

## EVOLUTION OF FLOWERING AND FRUIT QUALITY TRAITS IN CULTIVATED TOMATO AND ITS WILD RELATIVES

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The genome of cultivated tomato (*S. lycopersicum*) has a limited sequence variation due to bottlenecks during domestication and subsequent breeding; however, the study of sequence variations between tomato and related wild species could provide a useful tool for the analysis of the evolution of flowering and fruit quality traits. Old accessions of *S. lycopersicum* var. *cerasiformae* as well as wild tomato species (*S. pimpinellifolium*, *S. cheesmaniae*, *S. neorickii*, *S. chmielewskii*, *S. chilense*, *S. habrochaites*, *S. pennellii*, *S. arcanum*) were selected to represent ancient varieties and closely related progenitor species. Within the gene pools of these species, much variability exists for various morphological and biochemical characters connected with flowering and fruiting. The aim of the project is to identify genetic differences, arising during tomato speciation, responsible for the variability of two traits: the photoperiodic response, that causes some species to be short-day and other to be day-neutral with respect to flowering, and the different colour of the ripe berry, that varies from green to red.

The *CRYPTOCHROME* and *CONSTANS* gene families, controlling flowering time in *Arabidopsis*, are being sequenced, but up to now no mutations discriminating day-neutral from short-day species have been identified.

Concerning berry colour, we focused our attention on the carotenoid biosynthetic pathway. All the early genes of this pathway (*PHYTOENE SYNTHASE 1* and *2*, *PHYTOENE DESATURASE*, *CAROTENE ISOMERASE*, *LYCOPENE BETA-CYCLASE*, *LYCOPENE EPSILON-CYCLASE*, and *BETA*) have been or are being sequenced. The sequence analysis has so far highlighted the presence of mutations in the promoter and coding regions that differentiate the red and orange-fruited species from the green-fruited ones.

The identification of the mutations that have a functional role is the next step of this research project.