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DISSECTING LYCOPENE BIOSYNTHESIS IN TOMATO FRUITS THROUGH VIRUS-INDUCED GENE SILENCING

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Tomato fruits owe their color to the red carotene, lycopene. In order to elucidate the role of the early dedicated genes of the carotenoid pathway, we adopted a Virus-Induced Gene Silencing (VIGS) reverse genetic approach based on agro-infection with Tobacco Rattle Virus (TRV) carrying Rosea1 and Delila silencing fragments (TRV/DR). These serve as a visual marker to dissect silenced from non-silenced sectors (Orzaez et al., 2009). Tomato fruits expressing full-length Rosea1 + Delila, (DR) and consequently accumulating high levels of anthocyanin pigments were infected with TRV/DR, plus a fragment of a carotenoid gene. Seven genes (PSY1, PSY2, PDS, ZDS, ZISO, CrtISO and CrtISO2) were silenced individually in DR fruits and fully ripe fruits were analysed trough HPLC. The results allow to dissect the role of each gene in lycopene biosynthesis and demonstrate that VIGS, associated to a visual marker, is a rapid tool for the functional study of genes controlling tomato fruit quality traits.