Nitric oxide improves tolerance to Fusarium oxysporum f. sp. cubense Tropical Race 4 in banana

ABSTRACT

Nitric Oxide (NO) is one of the most studied signalling molecules as it is an important modulator that interact with other molecules during plant defence mechanism against pathogen attack. The predominant regulatory mode of action of NO is protein S-nitrosylation - the covalent binding of NO moiety to the sulfhydryl group of cysteine residue to form S-nitrosothiol (SNO). In this study, we examined the potential role of NO in modulating the interaction of banana- Fusarium oxysporum f. sp. cubense Tropical Race 4. We demonstrated that pre-treatment of banana seedlings with NO donor S-nitrosoglutathione (GSNO) managed to delay Fusarium wilt symptom development, corresponding to a low disease severity index (DSI) whereas pre-treatment with NO scavenger 2-phenyl-4,4,5,5-tetramethylimidazoline-1-oxyl-3-oxide (cPTIO) increased the DSI. GSNO treatment increased the SNO level from 57.6 μM mg^{-1} during the early stage of infection to 97 μM mg^{-1} in Foc TR4-challenged banana roots. Biotin switch assay also showed that the banana proteins are S-nitrosylated following inoculation with FocTR4. The findings of this study suggested that NO can improve the tolerance of banana to Foc TR4 through S-nitrosylation, as a molecular mechanism underlying the interaction between the FocTR4 and banana.

Keyword: Nitric oxide; S-nitrosothiol; S-nitrosylation; Banana; FocTR4; Tolerance