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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 CRY1a and CRY2 overexpressors shows 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 fruits is under way, seeking the regulatory networks underlying the observed high pigment phenotype.We report the characterization of a new ORF of tomato which shows high similarity to Arabidopsis Cry3. It's coding sequence is quite different from the other tomato cryptochromes and, as observed in Arabidopsis, tomato CRY3 does not include a C-terminal domain. Temporal transcript modulations of CRY3 have been measured in wild type, cry1a mutant and transgenic overexpressing (CRY2-OX) tomato plants under both long day (LD) and constant light conditions (LL).

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