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METABOLIC ENGINEERING OF TOMATO FRUIT CAROTENOIDS INDUCES GLOBAL CHANGES IN FRUIT GENE EXPRESSION, VOLATILE AND PRIMARY METABOLITE PROFILES

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We performed a global profiling of tomato fruits overexpressing lycopene beta-cyclase (*LCY-b*), beta-carotene hydroxylase (*CHY*) or both transgenes, under the control of the chromoplast-associated *PDS* promoter. All fruits show large alterations in carotenoid composition and in . endogenous carotenoid gene expression. Variations in carotenoid composition are associated with large modifications in transcriptome profiles, affecting regulatory genes (myb and zinc-finger transcription factors) and genes involved in primary and secondary metabolism and hormone biosynthesisDramatic alterations were also observed in volatile and primary metabolite profiles. All fruits exhibited severe ripening phenotypes, with alterations in ethylene production and fruit firmness. Overall, these data indicate that carotenoid metabolism plays a hitherto unsuspected role in the control of tomato fruit metabolism and ripening.