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TOWARD THE FUNCTIONAL CHARACTERIZATION OF THE SUMO PATHWAY DURING THE PLANT RESPONSE TO ABIOTIC STRESSES

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The transient conjugation of the Small Ubiquitin-like MOdifier (SUMO) protein to target proteins is a post-translational modification playing an influential role in a wide variety of cellular processes, by regulating protein-protein interactions and subcellular location or by antagonizing ubiquitination. In yeast and human, SUMOylation target proteins are factors involved in DNA repair and chromosomal segregation, transcriptional regulators and RNA-binding proteins, cytoskeleton components and nuclear transport factors as well as metabolic enzymes. Mechanistically, SUMOylation involves the sequential action of a SUMO activating enzyme (E1 or SAE), a SUMO conjugating enzyme (E2 or SCE) and eventually an E3 ligase. SUMOylation is conserved in plants and the conjugation system of *Arabidopsis* has been characterised, however a few number of plant SUMO-conjugates have been identified so far and evidence on SUMOylation functions in plant life is limited. Activation of the SUMOylation is a known response of Arabidopsis to abiotic stresses like heat, H2O2 and cold. We assessed the effect of exposure of *Hordeum vulgare* and *Triticum durum* to temperature stresses by the expression profiling of genes of the SUMOylation pathway and by the accumulation of SUMO conjugates. Given that they are potential regulators of the plant molecular response to stresses, in order to obtain their isolation three proteomic approaches have been initiated in *Triticum durum* and *Arabidopsis.* Transgenic *Arabidopsis* plants overexpressing the SUMO conjugating enzyme AtSCE1a fused to the TAP tag have been produced to isolate protein complexes of the SUMOylation pathway. A wheat cDNA library from cold treated leaves has been screened by yeast two-hybrid analysis to isolate potential E2 interactors (SUMO-conjugates and E1/E3 enzymes). An immunoaffinity chromatography by the anti-SUMO1 immunoglobulin followed by LC-MS/MS analysis has been used to identify wheat proteins conjugated to SUMO after heat stress. Preliminary results of these strategies are shown.