

Tissue Specific Accumulation of Anthocyanins in Teinturier Grape (Kolor)

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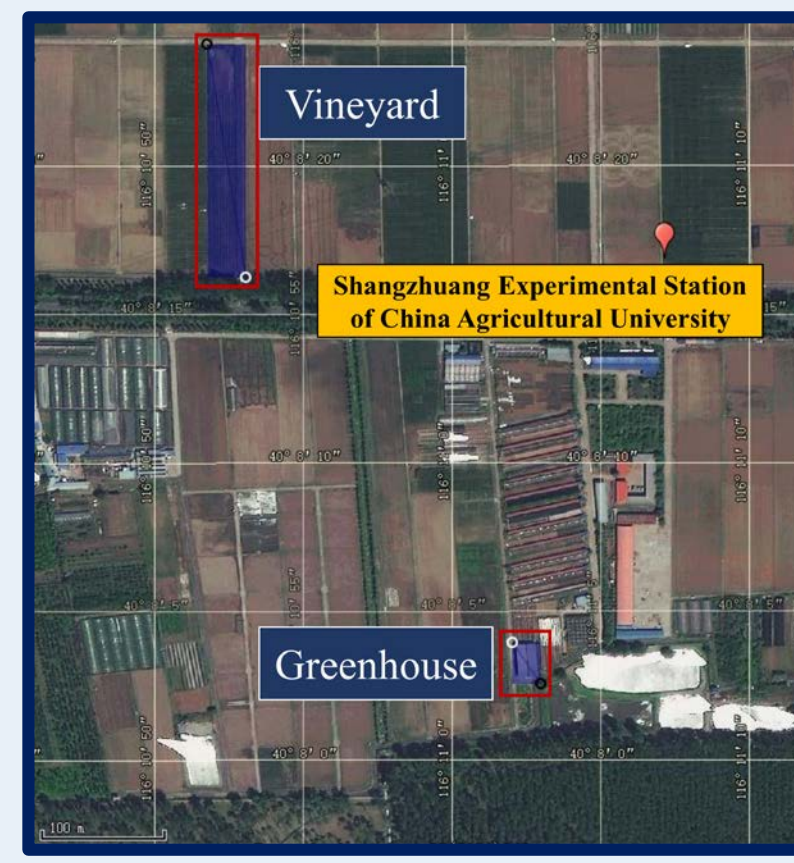
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Introduction

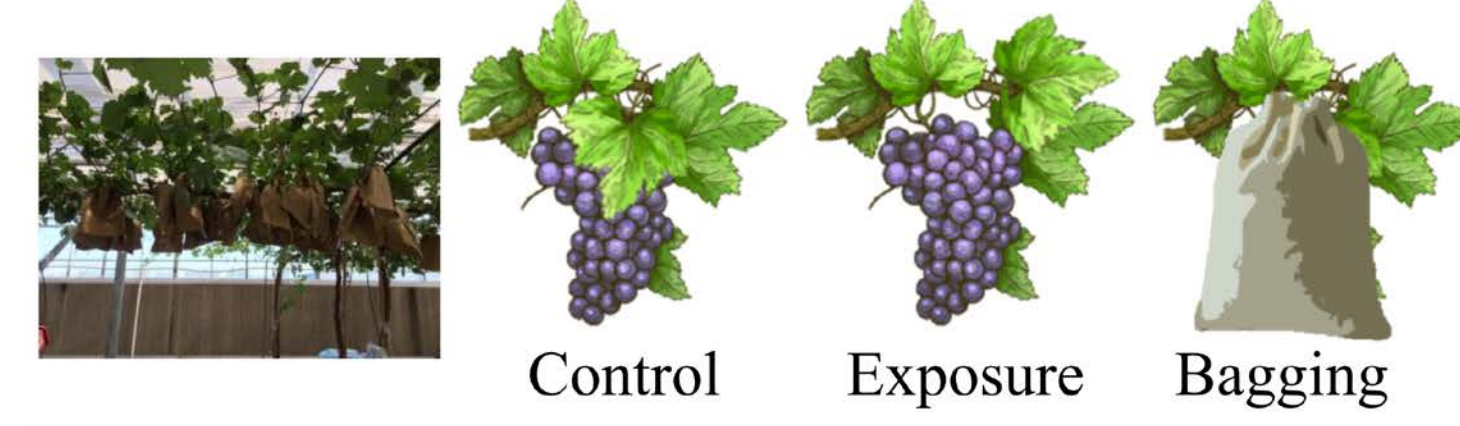
Anthocyanins are water-soluble pigments, which are substantial secondary metabolites biosynthesized in flavonoid pathway. Anthocyanins usually accumulate in the grape skins and are responsible for skin changing from green to red or purple. Anthocyanins could be regulated by light during development. Kolor (*Vitis vinifera* L. cv.) is a teinturier grape cultivar which accumulates anthocyanins in skins and pulps. The aims of the present work were to determine the distribution of anthocyanins in the skin and pulp of Kolor berries, and to identify the light-response patterns of individual anthocyanins. Besides, through RNA-seq analysis, we identified the key genes both controlling tissue-specific accumulation of anthocyanins and being regulated by light.

Materials

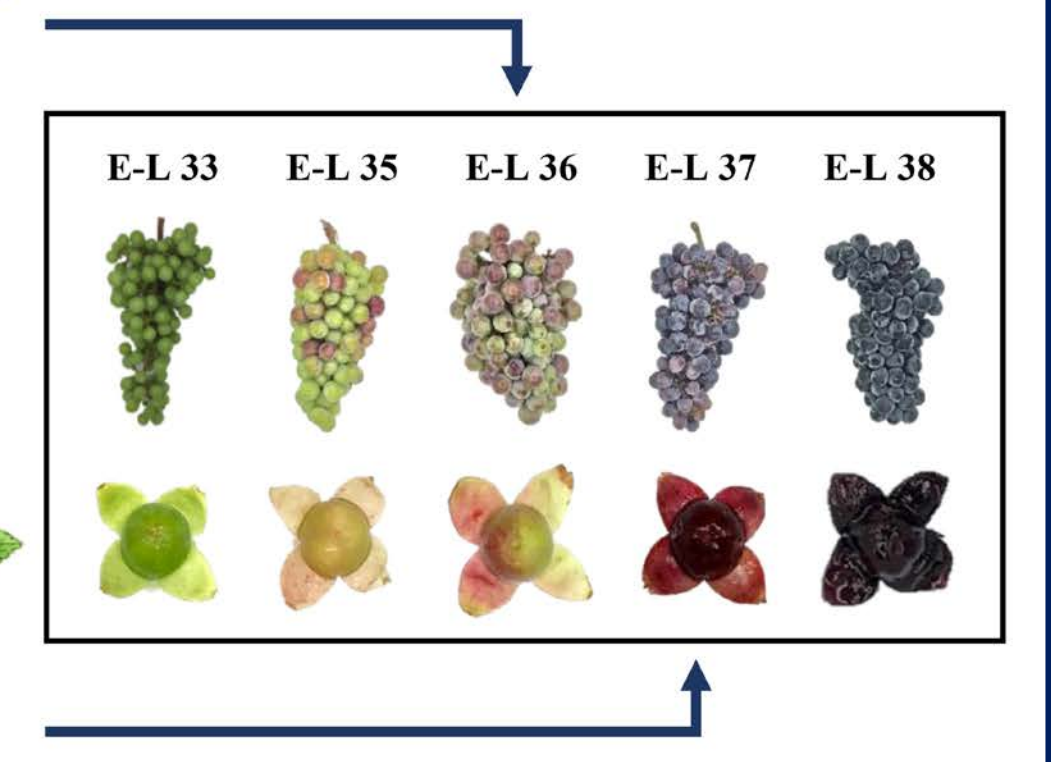
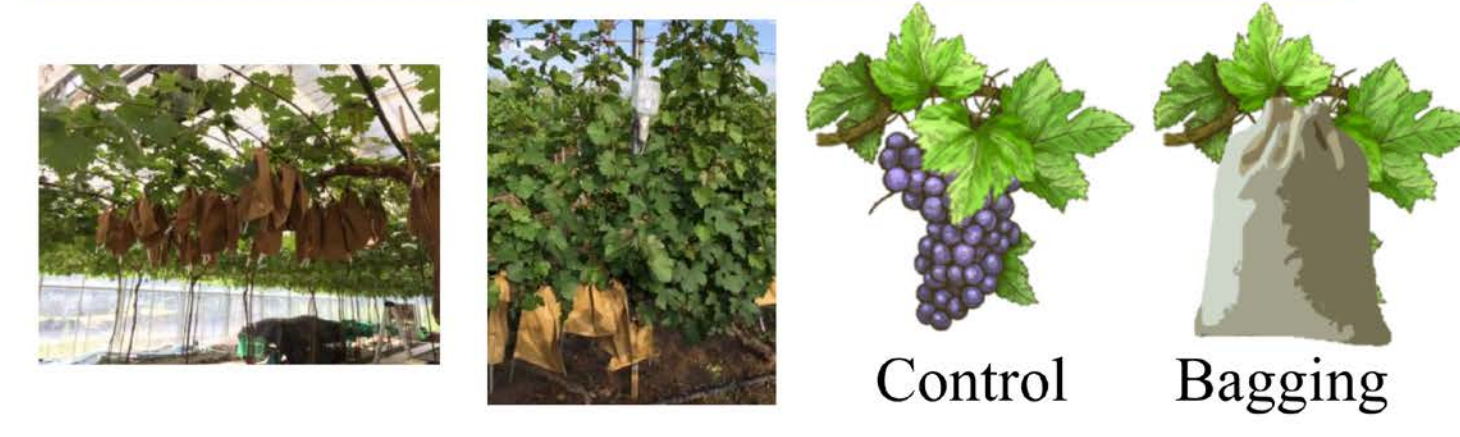
- Kolor
- Beijing, China
- 40°14' N, 116°19' E



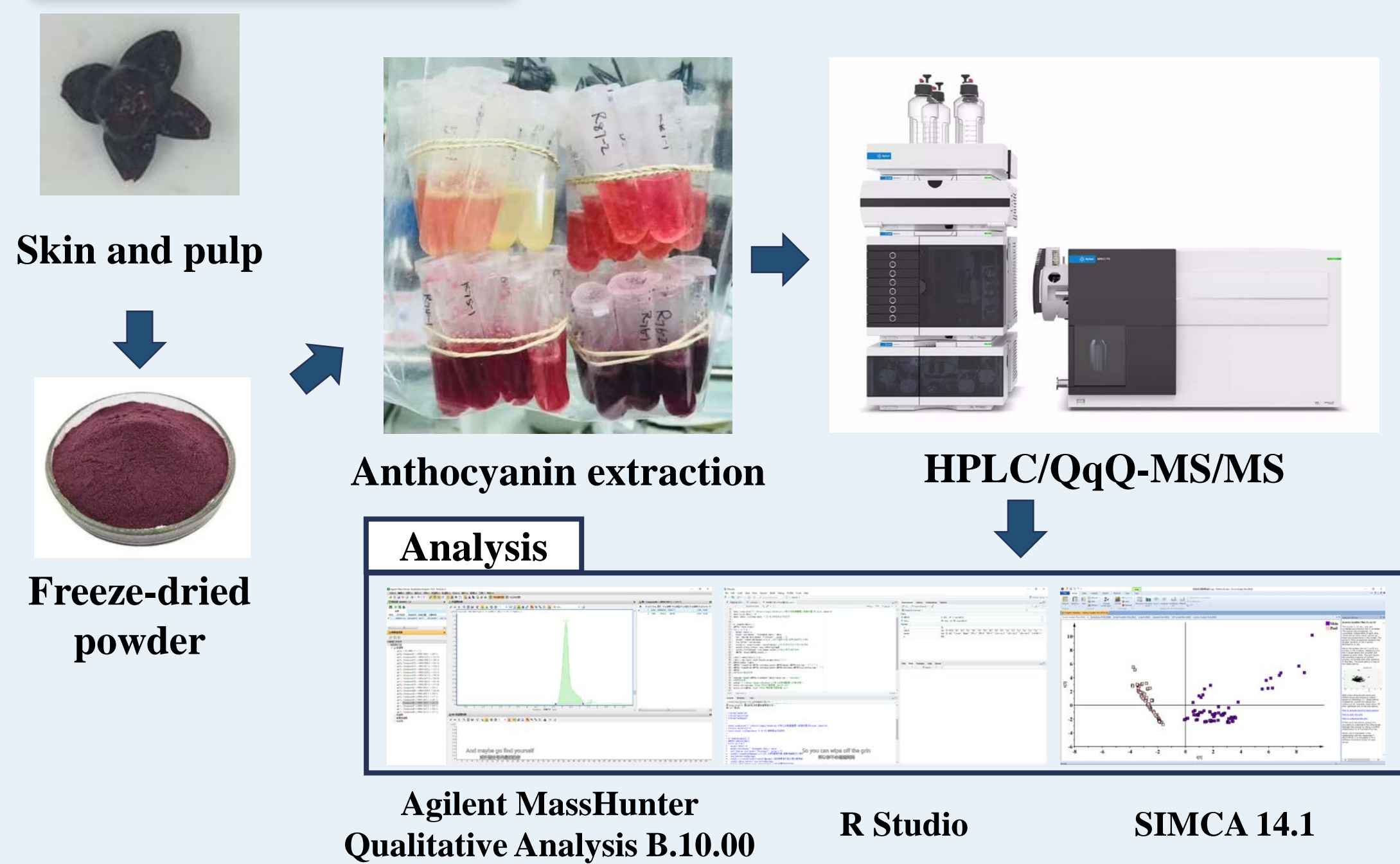
Greenhouse (2017)



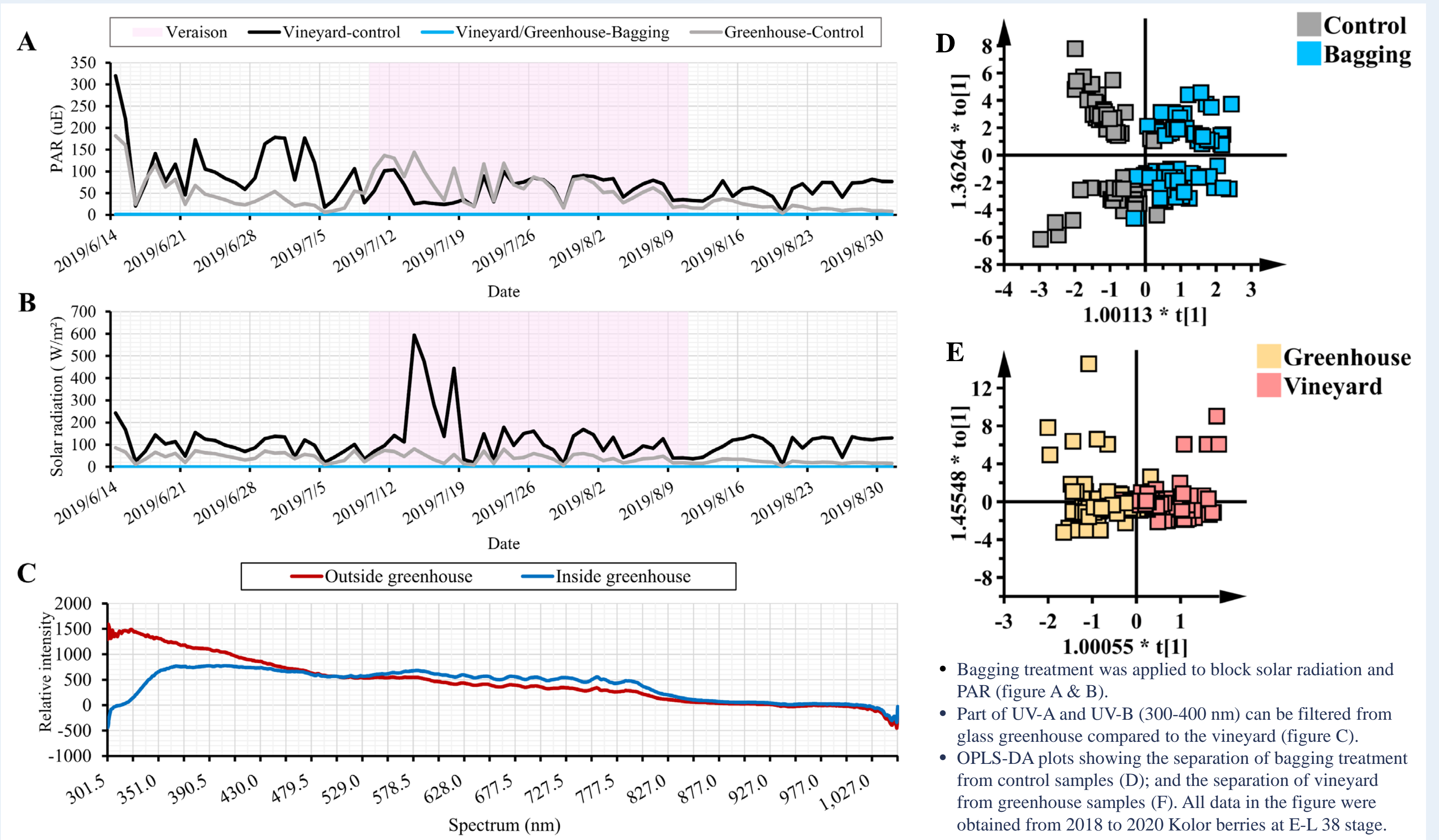
Greenhouse & Vineyard (2018-2020)



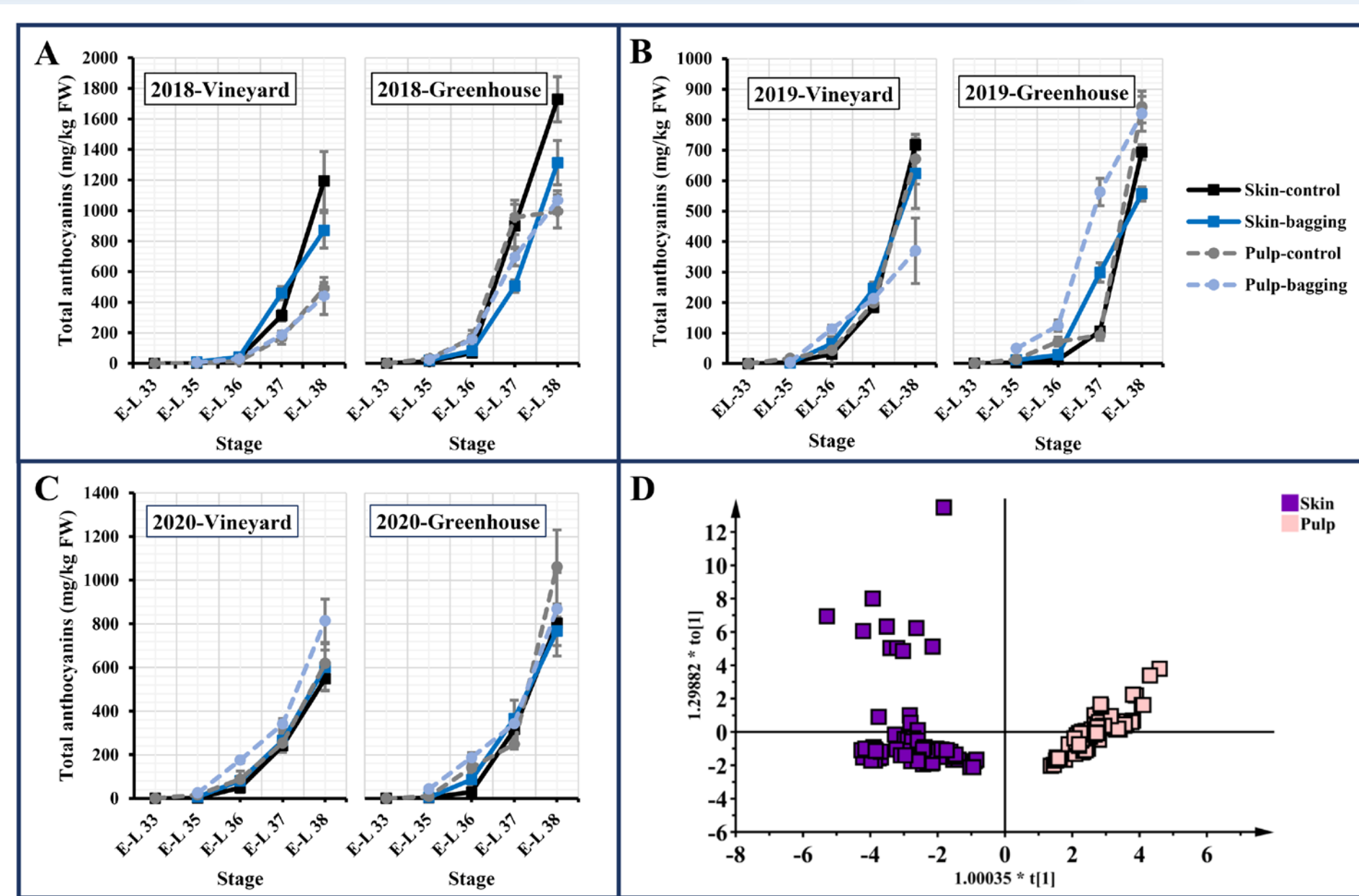
Methods



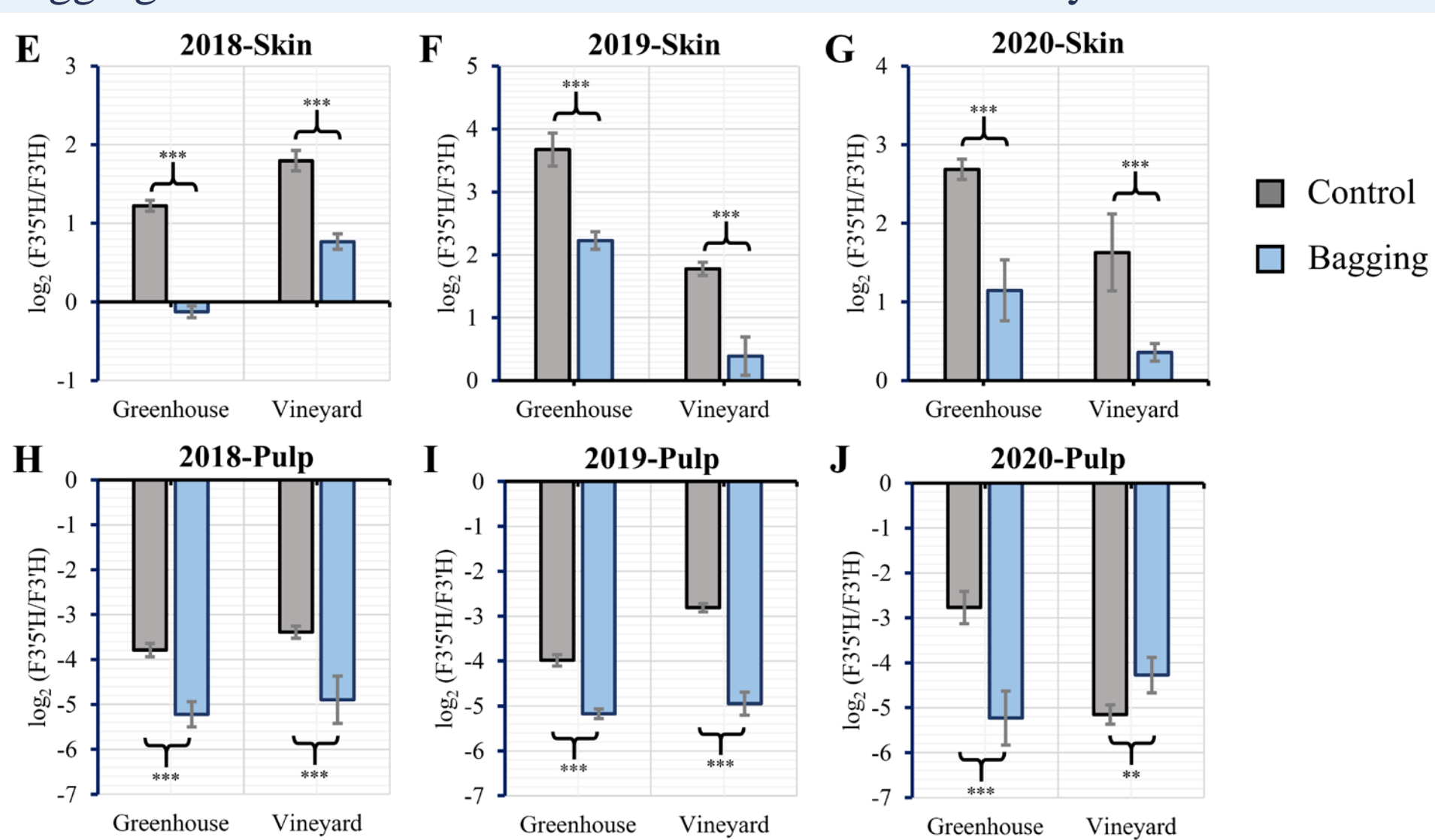
Influence of Light Treatments



Accumulation of Anthocyanins

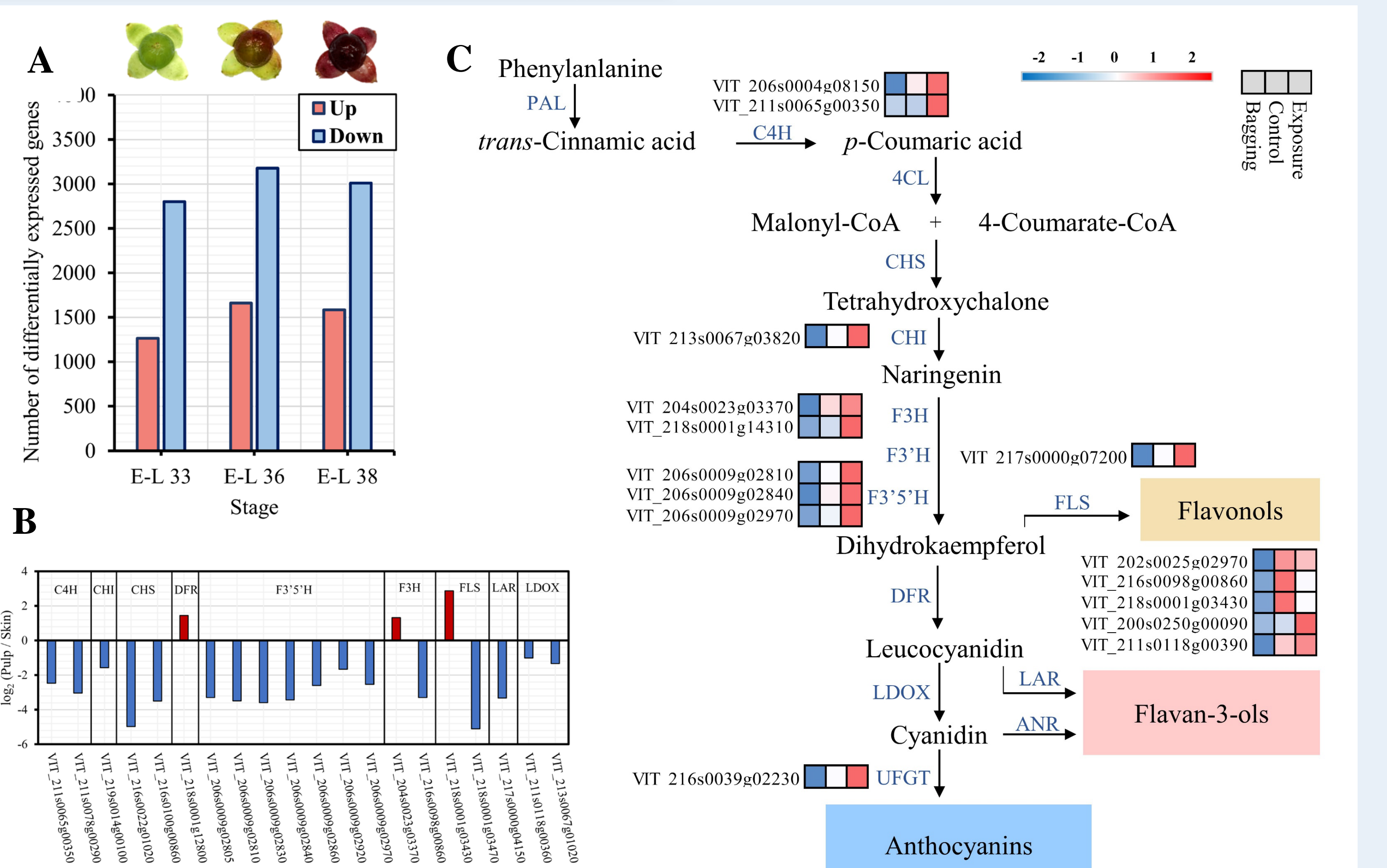


- The concentrations and proportions of anthocyanins have tissue specificity in Kolor berries.
- Bagging treatment decreased the total content of anthocyanins in skins.



- In control berries, the ratio of 3',5'-substituted/3'-substituted anthocyanins in skins was higher than 2, but it was lower than 0.2 in the pulp.
- Bagging treatment decreased the ratios of 3',5'-substituted anthocyanins in skins and pulps.

Key DEGs with Tissue Specificity



- 4595 genes were differentially expressed between skins and pulps in Kolor berries at E-L 37 (pre-harvest).
- Seven *F3'5'H* genes were screened with tissue specificity, and they had much higher expressions in the skins than those in the pulps.
- Three *F3'5'H* genes (VIT_206S0009G02810, VIT_206S0009G02970 and VIT_206S0009G02970) were up-regulated in skin after exposure treatments, and were down-regulated by bagging.

Conclusions

- Anthocyanins were asymmetrically distributed in the skins and pulps of Kolor berries.
- Sunlight exclusion treatments affected the biosynthesis of anthocyanins in Kolor berries and regulated the key genes of flavonoid biosynthesis pathway, such as *F3'5'Hs*.
- Overall, the study provides novel insights for further understanding tissue-specific accumulation of anthocyanins, and diverse responses to light in teinturier grapes.

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Reference:

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