

Biosynthesis of carotenoids during bilberry (*Vaccinium myrtillus* L.) fruit development

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Abstract

Bilberry (*Vaccinium myrtillus* L.) fruits are rich with anthocyanin pigments but they also contain other bioactive compounds, such as carotenoids. In the present study, biosynthesis of carotenoids was studied in different stages during bilberry fruit development and ripening and as response to light treatments. Eight key carotenoid biosynthetic genes (*PSY*, *PDS*, *ZDS*, *CRTISO*, *LCYE*, *LCYB*, *BCH*, *ECH*) were isolated from bilberry and their expression was analyzed with qRT-PCR. Composition of carotenoids was analyzed from the same samples with HPLC-MS. The most abundant carotenoids in bilberry fruit were lutein and β -carotene accompanied by minor amounts of xanthophylls such as neoxanthin, violaxanthin and zeaxanthin. The expression of the carotenoid biosynthesis genes showed increase in transcript levels of phytoene synthase (*VmPSY*), phytoene desaturase (*VmPDS*), carotenoid isomerase (*VmCRTISO*) and lycopene β -cyclase (*VmLCYB*) at the onset of fruit ripening. However, the increase in the expression did not lead to the accumulation of carotenoids during ripening in ripe berries and the carotenoid levels decreased during the fruit development. Light conditions during fruit development affected specifically the expression of *PSY* and *LCYB*. The results suggest that the carotenoid levels in bilberry fruit are determined by their biosynthesis and degradation of carotenoids to apocarotenoids such as abscisic acid.