Induced xylem ontogenesis in cotyledons of the *fra2* katanin mutant of the *Arabidopsis thaliana* plant

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KATANIN is a heterodimeric microtubule-severing AAA ATPase protein, consisting of a catalytic p60 and a regulatory p80 unit, playing significant roles in various cellular processes, such as cell division, cell elongation, and morphogenesis. The mutant *fragile fiber 2 (fra2)* bares a deletion of A2329 residue, which leads to a frameshift of the ORF and thus to a premature stop codon. The aberrant protein, which lacks 78 amino acids from the C-terminal region, affects the abovementioned processes in all organs of the plant and therefore *fra2* demonstrates a dwarf phenotype. It is known that cortical microtubules regulate cellulose microfibril deposition and previous studies have also shown that root xylem differentiation in *fra2* is compromised. In this study we examined xylem element differentiation in *fra2* and wild-type (Col-0) cotyledons, using the VISUAL culture system in which xylem ontogenesis is *in vitro* induced. Transverse and longitudinal sections of chemically-fixed and resin-embedded cotyledons of both *fra2* and Col-0, before and after induction, were stained with toluidine blue and observed under an optical microscope. Moreover, whole cotyledons were examined after chloral hydrate treatment. The results highlighted that the xylem-differentiated *fra2* cambial cells underwent an increased and irregular number of cell divisions. Also, *fra2* cotyledons exhibited an undifferentiated central nerve and incomplete vascular branching in their cotyledons, even after the induction of xylogenesis, as opposed to wild-type plants. Furthermore, while induction of Col-0 plants often led to an increased number of ectopic xylem elements, in *fra2* mutants their appearance was sporadic. The above data underline the important role of KATANIN during xylem ontogenesis and differentiation in *Arabidopsis thaliana.*