

## Characterization of Heterotrimeric G Protein $\alpha$ Subunit in Tomato

**Authors :** Thi Thao Ninh, Yuri Trusov, José Ramón Botella

**Abstract :** Heterotrimeric G proteins, comprised of three subunits,  $\alpha$ ,  $\beta$  and  $\gamma$ , are involved in signal transduction pathways that mediate a vast number of processes across the eukaryotic kingdom. 23  $G\alpha$  subunits are present in humans whereas most plant genomes encode for only one canonical  $G\alpha$ . The disparity observed between Arabidopsis, rice, and maize  $G\alpha$ -deficient mutant phenotypes suggest that  $G\alpha$  functions have diversified between eudicots and monocots during evolution. Alternatively, since the only  $G\alpha$  mutations available in dicots have been produced in Arabidopsis, the possibility exists that this species might be an exception to the rule. In order to test this hypothesis, we studied the G protein  $\alpha$  subunit (TGA1) in tomato. Four *tga1* knockout lines were generated in tomato cultivar Moneymaker using CRISPR/Cas9. The *tga1* mutants exhibit a number of auxin-related phenotypes including changes in leaf shape, reduced plant height, fruit size and number of seeds per fruit. In addition, *tga1* mutants have increased sensitivity to abscisic acid during seed germination, reduced sensitivity to exogenous auxin during adventitious root formation from cotyledons and excised hypocotyl explants. Our results suggest that  $G\alpha$  mutant phenotypes in tomato are very similar to those observed in monocots, i.e. rice and maize, and cast doubts about the validity of using Arabidopsis as a model system for plant G protein studies.

**Keywords :** auxin-related phenotypes, CRISPR/Cas9, G protein  $\alpha$  subunit, heterotrimeric G proteins, tomato

**Conference Title :** ICPBMB 2019 : International Conference on Plant Biotechnology and Molecular Biology

**Conference Location :** Singapore, Singapore

**Conference Dates :** September 10-11, 2019