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Rice plants regenerated under saline conditions displayed salt tolerance and stress memory

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Abstract

Plants exposed to environmental stress for long durations often can adapt to stress conditions with improved tolerance. Moreover this acquired tolerance to stress can be retained even after reverting to destressed growth conditions, which is known to stress memory. In these adaptation and stress memory processes, epigenetic regulation, such as DNA methylation and histone modifications play a key role. Here, we showed that regenerated rice plants from embryogenic callus exposed to gradually increasing NaCl concentrations (up to 120 mM NaCl) acquired salt tolerance and their enhanced tolerance are inherited to subsequent generations. The rice plants (R0) regenerated from rice callus under saline conditions were transplanted into normal paddy field and R1 seeds were harvested. These R1 seeds displayed higher germination rate on MS medium containing 100mM NaCl than wild-type. The callus derived from R1 seeds showed better growth than control callus on high salinity medium. And the salt-adapted R1 plants exhibited higher chlorophyll contents and also higher K^+/Na^+ ratio than wild-type rice under saline conditions. The results indicated that rice plants successfully adapted to saline growth conditions during regeneration on high salt medium and moreover this acquired tolerance to salt stress was inherited subsequent generation.

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