

MILAN, ITALY
University of Milan

Tomato and *Arabidopsis* plants overexpressing the *Ramosa1* maize gene show cell expansion

--Cassani, E; Landoni, M; Pedretti, G; Pilu, R

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 1C 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

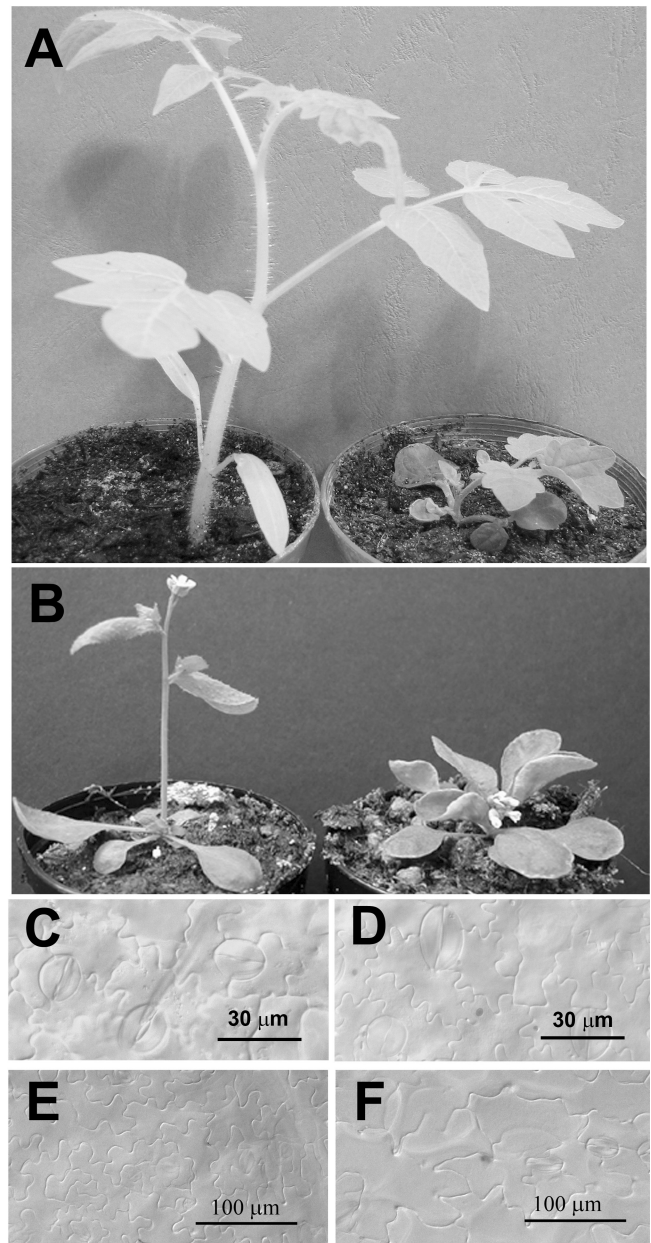


Figure 1. Phenotype of transgenic tomato (A) and *Arabidopsis* (B) plants overexpressing the *Ra1* gene (right) and control (left). Interference contrast photographs of wild type epidermal cells of tomato (C), *Arabidopsis* (E) and transgenic plants overexpressing the *Ra1* gene (tomato, D; *Arabidopsis*,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

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 plant