THE BIOLOGY OF WOODY ROOT: MECHANISMS CONTROLLING THE THIGMOMORPHOGENESIS

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In response to mechanical stress and to improve their anchorage, plants have developed complex machineries to detect mechanical perturbations and to induce a suite of modifications collectively known as thigmo-morphogenesis. Since *Populus* has the first forest tree genome to be decoded, it represents a model species for addressing questions on the mechanisms controlling adaptation of woody roots to changing environments. In this study, an integrated approach of morphological, physiological and molecular analysis was used to investigate factors controlling temporal and spatial modifications in *Populus nigra* woody taproots subjected to bending. Proteome maps of the unstressed and bent taproot were compared and 210 protein spots have been further indentified. The proteomic approach revealed the expression, of several key factors controlling metabolism/energy production, lateral root formation and lignin deposition in the thigmoresponse of the woody poplar root. Thus, morphogenetic responses and local variations of lignin and plant hormone contents have been examined, together with the expression of Auxin (IAA) and Giberellins (GAs) regulators and transporters.

Modeling the spatial and temporal mechanical force distribution along the woody taproot axis enabled us to discuss the events occurring in its above-bending-, central bending- and below-bending-sectors, in relation to the mechanical stress intensities.

The response to mechanical stress was also analyzed during a three points time course. In this regard, we present data referring to the plant transition from its condition of winter dormancy to that of full vegetative activity.

Scippa G.S., Trupiano D., Rocco M., Di Iorio A., Chiatante D., 2008. Unravelling the response of poplar (*Populus nigra*) roots to mechanical stress imposed by bending. Plant Biosystems 142: 401- 413.

Scippa G.S, Trupiano D., Di Iorio A., Montagnoli A., Lasserre B., Rocco M., Grosso A., Scaloni A., Marra M., Chiatante D., 2011. Involvement of lignin and hormones in the response of woody poplar taproots to mechanical stress. Physiologia Plantarum (submitted).

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