

Gene Technology of Salt-Tolerant Plants

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Summary

Glycinebetaine (hereafter betaine) is accumulated in a number of halotolerant plants and bacteria as an acclimation response to saline and/or water-deficient environments. Betaine acts as an osmoregulative substance keeping the osmotic balance with the environments and also prevents the dissociation of various enzymes at high concentration of salt. Betaine protects the photosystem II complex of the thylakoid membranes against the high salt-induced dissociation of the extrinsic proteins.

Choline oxidase, which is isolated from the soil bacterium, *Arthrobacter globiformis*, converts choline to betaine via a one-step reaction. We cloned the *codA* gene for this enzyme and introduced it into the cyanobacterium, *Synechococcus* sp. PCC 7942, and a higher plant, *Arabidopsis thaliana*. The *codA* gene was expressed in these organisms and the transformants accumulated betaine. Consequently the cyanobacterium acquired tolerance to salt stress, as evaluated by growth, chlorophyll accumulation and photosynthetic activity, and the plant did so as evaluated by germination and growth.