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A Putative Acetyltransferase Gene Differentially Regulates Multiple Traits In Plants Under Biotic And Abiotic Stresses

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[Introduction]

Constantly challenged by numerous biotic and abiotic stresses, plants have to defend and survive through very complex mechanisms involving multiple molecular, cellular and physiological adaptations. With the advancement of scientific research, new insights into these complex mechanisms are revealed and bulks of data are generated continuously. Here, we report the involvement of a putative acetyltransferase gene (*At3g62160*) in biotic and abiotic stresses, which has significant sequence similarity with *Zinnia elegans* L. Z3714 and Z9029 ESTs.

[Material and Methods]

The putative acetyltransferase gene (*At3g62160*) was identified in an effort to find orthologues of undifferentiated cambial meristematic cells-related differentially expressed genes (DEGs) from Yew tree, a study by Lee et al in 2010. One of the candidate loss of function mutant line was obtained from Aarabidopsis Biological Resource Centre (ABRC) and grown either on ½ Murashige and Skoog (MS) medium or soil at 23 ± 2 ºC, under long day conditions (16 h light and 8 h dark). The mutant after genotyping was exposed to different stress media and bacterial pathogens.

[Results and Discussions]

The mutant line revealed differential regulation of plant growth and development as compared to wild type (Col-0) plants under nitrosative (0.75 mM CySNO, 0.75 mM GSNO) and oxidative (2mM H_2O_2,1µM Methyl Viologen) stresses. *At3g62160* negatively regulates shoot and root growth under nitrosative stress while positively regulates under oxidative stress. The cotyledon development frequency was also higher on CySNO and GSNO enriched media while lower on H_2O_2 and Methyl Violgen supplemented media. On the other hand, *At3g62160* negatively regulates plant basal and R-gene mediated resistance to *Pst* DC3000 and *Pst*DC3000 (avirulent) bacterial pathogens. Our experiments revealed significantly lower number of bacterial colony forming units (CFU) per leaf disc after inoculation with *Pst* DC3000 virulent strain ($O.D_{600}$=0.0002), as compared to WT and *sid2* (*Salicylic Acid Induction Deficient 2*) mutant. At 3 days post inoculation the loss of function *At3g62160* exhibited a resistant phenotype. Likewise, the PR1 and PR2 gene expression was also more in our loss of function mutant as compared to WT and *sid2*. After challenging with *Pst* DC3000 (avrB) and subsequent histological staining at specific time points, the mutant line revealed the involvement of *At3g62160* in R-gene mediated resistance as well, having higher Hyper sensitive response. Together all these results lead us in a conclusion that the acetyltransferase genes are involved not only in growth related responses in planta but also could have an important role in biotic stress responses.

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