

Identification of non-standard effects in phenotypic analysis

V. Kharchenko

Luhansk Voroshilov State Agricultural University, Lugansk, LNR, Russia

* viktoriaKharchenko@rambler.ru

Motivation and Aim: To describe the phenotypic effects of plants, it is proposed to use a standardized, more or less, description of the plants. Researchers focus on different aspects of plant phenotypes. The phenotypic variability of mutants of *Arabidopsis thaliana* is most studied, but can we create a universal standard for describing the phenotype of the plant? The analysis of non-standard phenotypic effects in *tfl1-2* and *ap1-1* mutants in *A. thaliana* prompted us to consider the *TERMINAL FLOWER1* (*TFL1*) and *APETALA1* (*API*) genes as antagonists. Since it is assumed that *TFL1* determines the identity of the inflorescence meristem and the *API* gene determines the identity of the flower meristem. Despite the fact that gene *TFL1* is expressed during flower meristem formation too. The aim of this study was to elucidate the reasons for this paradox based on a detailed analysis of the phenotypic variability of flower and inflorescence morphogenesis in *A. thaliana*, *apetala 1-1* (*ap1-1*) and *terminal flower1-2* (*tfl1-2*) mutant lines.

Methods and Algorithms: The studies were conducted on plants of *A. thaliana*, the line *Landsberg erecta* (*Ler*) and the mutant lines *apetala 1-1* (*ap1-1*) and *terminal flower1-2* (*tfl1-2*) synthesized on its genetic basis. Seeds for the studies were obtained from the European Arabidopsis Storage Centre. Plants were cultivated at +20–23 °C, under 24-hour illumination from 6000 to 800 lux in the light culture laboratory of Lugansk State Agrarian University and the Botanical Garden of the Institute of the Far East Branch of the Russian Academy of Sciences, Vladivostok.

Results: The single terminal flower is a rare but standard trait for *A. thaliana* of the original line *Ler* and mutant lines *ap1-1* and *tfl1-2*, because it is formed in all plants of these lines, but the frequency of its formation is different and depends on cultivation conditions.

Conclusion: The inflorescence is a common transformation series that includes all flowers, regardless of their position on the inflorescence axis. The *TFL1* and *API* genes are not antagonists; they complement each other's action. *API* regulates the separation of flower organs, while *TFL1* regulates the number of flowers in the inflorescence and their density on the inflorescence axis.