Could thioredoxin h be involved in early response to gravitropic stimulation of poplar stems?

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The perception of gravity is essential for plant development. Trees constantly develop specialized woody tissues, termed « reaction wood » to correct inclined branch and stem growth in order to adopt an optimal position. Despite the economical impact of reaction wood occurrence and its importance from a developmental point of view, the perception and response to the gravitational stimulus have not been extensively studied in woody species in which primary and secondary growth occur.

Using complementary approaches (proteomics, qRT-PCR, immunolocalization), we have compared straight polar stems to stems that were inclined at 35° from the vertical axis for periods of time varying from 10 min to 6 hours depending on the experiments. The proteomics approach revealed that thirty six percent of the identified proteins that were differentially expressed after gravistimulation were established as potential Thioredoxin targets. qRT-PCR indicated an early induction of Thioredoxin h expression following gravistimulation. In situ immunolocalization indicated that Thioredoxin h protein co-localized with the amyloplasts located in the endodermal cells which may be specialized in gravity perception. These investigations suggest the involvement of Thioredoxin h in the first events of signal transduction in inclined poplar stems, leading to reaction wood formation.