THE \textit{Tdp1} (TYROSYL-DNA PHOSPHODIESTERASE) GENE FAMILY IN BARREL MEDIC (\textit{MEDICAGO TRUNCATULA} GAERTN.): BIOINFORMATIC INVESTIGATION AND EXPRESSION PROFILES

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The \textit{Tdp1} gene encoding Tyrosyl-DNA phosphodiesterase has been extensively investigated in animal cells, due to the role of this enzyme in the repair of topoisomerase I-DNA covalent lesions. When DNA topoisomerase I (topo I) binds DNA sites with modified nucleotides, e.g. the oxidized base 7,8-dihydro-8-oxoguanine (8-oxoG) or when the enzyme interacts with the anticancer drug camptothecin, the catalytic reaction is altered and topo I becomes covalently trapped at the 3’ end of the cleaved DNA strand, with deleterious effects on cell viability. \textit{Tdp1} catalyzes the hydrolysis of the covalent bond involving the tyrosine residue of the topo I catalytic site and the phosphate group at the 3’ end of DNA.

To date, information concerning the \textit{Tdp1} function are missing in plants. We report for the first time on the characterization of the \textit{Tdp1} gene family from barrel medic \textit{(Medicago truncatula} Gaertn.), family composed of two members, hereby named \textit{Tdp1a} and \textit{Tdp1b}. Both genes were constitutively expressed \textit{in planta} during the vegetative and reproductive growth stages and up-regulated during seed rehydration, reaching the highest expression levels at the beginning of the imbibition phase 2. This finding suggests for a role of both genes in the active DNA repair processes occurring during seed rehydration. Furthermore, the \textit{Tdp1a} and \textit{Tdp1b} genes were induced in aerial parts and roots of \textit{M. truncatula} plantlets challenged with heavy metals and water stress, respectively. The expression patterns of the barrel medic \textit{top1a} and \textit{top1b} genes, encoding distinct isoforms of DNA topoisomerase I, were also analysed and discussed in order to acquire information on a putative correlation between topo I and \textit{Tdp1} functions in plant cells.