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Tomato and Arabidopsis plants overexpressing the Ramosa1 maize gene show cell expansion
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With the aim of studying the possible application of the Ramosa1 gene as a modifier of inflorescence and branching architecture in plants, the coding region of the maize gene Ramosa1 was cloned under the control of the (CaMV) 35S promoter and the resulting construct containing the expression cassette 35S::Ra1 was used to transform Arabidopsis and tomato plants.

Transformed plants showing the most severe phenotype were characterized by a dramatic reduction of inflorescence elongation and a bushy appearance, i.e. the leaves were larger than wild type and often swollen and curled (Figure 1 A and B). In Arabidopsis, floral organs such as sepals, petals, stamens, pistils, seeds and pollens were bigger compared to wild type. These data indicate that the effects of Ra1 overexpression act in every tissue of plants, even in the gametophyte. The effects of the Ra1 ectopic expression were easily detectable even in seedlings because cotyledons and leaves are bigger than those of the control.

To investigate at the cellular level whether the increased size of the leaves and flower organs is a consequence of enhanced cell expansion or of enhanced cell division, we analyzed leaves and petals from normal and from Ra1 overexpressing plants using differential interference contrast imaging microscopy. Apparently only the size, but not the shape, is abnormal in transgenic plants, as observed in the morphology of transgenic leaves and flowers studied at the whole organ level.

Epidermal cells of tomato (Figure 1D) and Arabidopsis (Figure 1F) transgenic leaves are bigger than those of the wild type (Figure 1 C tomato and Figure 1E Arabidopsis) while still maintaining the correct organization inside the tissues. A good correlation between increased organ size and increased cell size recorded in the transgenic plants for primary root diameter and petal length confirms that the increase in organ size is caused primarily by the cells being larger (data not shown).

These results suggest that the RA1 protein is able to up-regulate cell expansion in all organs of Arabidopsis and tomato plants. Further studies will be necessary to understand the interaction between the Ra1 exogenous gene and the final target genes in Arabidopsis and tomato plants, and the behaviour of the Ra1 gene when overexpressed in other plan

Figure 1. Phenotype of transgenic tomato (A) and Arabidopsis (B) plants overexpressing the Ra1 gene (right) and control (left). Interference contrast photographs of wild type epidermis cells of tomato (C), Arabidopsis (E) and transgenic plants overexpressing the Ra1 gene (tomato, D; Arabidopsis, F).

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