

Duration of light intervals changes antioxidant response of industrial hemp

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INTRODUCTION

Industrial hemp (*Cannabis sativa* L. subsp. *sativa*) is one of the oldest cultivated plants used for many purposes throughout centuries. It has been valued for its nutritional and medicinal properties [1,2].

Hemp is a fast-growing, short-day, annual plant, characterized by high biomass yields and low demands for cultivation. The plant can endure great changes in daylight intensity and length. However, prolonged exposure to light can promote oxidative damage and in order to endure this stress plants must modify their antioxidative responses [2,3].



METHODS

Hemp seeds of two hemp cultivars (USO and Finola) were planted in a mixture of commercial substrate and perlite (70:30), after germination in water for 48 h. Cultivars were grown violet light ($\sim 250 \mu\text{mol m}^{-2} \text{s}^{-1}$, $20 \pm 2^\circ\text{C}$) at different light/dark intervals (16/8, 20/4 and 24/0) for approximately one month. To determine antioxidative potential, ferric reducing antioxidant power (FRAP) [4] and scavenging effect on the 1,1-diphenyl-2-picrylhydrazyl free radical (DPPH) assays were employed [5]. The content of total polyphenols was determined spectrophotometrically using Folin-Ciocalteu reagent [6].

RESULTS

DPPH

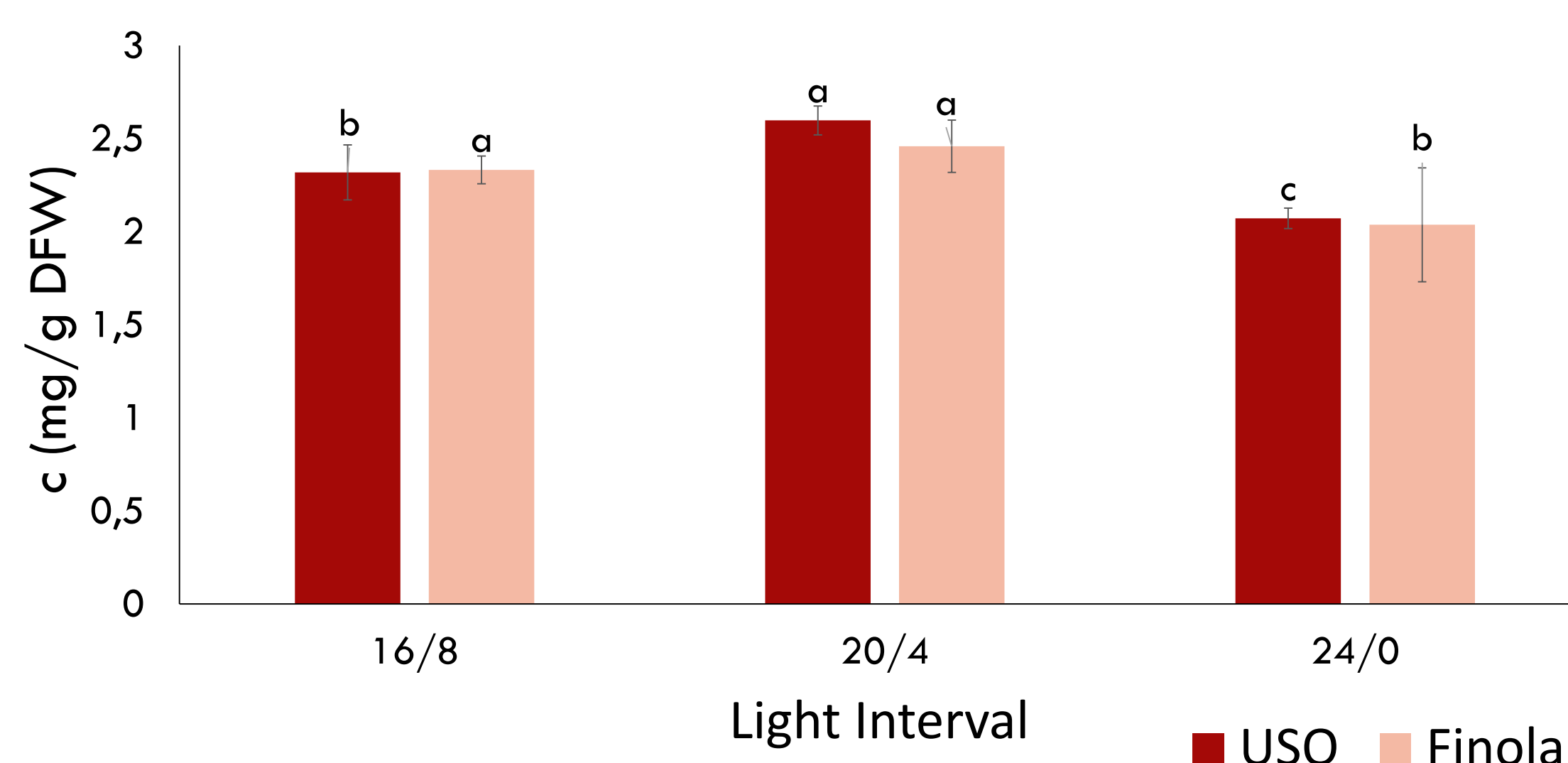


Figure 1. Highest DPPH values were observed at 20/4 light interval

FRAP

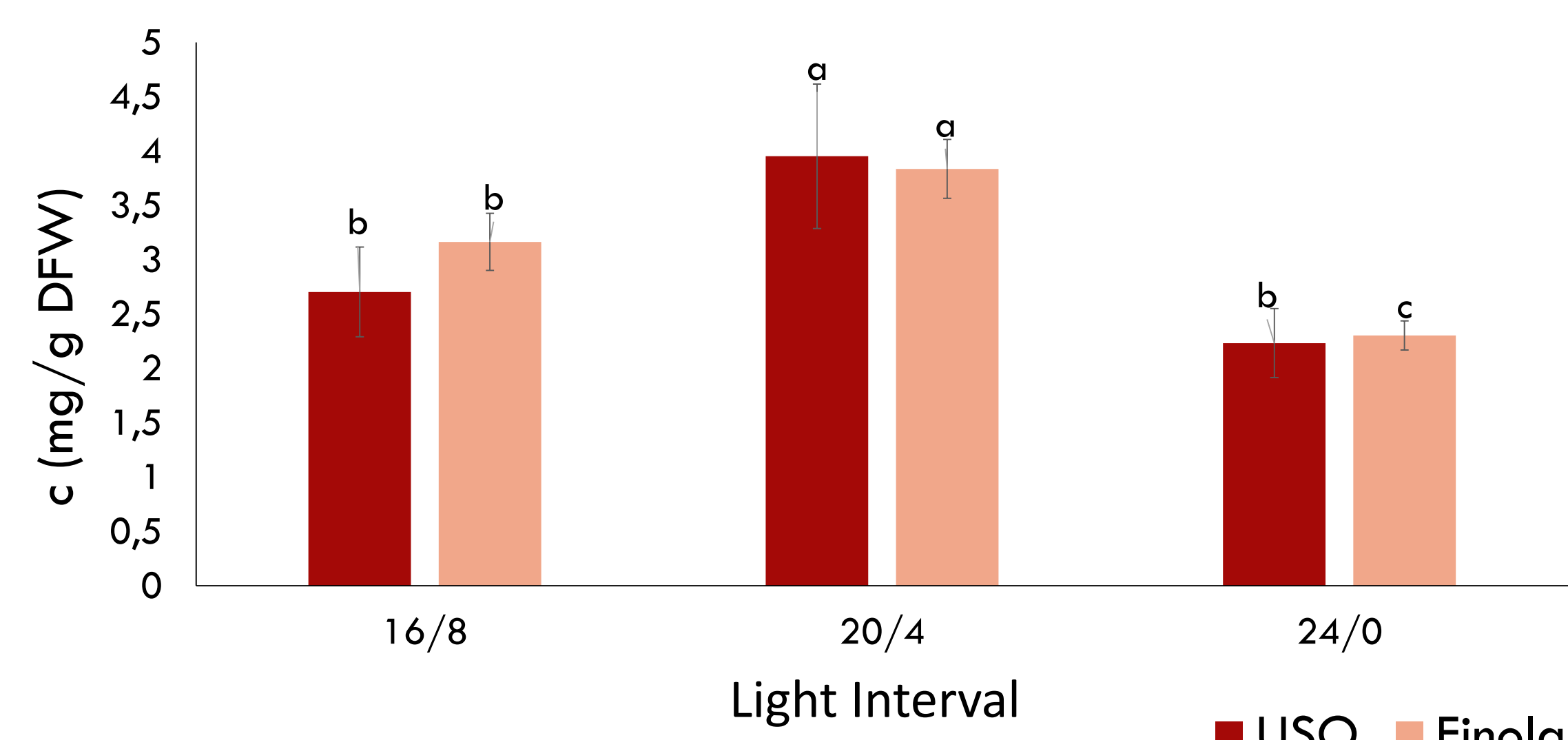


Figure 2. Both cultivars showed statistically significant higher FRAP values at 20/4 light interval

Total polyphenols

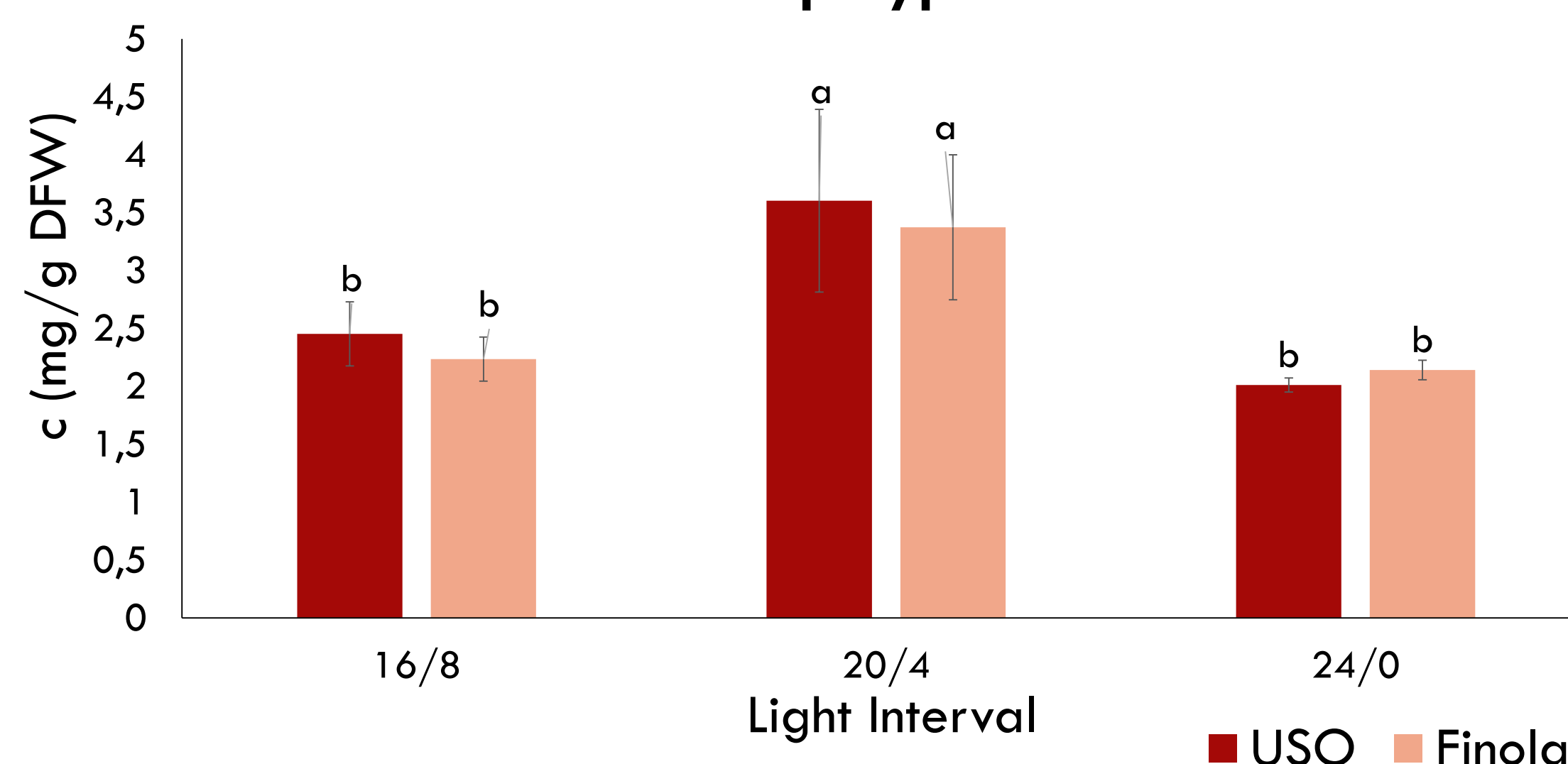


Figure 3. The content of total polyphenols showed statistically significant increase at 20/4 light interval in both cultivars

CONCLUSIONS

Highest FRAP values were observed at 20/4 in both cultivars. DPPH assay showed similar results as FRAP, except that no statistical difference was observed between 16/8 and 20/4 values for the Finola cultivar. The total phenolic content in both cultivars showed the highest values at 20/4 as well, correlating with other two methods and suggesting that phenolic compounds are likely to contribute to radical scavenging activity. All results indicate that 20/4 light interval causes the most stress in plants possibly inducing free radical formation and consequent increase in overall nonenzymatic antioxidant response in order to preserve important bioactive components.

REFERENCES

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