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Co-expression of PgNHX1 and AtAVP1 improves tolerance to both water and salt stress in transgenic rice

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Abiotic stresses such as drought and salinity are serious threats to modern agriculture. Climate change will likely make many places worse in terms of water availability and soil salinization which will have adverse impacts on food production in agriculture. Rice is the most preferred staple food for human population all over the world and it is frequently affected by several abiotic stresses including drought, salinity and cold. A number of transgenic improvements for abiotic stress tolerance have been achieved in rice. The present study reports that, the over expression of *PgNHX1-AtAVP1* in rice improves drought and salt tolerance. When T_2 seeds were grown on media containing different concentrations of PEG (8000), -12 and -17 bars, the *PgNHX1-AVP1* expressing rice plants showed enhanced root growth, which was hindered in the wild type seedlings. To screen putative T_2 plants for salt tolerance, stringent salt screening test was followed and root and shoot growth of T_2 putative transformants was used as a selection criterion. Some of the transgenics showed significantly higher root and shoot growth compared to wild type when they were subjected to 350 mM NaCl stress. To confirm the integration of the transgene in putative T_2 transgenic plants, PCR and RT-PCR analysis were performed. The results showed that all the selected seedlings were PCR positives and four lines were positive for RT-PCR analysis. Physiological studies viz., chlorophyll estimation, membrane stability index, cell viability test and K+/Na+ ratio were also conducted to assess their levels of stress tolerance in the T_2 generation. Some of the T_2 transformants showed lower percent reduction in chlorophyll content, higher membrane stability, cell viability and maintained higher K+/Na+ ratio after PEG and NaCl treatment compared to wild type. The results clearly demonstrated that transgenic rice plants over expressing *PgNHX1-AVP1* had superior stress tolerance capacity as compared to non-transformed plants.

Biography

Sushma M. Awaji has completed her post graduation at the age of 23 years from University of Agricultural Sciences, GKVK, Bangalore. At present she is pursuing Ph.D. degree with INSPIRE fellowship in the Department of Crop Physiology, UAS, GKVK, Bangalore, under the supervision of Dr. V. R. Sashidhar, with the thesis problem entitled "A gene pyramiding approach to improve salt tolerance in Rice involving tonoplast and plasma membrane transporters". She has published 3 papers in international journals and presented 4 posters in international conferences.

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Presowing seed treatment of jambhiri seed

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Jambhiri is one of the important and well known sturdy root stock extensively used in mandarin orange and sweet orange fruit crop. Life period of the plant grafted on the jambhiri are probably found to be higher in comparision to the other root stocks. Mandarin orange and sweet orange (grafted seedlings from jambhiri) shows a peculiar characteristic, a dense and expanded root canopy, although the germination is the important factor in developing the jambhiri seedlings.

By considering the importance of jambhiri and in regard to enhance the germination of jambhiri seeds one experiment has been conducted at Regional Fruit Research Station, Katol (Maharashtra) since last three years.

In the experiment carried out, the jambhiri seed soaked for 24 hours under different treatments before sowing. viz., GA3 (different concentrations), hot water, acid treatment, simple water soaking etc. The studies revealed that, the soaking of jambhiri seed in GA3 (10 ppm) solution for 24 hours before sowing was found to be beneficial in increasing the germination percentage better in comparison to other treatments. It may prove the important tool to reduce the germination barrier in jambhiri seeds upto some extent.

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