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Biochemical Composition and Expression of Anthocyanin Biosynthetic Genes of a Yellow Peeled and Pinkish Ariled Pomegranate (*Punica granatum* L.) Cultivar are Differentially Regulated in Response to Agro-Climatic Conditions

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Abstract

The accumulation of beneficial biochemical compounds in different parts of pomegranate (*Punica granatum* L.) fruit determines fruit quality and highly depends on environmental conditions. We investigated the effects of agro-climatic conditions on major biochemical compounds and on the expression of major anthocyanin biosynthetic genes in the peels and arils of a yellow-peeled and pink-ariled pomegranate cultivar in three agro-climatologically different locations in Sri Lanka. Drier and warmer climates promoted the accumulation of the measured biochemical compounds, i.e. total phenolic content (TPC), antioxidant capacity (AOX), and α , β , and total punicalagin, in both peels and arils compared to wetter and cooler climates. Pomegranate DFR, F3H, and ANS transcripts in both peels and arils showed higher relative expression in hotter and drier regions, compared to those grown in cooler and wetter conditions. Therefore, growing pomegranates in drier and warmer environments maximizes the production of beneficial biochemical compounds and associated gene expression in pomegranate fruit.

Keywords: Pomegranate (*Punica granatum* L); agro-climatic conditions; anthocyanin; antioxidant activity (AOX); punicalagin; total phenolic content (TPC).

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