

Cold-induced changes of protein and phosphoprotein expression patterns from rice leaves

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Cold stress is a critical abiotic stress that reduces crop yield and quality. The response of the rice proteome to cold stress has been documented, and differential proteomic analysis has provided valuable information on the mechanisms by which rice adapts to cold stress. A global analysis of the change in protein phosphorylation status in response to cold stress remains to be explored, however. Here, we performed a phosphoproteomic analysis of rice leaves following exposure to cold stress using a two-dimensional gel electrophoresis-based multiplex proteomic approach. Differentially expressed proteins and phosphoproteins were detected and identified by matrix-assisted laser desorption ionization time of flight/time of flight mass spectrometry combined with querying rice protein databases. 105 protein gel spots (stained with silver) showed a two-fold difference in abundance of protein spots from gels with and without cold stress; these proteins were identified to be involved in photosynthesis, redox homeostasis, signal transduction, energy metabolism, and protein folding and processing. Twenty-five phosphoprotein gel spots (stained with Pro-Q Diamond) that showed a two-fold abundance difference were identified, such as Rubisco large subunit, enolase, ascorbate peroxidase, adenosine kinase, methionine synthase 1, glyceraldehyde-3-phosphate dehydrogenase, ATP synthase subunit alpha, nucleoside diphosphate kinase, CPK1 adapter protein 2, and tubulin. Phosphorylation site predictors were used to confirm that the identified proteins had putative phosphorylation sites. These results suggest that phosphorylation of some proteins in rice leaves is regulated in response to cold stress.

Biography

Liming Yang has completed his Ph.D and postdoctoral studies from Nanjing Agricultural University. He has published more than 17 papers in reputed journals in field of genomics, proteomics and bioinformatics, especially plant response to stress.

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