

TYPE 3 METALLOTHIONEINS RESPOND TO WATER DEFICIT IN LEAF AND CAMBIUM OF WHITE POPLAR (*POPULUS ALBA*)

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The involvement of metallothioneins (MTs) in response to plant water stress and recovery was assessed by analysing gene expression in leaves and cambial zone of white poplar.

One-years-old plants were submitted to two different watering regimes: irrigation was withheld for nine days and then resumed until day 17 or soil moisture was maintained to field capacity by irrigation during the experiment. Changes in leaves and stem water relations, gas exchange and CO₂ assimilation were recorded. The expression profiles of MT genes were analysed in developing leaves and cambial zone at maximum stress level and after recovery and compared with the watered controls. Whole-plant water relations were significantly affected by water deprivation, though a complete recovery of plant water status was reached after resumption of watering. Withholding irrigation resulted in a significant decrease of leaf turgor potential and relative water content without a significant increase of the osmotic potential at full turgor. Similarly, stem water content decreased leading to a remarkable increase of stem shrinkage confirming that a mild water stress affected mainly tissue water status. Following to water depletion, the transcript analysis of MT genes revealed an increased expression level of type 3a and 3b MT genes in cambial tissues and particularly in leaves. After water resumption the transcription decreased, suggesting that the changes in gene expression were related to water deficit.

The results indicate that in leaf and, for the first time in the cambial zone, type 3 MTs respond in a specific manner to changes in water status. These results are consistent with the regulatory cis-elements in 5' flanking region of type 3 MT genes.