

# 1. Study of LED wavelength on ABA metabolism, anthocyanin synthesis, and sugar translocation in grapes

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## Abstract

The interaction between abscisic acid (ABA) and blue or red light irradiation on anthocyanin and sugar syntheses in 'Kyoho' (*Vitis labrusca* × *V. vinifera*) grape berries was examined. The following two experiment groups were created. In the first group, ABA antagonist of PYL-PP2C receptor (AS-6) was treated to the cluster at 38 days after full bloom (DAFB) (one week before veraison) and 48 DAFB (veraison). The second group was the untreated control group. The anthocyanin and sugar concentrations, ABA metabolism, and their related gene expressions were analyzed at 38, 48, 58, and 68 DAFB. The anthocyanin, glucose, fructose, sucrose concentrations, and the *VIMybA2* and *VvUFGT* expression levels were inhibited in AS-6 treated berries. In contrast, the expression levels of *VvPC2C9* in AS-6 treated berries were increased at 48 DAFB. These results suggest that endogenous ABA is associated with anthocyanin and sugar syntheses in grape skin.

To consider the effects of light on ABA metabolism and anthocyanin formation, three experiment groups were created. In the first group, blue (clusters)/blue (leaves) LED was irradiated for six hours at night from full bloom to harvest. In the second group, blue (clusters)/red (leaves) LED was similarly irradiated. The third group was the untreated control. The *VvNCED1* expression levels were increased in the first and second groups compared to the untreated control. The *CYP707A1* expression levels in the second group was decreased at 62 DAFB. The *VvPP2C9* expression levels in the first and second groups were inhibited. These expression levels influenced ABA concentrations in the skin. The anthocyanin concentrations were increased in the first and second groups. These results suggest that light quality influences ABA metabolism, resulting in anthocyanin formation in the grape skin.

**Keywords:** Light quality, Anthocyanin, Abscisic acid, ABA receptor, Grapes, Fruit

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