished such effects of 100 μM FA produced as well as decreased the expression of genes (*C3H*, *C4H*, *COMT*, *PAL*) related to FA biosynthesis. Additionally, FA treatment improved the correlations of NOS with *MYC2* (r = 0.85*), GLU (r = 0.93**) and CHI (r = 0.94**). These findings indicated that FA treatment could be a promising approach to improve resistance against *B. cinerea* in tomato fruit, which was related to NO signaling pathway.