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Nitric oxide (NO) and H_2O_2 mediated hypersensitive response during plant-pathogen interaction

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Nitric oxide (NO) and H_2O_2 molecules are regulatory molecules in various developmental processes and stress responses. Tobacco (Kanchan variety) leaves infiltrated with bacterial pathogen Xanthomonas oryzae pv. Oryzae dramatically potentiated NO and H_2O_2-mediated hypersensitive response, a localized programmed cell death (PCD) which confines the pathogen to the site of attempted infection. With this experimental model system, tobacco leaves were infiltrated with NO donor, sodium nitroprusside (SNP), and NO scavenger, cPTIO with bacterial suspension culture in hydroponically grown plants in two different nutrient media (nitrate and ammonium). NO emission and production of ROS molecules (H_2O_2, CAT, SOD) were detected through H_2O_2 staining during HR development. With NO donor, both NO emission and H_2O_2 production were enhanced demonstrating that both were cooperatively activated during the non phyto-pathogenic interaction. While decrease in NO emission and H_2O_2 production by cPTIO also provided evidence for role of NO in HR. Catalase (CAT) and superoxide dismutase (SOD) both were enhanced during plant–pathogen interaction that involved ROS signal transduction. Our experiments suggested that NO enhanced the resistance against non phyto-pathogenic bacterial pathogen and this was furthermore activated in the nitrate, but lesser in ammonium growing tobacco plants. The role of nitrate and ammonium as nitrogenous source and how these are involved in NO and H_2O_2 signal transduction during plant pathogen interaction, is not much known. The results highlighting the role of these two nutrients in triggering NO mediated HR will be presented and discussed.

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