

Levels of Lycopene β -Cyclase 1 Modulate Carotenoid Gene Expression and Accumulation in *Daucus carota*

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Plant carotenoids are synthesized and accumulated in plastids through a highly regulated pathway. Lycopene β -cyclase (LCYB) is a key enzyme involved directly in the synthesis of β -carotene and β -carotene through the cyclization of lycopene. Carotenoids are produced in both carrot (*Daucus carota*) leaves and storage roots, and high amounts of β -carotene and β -carotene accumulate in the latter. In some plant models, the presence of different isoforms of carotenogenic genes is associated with an organ-specific function. *D. carota* harbors two *Lcyb* genes, of which *DcLcyb1* is expressed in leaves and storage roots during carrot development, correlating with an increase in carotenoid levels. In this work, we show that *DcLCYB1* is localized in the plastid and that it is a functional enzyme, as demonstrated by heterologous complementation in *Escherichia coli* and over expression and post transcriptional gene silencing in carrot. Transgenic plants with higher or reduced levels of *DcLcyb1* had increme