frontiers | Frontiers in Plant Science

TYPE Original Research
PUBLISHED 25 March 2024
DOI 10.3389/fpls.2024.1370949

OPEN ACCESS

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RECEIVED 15 January 2024
ACCEPTED 26 February 2024
PUBLISHED 25 March 2024

CITATION
He H, Chen X, Wang T, Zhang X, Liu Z, Qu S, Gu Z, Huang M and Huang H (2024) Flower development and a functional analysis of related genes in Impatiens uliginosa.
Front. Plant Sci. 15:1370949.
doi: 10.3389/fpls.2024.1370949

Flower development and a functional analysis of related genes in Impatiens uliginosa

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Impatiens uliginosa is a plant of the Impatiens, with peculiar flowers. In this study, we combined morphogenesis and molecular biology to explore its development of flowers. An analysis of basic observational data and paraffin sectioning showed that it took approximately 13 d for the floral organs to differentiate. An analysis of the development of inflorescences and floral organs by scanning electron microscopy showed that the inflorescence of I. uliginosa is a spiral raceme. The floral organs differentiated in the following order: lateral sepals (Ls), posterior sepal (Ps), anterior sepals (As), anterior petal (Ap), lateral petals (Lp), stamens (St) and gynoecium (Gy). I. uliginosa was found to have four sepals, and the connate stamens are caused by the fusion and growth of filament appendages. The results of fluorescence quantification and virus-induced gene silencing showed that I. uliginosa had its own unique model for flower development, and there was functional diversity of IuAP1 and IuDEF. Among them, IuAP1 controls the formation of bract s (Br), regulates the morphogenesis of posterior sepal, controls the anthocyanin precipitation of the anterior petals and the formation of lateral petals. IuDEF regulates the morphogenesis of lateral sepals, the length of development of the spur, and controls the size of yellow flower color plaques of the lateral petals. In this study, the process of flower development and the function of flower development genes of I. uliginosa were preliminarily verified. This study provides basic guidance and new concepts that can be used to study the development of Impatiens flowers.

KEYWORDS

Impatiens uliginosa, floral development, SEM, floral development genes, floral development model, function of IuAP1 and IuDEF