

## [07]生食用ブドウの果色と果皮アントシアニンとの 関係：果色育種への応用

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<https://doi.org/10.15017/13933>

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出版情報：九州大学農学部農場報告. 7, pp.1-72, 1994-03-25. University Farm, Kyushu University  
バージョン：  
権利関係：

## SUMMARY

Anthocyanins in the skin of a large number of grape cultivars and the inheritance of anthocyanin composition in  $F_1$  hybrids were studied. Relationship between fruit color and anthocyanin, as well as the effect of environmental conditions on anthocyanin synthesis were also investigated.

### 1. Anthocyanin composition in grape skin.

The anthocyanin compositions of *Vitis vinifera*, *V. vinifera* × *labrusca* and tetraploid grapes bred in Japan were investigated. Based on anthocyanin composition, cultivars were classified into five types as follows ;

I . Cy types ; Those having mostly cyanidin.

II . Pn+Cy types ; Peonidin (more than 50%)+Cyanidin, having low 5' hydroxyl groups.

III . D1+Cy types ; Delphinidin (more than 50%)+Cyanidin, having low methylated anthocyanin.

IV . Cy+Pn+D1+Pt type ; Those having hydroxyl and methylated anthocyanin, except malvidin.

V . Mv type ; Those having mostly malvidin.

*V. vinifera* cultivars had the anthocyanin composition of type I, II or V. In *V. vinifera* × *labrusca*, all anthocyanin types were observed. The anthocyanin types of tetraploid grape cultivars bred in Japan were similar to those of *V. vinifera* cultivars.

### 2. Relationship between fruit color and anthocyanin in grape skins.

Anthocyanin content had effects on the lightness ( $L^*$ ) and chroma ( $C^*$ ) of grape skin. The content of anthocyanin (A) and skin lightness ( $L^*=35.8-6.19 \text{ Log A}$ ) were correlated. Relationship between anthocyanin composition and hue angle ( $H^*$ ) was also recognized. Type I and II groups had high hue angles. Type V group had mostly a low hue angle. Diglucoside ratio was not effective on hue angle. Acylated anthocyanin had a slight blue effect on grape color.

### 3. Evolution of anthocyanins in grape skins during ripening.

In 'Royal', 'Russki Concord' and 'Schuyler' grapes, anthocyanin composition was slightly changed during ripening. However, the anthocyanin composition of 'Queen' showed evolution. Major anthocyanin, malvidin glucoside, was appeared in the early period of ripening. Because the end product as malvidin glucoside was appeared soon, the biosynthesis of anthocyanin was rapidly proceeded to last step at an early stage of fruit color development.

#### 4. Anthocyanin composition in grape skin infected by virus.

The anthocyanin compositions of 'Kaiji', 'Koushu', 'Sekirei' and 'Kyoho', infected by virus were investigated. Some cultivars, infected by virus, showed a reduction in anthocyanin content but its composition was stable.

#### 5. Effects of temperatures during ripening on anthocyanin composition in grape skins.

Grape cultivar 'Delaware', 'Isabella' and 'Muscat Bailey A' were grown in pots in phytotrons under 15, 20, 25 and 30°C. High temperature condition greatly reduced the coloration of 'Isabella'. Under 15°C condition, the biosynthesis of anthocyanin B-ring of 'Muscat Bailey A' was not fulfilled. The anthocyanin compositions of these three cultivars were not affected by high temperature.

#### 6. Effects of light conditions around cluster on anthocyanin composition in grape skin.

Under dark treatment, 'Flame Tokay', 'Benizuiho' or 'Suffork red' were not colored. The coloration of 'Queen', 'Royal', 'Steuben' and 'Ryuhō' were slightly reduced by dark treatment. Cutting off red, blue or ultra violet ray reduced the coloration of 'Flame Tokay'. Under dark treatment, the biosynthesis of anthocyanin B-ring was reduced.

#### 7. Variation of anthocyanin composition in the fruit skin of F<sub>1</sub> hybrids.

In order to know the heritability of B-ring modification of anthocyanins in grape skin, anthocyanin compositions in F<sub>1</sub> generation of grape cultivars were investigated. 'Muscat of Alexandria', which has green fruit color, had a latent ability of methylation for B-ring of anthocyanin. 'Italia' was seemed to suit as a parent for breeding red grape cultivars, because of its low heritability of hydroxylation ability. The heritability of methylation ability in 'Mills' was lower than in 'Rizamat' or 'Muscat Hamburg'. The amount of methylated anthocyanin in 'Muscat Hamburg' was almost the same as 'Queen', but the former cultivar seemed to have a higher heritability of methylation ability. 'Muscat Hamburg' had a low heritability of hydroxylation for B-ring of anthocyanin. 'Schuyler' showed a high heritability of hydroxylation.