Seed priming with spermine and spermidine regulates the expression of diverse groups of abiotic stress-responsive genes during salinity stress in the seedlings of indica rice varieties

Saikat Paul, Aryadeep Roychoudhury

PII: S2352-4073(17)30013-6
DOI: doi: 10.1016/j.plgene.2017.04.004
Reference: PLGENE 90

To appear in: *Plant Gene*

Received date: 1 February 2017
Revised date: 20 April 2017
Accepted date: 25 April 2017

Please cite this article as: Saikat Paul, Aryadeep Roychoudhury , Seed priming with spermine and spermidine regulates the expression of diverse groups of abiotic stress-responsive genes during salinity stress in the seedlings of indica rice varieties. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Plgene(2017), doi: 10.1016/j.plgene.2017.04.004

Seed priming with spermine and spermidine regulates the expression of diverse groups of abiotic stress-responsive genes during salinity stress in the seedlings of indica rice varieties

Saikat Paul, Aryadeep Roychoudhury*

Post Graduate Department of Biotechnology, St. Xavier's College (Autonomous), 30, Mother Teresa Sarani, Kolkata – 700016, West Bengal, India

*Corresponding author: E-mail - aryadeep.rc@gmail.com

Abstract

Seed priming with polyamines (PAs) is one of the most desirable techniques to enhance stress tolerance, since it provides prolonged and potential protection to multiple stresses with minimal application cost. In the present study, the main aim was to analyze the effect of seed priming with spermine (Spm) and spermidine (Spd) in salt stressed IR-64 (salt-sensitive) and Nonabokra (salt-tolerant) seedlings with respect to the regulation of genes controlling multiple metabolic pathways governing salt tolerance. The transcriptome profiling of key genes, encoding non-enzymatic and enzymatic antioxidants (*ANS*, *CAT*, *SOD*, *APX*, *GR*), osmolyte (*P5CS*, *PDH*, *BADH1*), ABA biosynthetic enzyme (*NCED3*), transcription factors (*TRAB1*, *WRKY71*), LEA (*Osem*), ion transporter (*NHX1*), PA-metabolic enzymes (*SAMDC, SPDS*, *SPMS*, *DAO, PAO*) and content of endogenous PAs, responsible for stress tolerance were studied in the shoots and roots of both the cultivars. Our data showed that both Spm and Spd priming enhanced the expression of antioxidant genes in shoots and roots with respect to non-primed stressed seedlings; however, the expression was enhanced more with Spm priming in the salt-sensitive cultivar during stress. Priming with Spm and Spd also increased the expression of osmolyte biosynthetic genes. In addition, both the PAs significantly enhanced the expression of ABA biosynthesis gene, along with increased expression of ABA-inducible transcription factors and *LEA* gene in both shoots and roots; Spm application triggered better expression. Seed priming with Spd also altered the expression of ion transporter like *NHX1* under stress in the shoots of both the cultivars, with better effect in IR-64. Salinization increased (Spm+Spd)/Put ratio more in the tolerant cultivar. Priming with both PAs increased (Spm+Spd) to Put ratio in the two