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Elongation factors Tu and 1A: multifunctional proteins involved in plant heat tolerance

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Protein synthesis elongation factors EF-Tu and eEF1A (EFs) are highly conserved and abundant GTPases in living cells, with a major role in transporting the aminoacyl-tRNA complex to the ribosome during translation. EFs are also considered multifunctional proteins with numerous noncanonical activities. EFs possess chaperone activity in preventing protein aggregation, interact with misfolded newly synthesized polypeptides and possibly direct them to the proteasome, and participate in viral replication [1]. eEF1A is also implicated in the organization of cytoskeleton and apoptosis, while EF-Tu of bacterial pathogens elicits plant innate immunity [1]. There is growing evidence that up-regulation of EFs genes by abiotic stresses may play an important role in stress responses in plants. The heat stress-induced accumulation of EFs has been detected in a number of plant species, and it correlates with the heat tolerant phenotype in maize, wheat, and potato [2]. Accumulation of EFs may enhance protein synthesis and the capability of plant cells to sustain heat stress. Besides, the proposed EFs role in the quality control of newly synthesized proteins and chaperone activity in preventing protein thermal aggregation and inactivation might be important in alleviating negative effects of high temperature. Taken together, these multifunctional proteins may represent coordinators of the cellular processes in stressed plants, for instance, protein synthesis with recognition and repair/degradation of misfolded proteins.

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