PLANT BODY MODIFICATION IN A SUNFLOWER MUTANT WITH ENLARGED SHOOT APICAL MERISTEM

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Throughout plant life new organs are reiteratively differentiated to interact with the biotic and abiotic factors. The continuous embryology is a basic ability of plants and depend on meristematic centres of cell division and cell expansion. To warranty postembryonically growth the size of apical meristems is regulated with accuracy. In shoot apical meristem (SAM) of dicot plants, a peripheral zone (PZ) of rapidly dividing cells produce new lateral organs while a central zone of slowly dividing cells has the key role of meristematic cell recovery. When the area of central pool of stem cells is not closely controlled, plant body plan becomes abnormal (Fletcher, 2002; Annual Review Plant Biology 53: 45-66). The genetic analysis at molecular level of SAM maintenance in the plant model Arabidopsis thaliana, has been demonstrated that CLAVATA loci are involved in the transduction pathway responsible to retain the proper number of stem cells (Lenhardt and Laux, 2003; Development 130: 3163-3173). The defect of gene function in recessive clv mutants induces an improper accumulation of stem cells during the transition of SAM to inflorescence meristem (IF) with manifestation of fasciated phenotype (Clark, 2001; Nature Reviews Molecular Cell Biology 2: 276-284). The disposition of leaves and flowers around the stem is a pivotal trait of plant architecture and several models have been proposed to explain it. Moreover, recent evidences showed the involvement of specific auxin gradients in the reiterativity and stability of leaf positioning on arabidopsis vegetative apex (Reinhardt et al., 2003; Nature 426: 255-260).

We have recently isolated within an inbred line of sunflower, a recessive mutant (stf, stem fasciated) affected by the occurrence of fasciation in stems and inflorescences. In addition to morphological analysis under field conditions, we evaluated by serial sections, the size of stf SAM during both vegetative and reproductive stages. Moreover, the consequences of the mutation were investigated at histological level in hypocotyl, epicotyl, stems and roots. The mutant showed a dramatic increase of leaves number (27.8 vs. 163.1). From the bottom to the top of the stem, the number of leaves differentiated in the mutant gradually increased and the higher number was observed in the last section of stem below the insertion of inflorescence. The stf leaves were always smaller than in wild type and the wider difference occurred in the last section of the stem. The shape of stf stem changed during the growth. It was cylindrical at the base but after the transition from vegetative to reproductive stage, it gradually broadened at the tip to give a band-shaped fasciation of stem that was pronounced just below the inflorescence. In a 3 day-old seedlings median longitudinal sections
through the *stf* shoot tips showed a similar size of apical meristem with respect to control; nevertheless, already after 10 days of culture, the meristem width of mutant was significantly higher than in wild type. This peculiar trait was observed also after the transition from vegetative to reproductive stage. Despite the marked enlargement, the apical meristem of *stf* mutant did not show any detectable alteration in meristem zonation nor in the shape. Hypocotyls and epicotyls explants, obtained from three weeks-old seedlings of the *stf* mutant, were able to callus proliferation on MS medium without growth regulators. The hypothesis of an altered content of auxin in *stf* tissues was evaluated.