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Poster Abstract – F.15

THE TOMATO CRYPTOCHROME GENE FAMILY: FUNCTIONAL CHARACTERIZATION AND GENE REGULATION

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Plants use multiple photoreceptors to perceive changes in quality and quantity of light and to regulate growth and development. Blue light, perceived by cryptochrome and phototropin photoreceptors, regulates a variety of physiological processes in plants, such as photomorphogenesis, pigment biosynthesis, tropic and stomatal movements. We are characterizing the tomato cryptochrome gene family, which contains at least four members, (Cry1, Cry1b, Cry2 and Cry3).

The different cryptochromes are being characterized through a combination of transgenic overexpression, transgenic RNAi, and Virus-Induced Gene Silencing (VIGS). Tomato CRY2 overexpressors show phenotypes similar to, but distinct from their Arabidopsis counterparts (hypocotyl and internode shortening under both low- and high-fluence blue light), but also several novel ones, including a high-pigment phenotype, resulting in overproduction of anthocyanins and chlorophyll in leaves and of flavonoids and lycopene in fruits. and an unexpected delay in flowering. Virus-induced gene silencing of CRY2 results in a reversion of several of the above phenotypes.

Microarray and metabolomic profiling of CRY2-OX plants is under way, seeking the regulatory networks underlying the observed phenotypes.

Finally, we analyzed the diurnal oscillations of tomato transcripts encoding different photoreceptors of the phytochrome, cryptochrome and phototropin families, of central oscillator genes (CCA1, LHY and TOC1) and of flowering time genes, (CONSTANS, GIGANTEA and FT). Transcription pattern studies of all these genes are currently in progress in the wt plants and in photoreceptor mutants in order to investigate how many of these genes show diurnal or circadian oscillations in transcript abundance.