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# The real function of the gene *TERMINAL FLOWER 1*

Kharchenko V.E.
*SEI HE LPR Lugansk State Agrarian University, Lugansk, Lugansk People's Republic*
*viktoriakharchenko@rambler.ru*

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*Motivation and Aim*: *TERMINAL FLOWER 1 (TFL1)* is a key regulator of *Arabidopsis thaliana* plant architecture that is of paramount importance to plant adaptation and crop improvement. Published research denotes that *TFL1* suppresses transition to flowering [1]. A protein homologous of *TFL1* were found in virtually all seeds plants [2]. Despite the importance for plant breeding, limited research data on the *TFL1* and its regulation of flowering is available. The primary objective of this study to clarify the functions of the gene *TFL1*.
*Methods and Algorithms*: The functions of the *TFL1* gene were tested using a detailed analysis of *Arabidopsis thaliana* phenotype variability with its normal (line L*er*) and abnormal expression (the mutant line *tfl1-2*). Obtained results were analyzed using ANOVA from the STATISTICA package. The shoots' structure was analyzed using the fractal approach. Certain elements were isolated on the shoots and duplicated in accordance with the principle of decreasing proportion. Modification variability of inflorescences was evaluated by different the level of illumination (from 6000 to 800 lux). The structure of inflorescences was analyzed during morphogenesis using an electron scanning microscope and a laser confocal microscope.
*Results*: Plants with a single terminal flower were obtained as a result of modification variability in the parent line *Ler Arabidopsis thaliana* (Fig. 1, A). Indeed, the terminal flower had a structure typical to *Arabidopsis thaliana* [2]. Microscopic analysis of the inflorescences revealed that the complex of fused flowers at the top of *Arabidopsis thaliana tfl1-2* shoots is not identical to the "terminal flower", since the last flower in its inflorescence can be in a lateral position and is usually underdeveloped (see Fig. 1, B). Therefore, mutations in the *TFL1* gene will not switch the inflorescence development program from indeterminate to determinate but only reduce it. The obtained results are consistent with the effects described in experiments on ectopic expression of *TFL1*-like genes [2, 4, 5]. With insufficient expression of the *TFL1* gene in plants, the structure of the inflorescence turned out to be underdeveloped. When *TFL1* is overexpressed, new stages of inflorescence morphogenesis arise. However, they do not form apical flowers, and their flower symmetry does not change. A new stage of morphogenesis arises in the inflorescence when the *TFL1* gene is overexpressed, similarly to the way it is observed in polyploids. Therefore, *TFL1* regulates the process of morphogenesis in general and is of key importance for harvest plants.
*Conclusion*: The results obtained in the model suggest that *TERMINAL FLOWER 1* regulates not only the time of transition to flowering in plants, but also the stages of inflorescence morphogenesis and harvest of plants. The insufficient expression leads to reduced or lost stages of morphogenesis (pedomorphosis). On the contrary, overexpression causes new stages of morphogenesis (anaboly, hypermorphosis) to

appear. It is probable, that the misunderstanding of the function of the *TFL1* is associated with an attempt to express it through a specific phenotypic effect, and not through the modus of action.

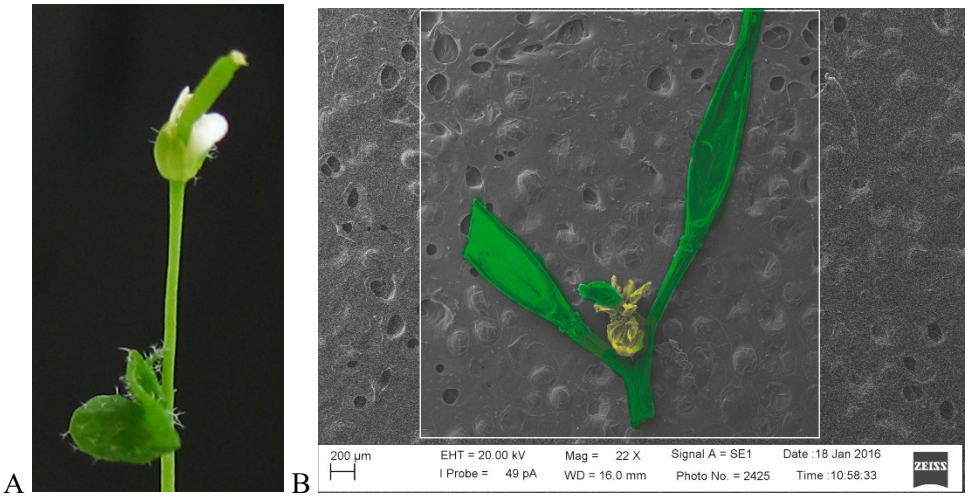


**Fig. 1.** Terminal flowers in *Arabidopsis thaliana*

This terminal flower arose in *Ler Arabidopsis thaliana* as a result of modification variability (A). This terminal flower arose in *tfl1-2 Arabidopsis thaliana* as a result of mutation variability (B).

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