Summary

When addressing the genetic dissection of a complex trait, what really matters is the identification of the genes with major effects, because their modification may result in qualitative changes in the phenotype. For this purpose, a mutagenesis-based approach has two advantages: first, the identification of a mutant reveals that the altered gene has a key effect on the trait; secondly, the phenotypic characterization of the mutant allows making an inference about the gene function. Insertion mutagenesis by T-DNA provides an additional advantage: a gene tagged by a T-DNA insert can be easily identified using PCR-based techniques (e.g. Anchor- PCR).

In order to identify genes that control developmental traits and abiotic stress tolerance in tomato and wild related species, we are performing a program of insertion mutagenesis in collaboration with the groups of Dr. Rafael Lozano (University of Almeria) and Dr. MªCarmen Bolarín (CEBAS-Murcia). The objectives of the present Doctoral Thesis are framed in the context of this insertion mutagenesis program in tomato and wild relatives. First, in order to expand the collections of T-DNA lines previously generated in our group, 952 T-DNA lines of tomato, 405 of *Solanum pimpinellifolium* and 550 of *S. cheesmaniae* have been obtained. Secondly we performed the evaluation of progenies from 1545 T-DNA lines of tomato, 194 T-DNA lines of *S. pimpinellifolium* and 149 T-DNA lines of *S. cheesmaniae*. The screening *in vitro* of those progenies allowed us to identify 43 mutants altered in early developmental traits. In addition, we were able to detect three mutants of tomato and another one of *S. cheesmaniae* which are hypersensitive to salt stress. The phenotypic and genetic characterization of selected mutants has been carried out. Finally, we performed the functional analysis of the *PMS* (*PROTECTING MERISTEMS AGAINST SALINITY*) gene tagged in the *pms-916* tomato mutant. Our results suggest that the *PMS* gene plays an essential role in the protection of the shoot apical meristem and young tissues of the tomato plant under salinity stress conditions.