

Plants on brassinosteroids

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Abstract

GLYCOGEN SYNTHASE KINASE3/Shaggy-like kinases (GSKs) represent a highly conserved group of proteins found in all eukaryotes. In plants they are encoded by multigene families and integrate signaling of brassinosteroids, auxin and abscisic acid in wide range of physiological and developmental processes with a strong impact on plant responses to environmental and biotic factors.

Based on the structures of 10 *Arabidopsis* GSK genes we identified and annotated a family of 7 GSK genes in barley genome. The results indicated that a single transcriptionally active gene should be included in the current barley genome and the structure of another GSK-encoding gene had been corrected based on the syntenic region of *Brachypodium distachyon* and barley experimental analysis. Using an RNAi-based strategy, we obtained barley plants with a significantly lowered transcript level of selected *HvGSK* genes. Expression of *HvGSK1.1* in silenced lines was strongly negatively correlated with biomass of the seedlings grown in normal and salt stress conditions. The elevated biomass of seedlings with silenced expression of the gene, compared with WT control, was the most pronounced feature of all transgenic lines. Silencing of *HvGSK1.1* was associated with altered expression of four GSK paralogs in barley indicating for a strong cross-regulation of the paralogs. The results will be discussed in the view of the roles of the GSKs as the negative regulators of brassinosteroid signaling pathway.