Mechanical stresses and long-distance signaling in Poplar

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Abstract

Under natural conditions, plants are subjected to mechanical stresses and potentially show a response at a distance from the site of stimulation suggesting the transfer of information. The nature of the information vector remains unknown to date. The propagation of an electrical signal following the bending of the poplar stem was studied by extracellular electrophysiology measurements. This study revealed the propagation of a graded potential (GP), an electrical response with original characteristics that differentiate it from an action potential (AP) and its electrotonic propagation, leading to the idea of another mode of propagation and to the hypothesis of a hydroelectric coupling. In order to determine whether the PG is likely to trigger a biological response, various RNA seq experiments were undertaken. The results revealed a significant transcriptional response at a distance from the solicited area, dependent on the passage of a PG.

Keywords: Poplar, stem bending, electrical signal, hydraulic pressure wave, RNA seq

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