



Applying distal leaf removal to face global warming and advanced phenological stages of grapevines in a semi-aird climate



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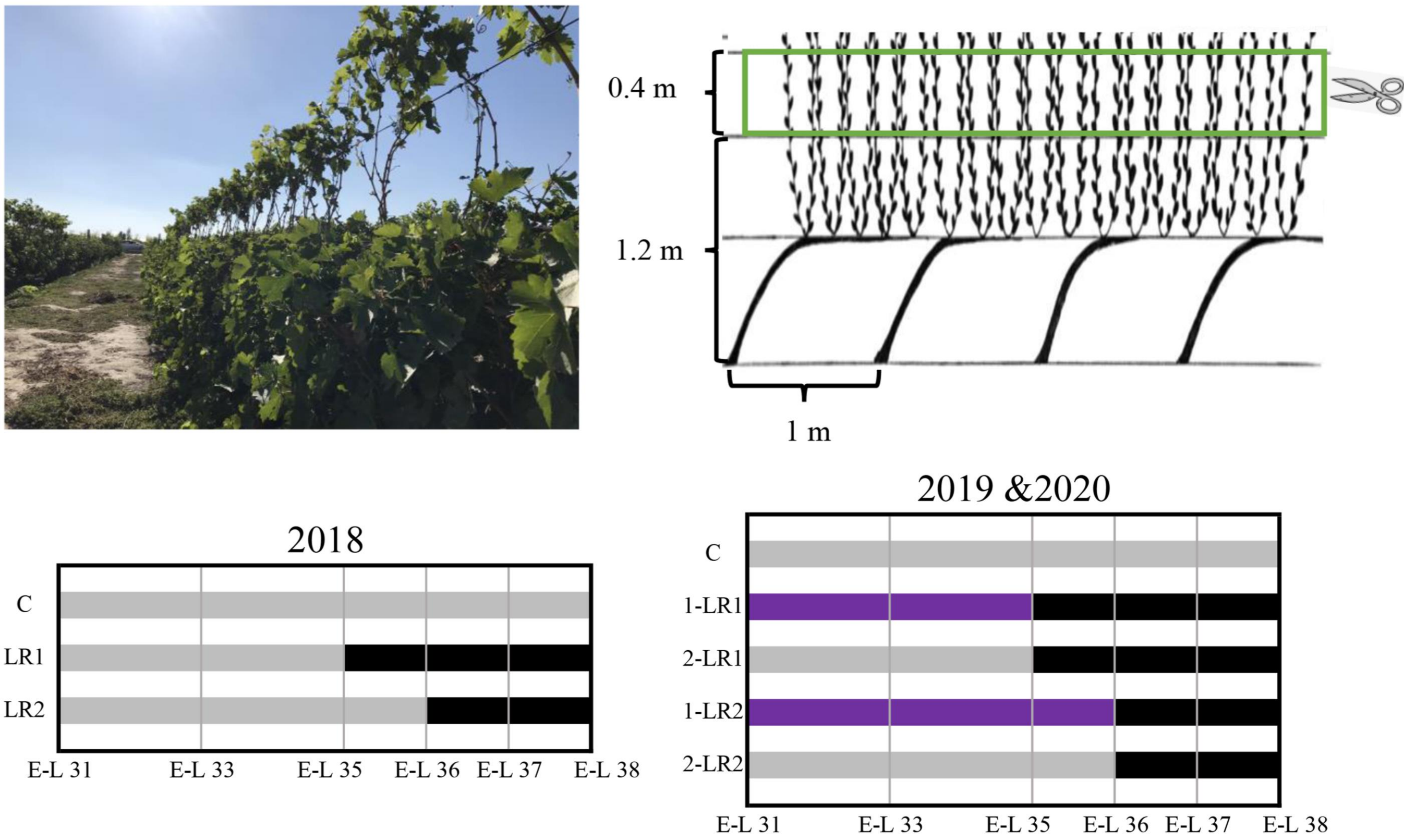
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BACKGROUND

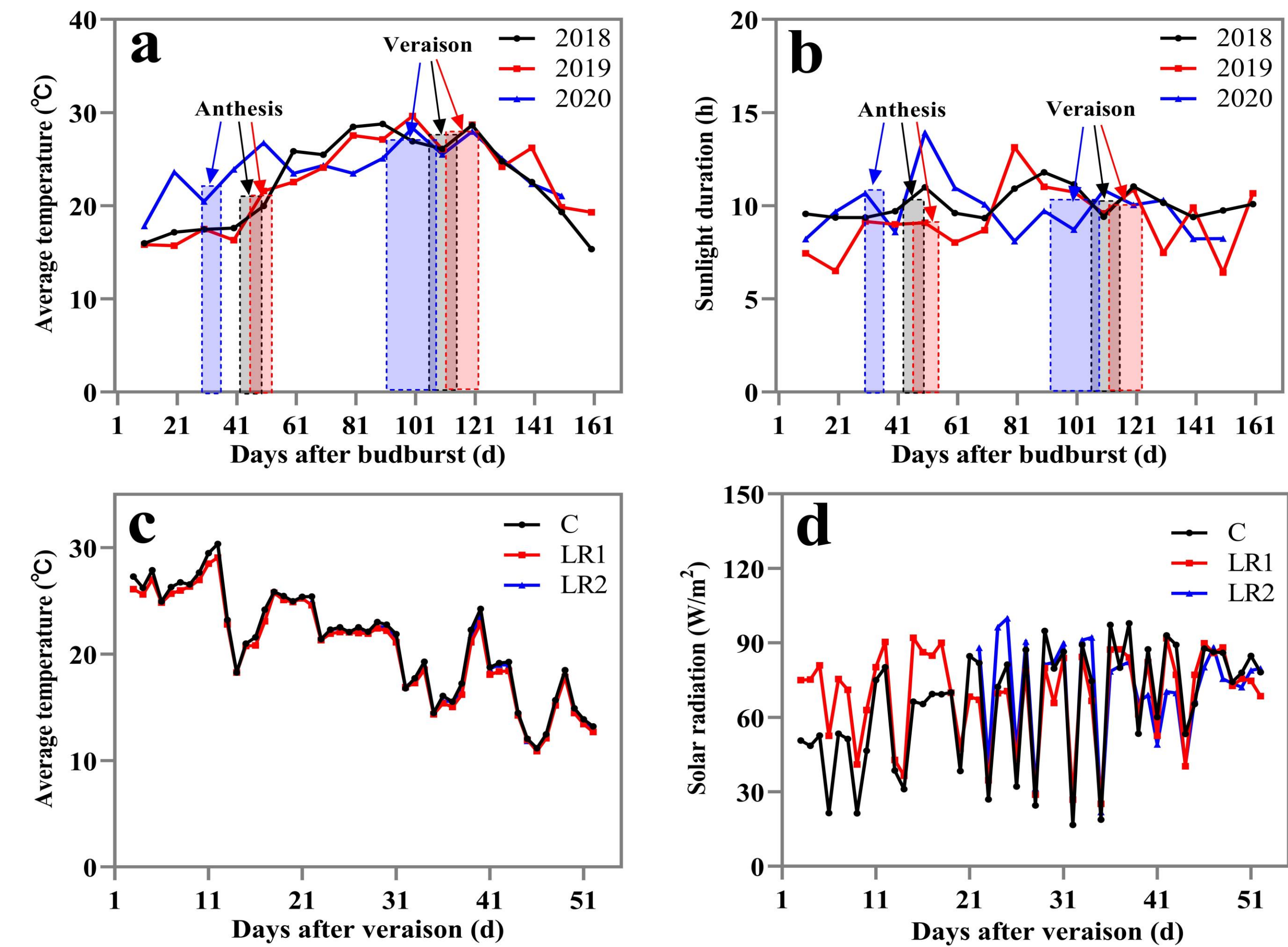
The heterogeneity of the vineyard environment caused high variability in grape metabolites and flavor profiles, and the phenomenon was more prominent in recent years of climate change. The north foot of Mt. Tianshan located in Xinjiang province is a major wine region in China. The strong light and large diurnal temperature differences of this region usually cause rapid sugar accumulation during ripening. When grapes reached commercial maturity, a challenge for wineries is to harvest grapes within a short period to maintain uniform maturity given winery equipment restrictions. Herein, distal leaf removal was applied in the semi-arid Xinjiang to adjust the source to sink ratio of grapevines for three consecutive years (2018-2020).

MATERIALS AND EXPERIMENTAL DESIGN



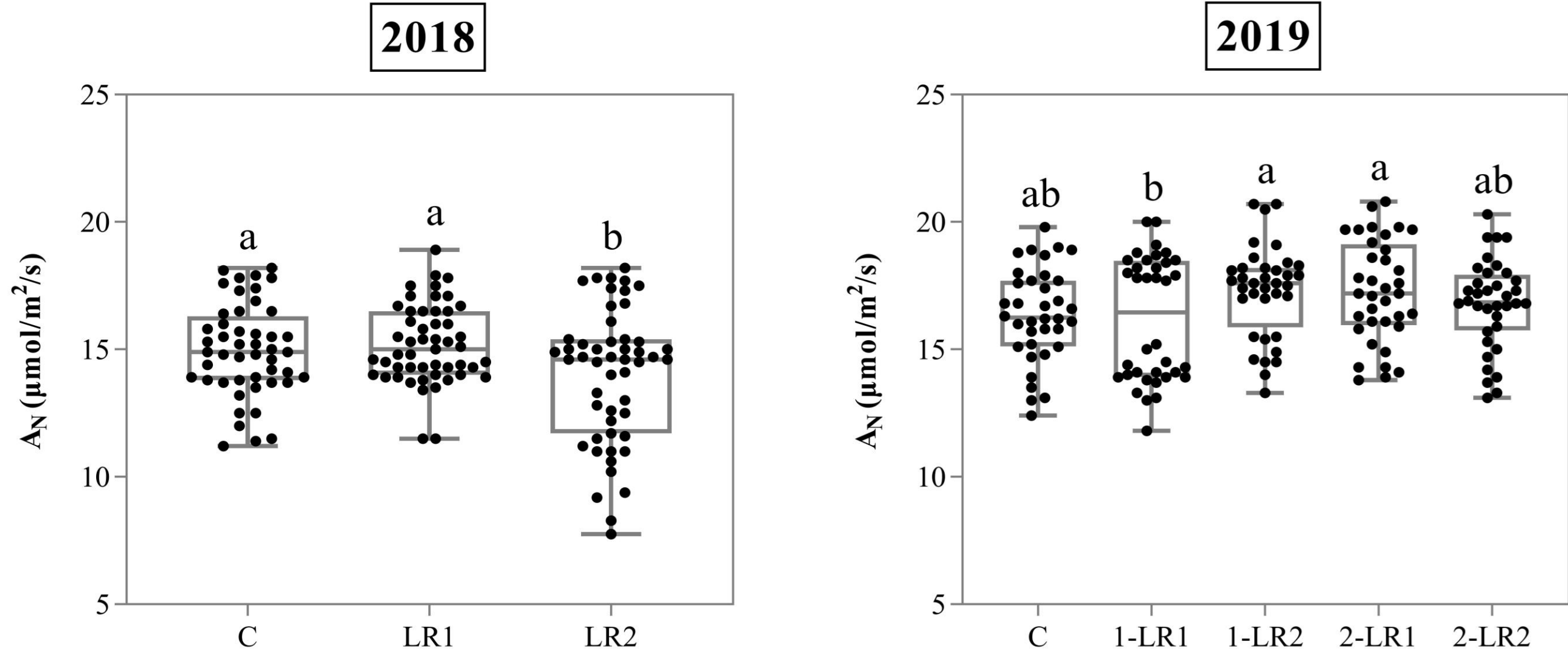
The upper canopy leaves between the second and third wire (1.2 m to 1.6 m) were manually removed at the beginning of véraison and post-véraison. Besides the repeated experiments among vintages, carry-over effect was also evaluated.

RESULTS: Microclimate



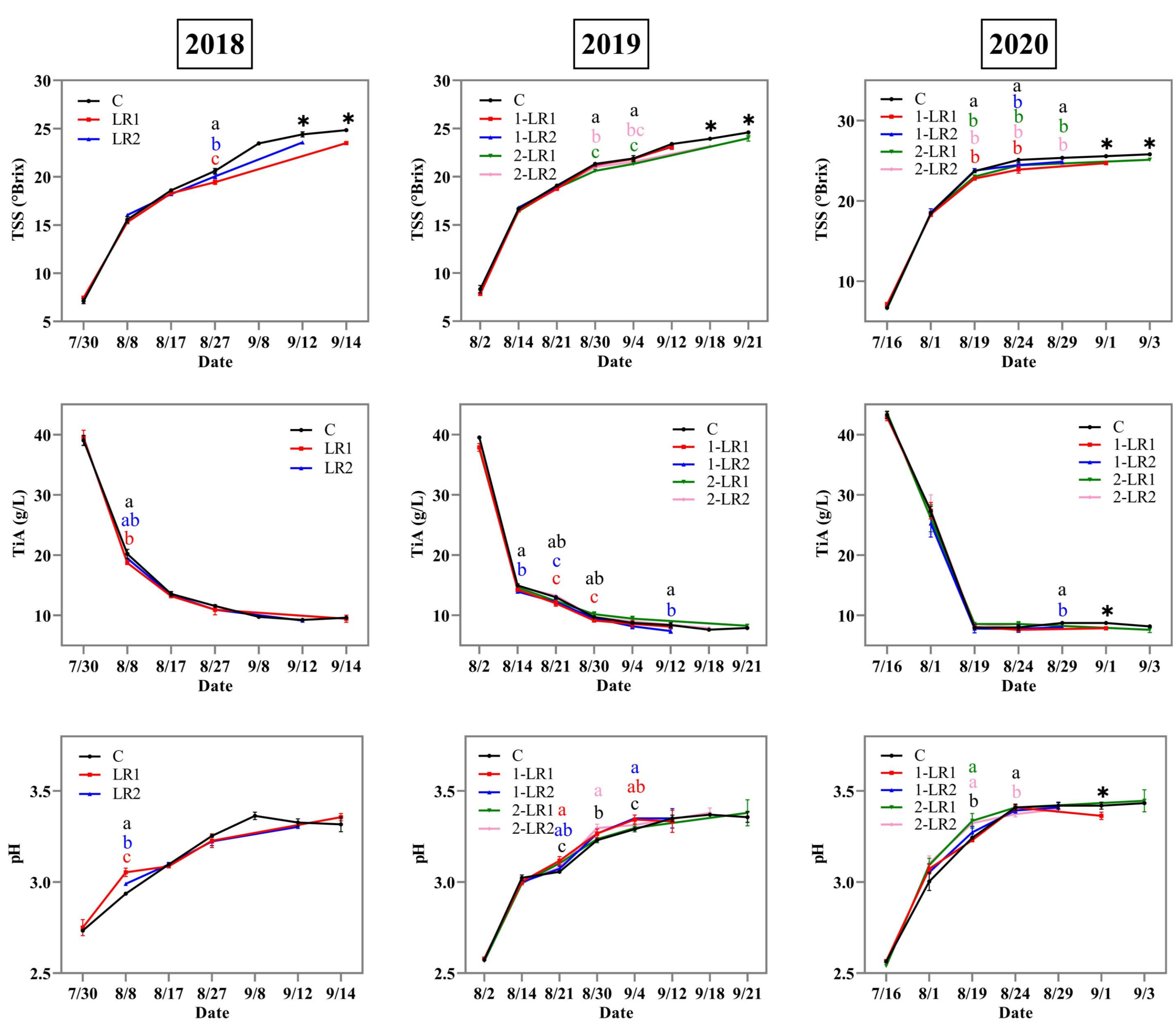
LR had little influence on temperature while increasing the solar radiation around clusters.

RESULTS: Photosynthesis capability



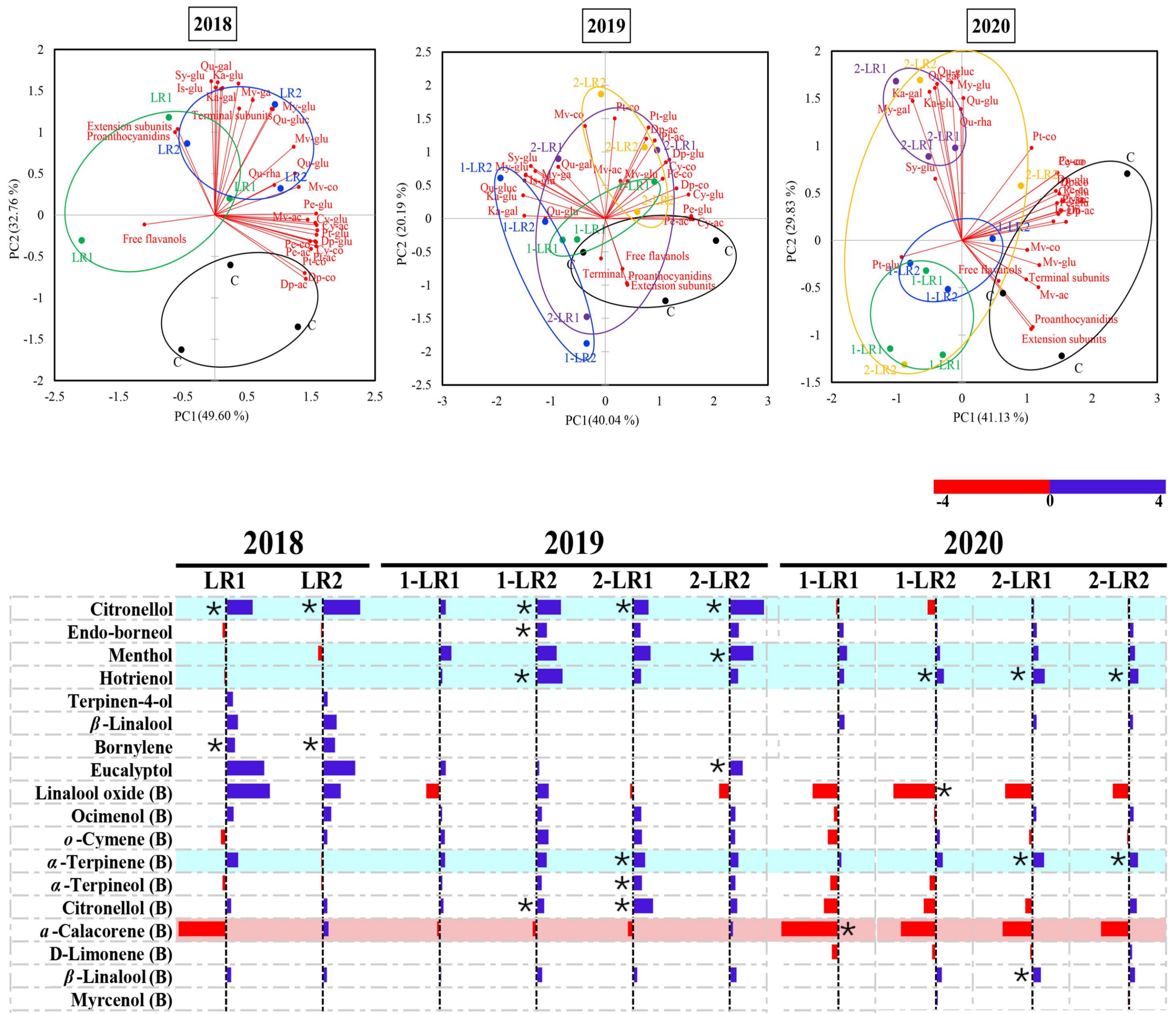
The leaf removal treated vines did not show photosynthetic compensation in fully expanded 6-8 node leaves.

RESULTS: Grape physiochemical parameters



Distal leaf removal significantly inhibited grape TSS accumulation without affecting the titratable acidity and pH.

RESULTS: Secondary metabolites



Distal leaf removal significantly increased flavonols concentrations in grapes while had limited influence on anthocyanins and flavanols. Distal leaf removal was beneficial for accumulating C6 alcohols, terpenes, and the free form of (Z)-β-damascenone in grapes.

CONCLUSION

Limiting source was helpful to inhibit sugar accumulation and reduce the decoupling of technique maturity and phenolic maturity to some extent. Distal leaf removal was found to be beneficial for the accumulation of C6 alcohols, terpenes and norisoprenoids in grapes due to the moderate exposure of clusters and more balanced source-sink vines caused by LR treatment. The carry-over effect did not show in LR wines which indicated that LR in consecutive years in the same vines was practical for viticulture to face global warming and delay ripening.

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