Antioxidant properties of radish microgreens grown at different LED lighting

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INTRODUCTION

Microgreens have recently become very popular food product. They are considered as "functional food" containing high content of bioactive components and antioxidants that can benefit human health[1]. Although they are easy to grow, the artificial lighting could significantly influence the antioxidant capacity and the content of phytochemical components[2]. This investigation aimed to determine the effect of two different artificial light sources on antioxidant properties of radish microgreens.

Figure 1. Radish (*Raphanus sativus* L.) cultivars: Sango (*a*), Daikon (*b*) and China rose (*c*) microgreens.

MATERIAL AND METHODS

The study was performed on three radish (*Raphanus sativus* L.) cultivars: China rose, Sango and Daikon. Radishes were grown in a growth chamber with artificial purple and white LED lighting (45 mmol $m^2 s^{-1}$, 24°C, photoperiod 16h/8h). Physiological status of 7-day old microgreens were determined by measuring total antioxidant capacity (DPPH and FRAP)[3], amount of total soluble phenols (PHE)[4], sugar[5] and proteins[6], as well as the concentrations of ascorbic acid (AA)[7], carotenoids, total chlorophylls[8] and anthocyanins (ANTH)[9].

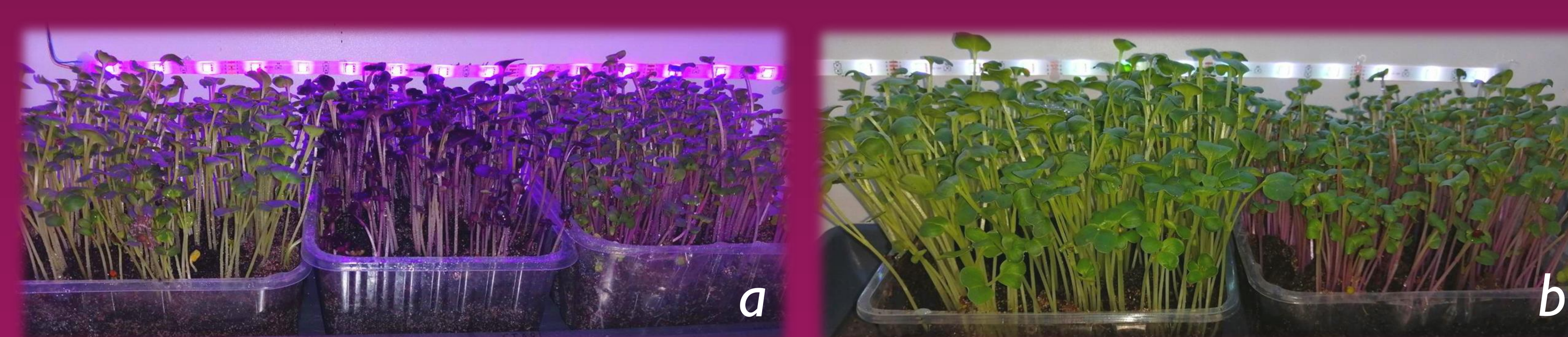

Figure 2. Radish (*Raphanus sativus* L.) microgreens grown under artificial purple (*a*) and white (*b*) LED lighting.

RESULTS

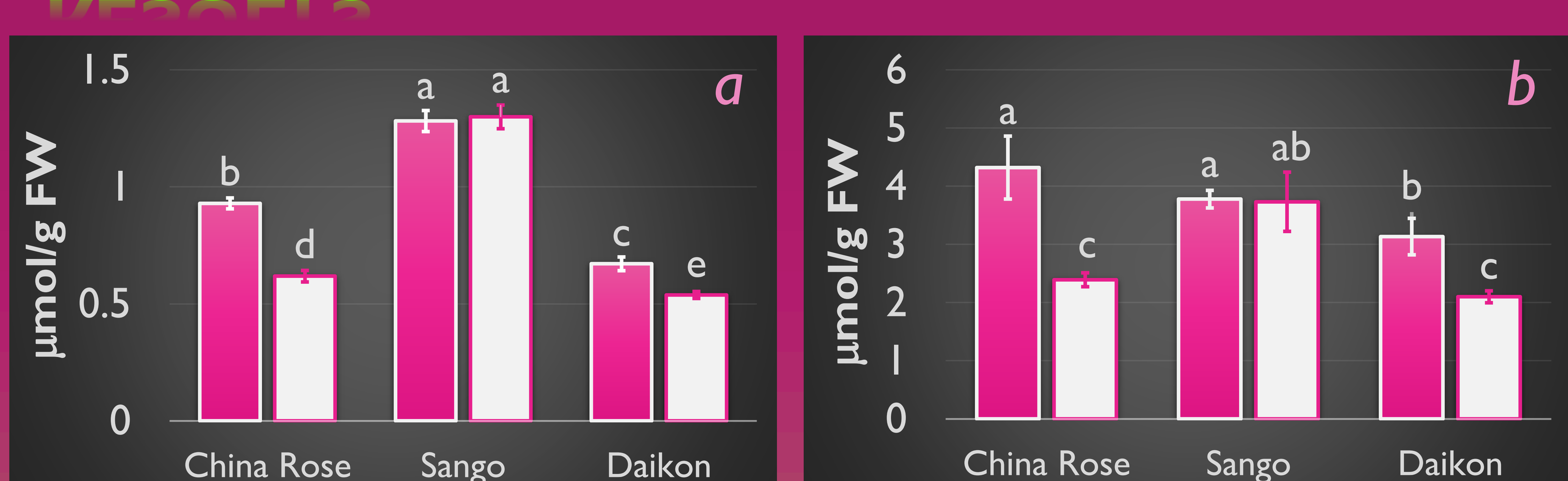

Figure 3. DPPH (*a*) and FRAP (*b*) methods were used to determine total antioxidant capacity in radish microgreens grown at purple and white LED lighting. Data are represented as means ± SD, different letters represents statistical difference at p<0,05 (ANOVA, LSD).

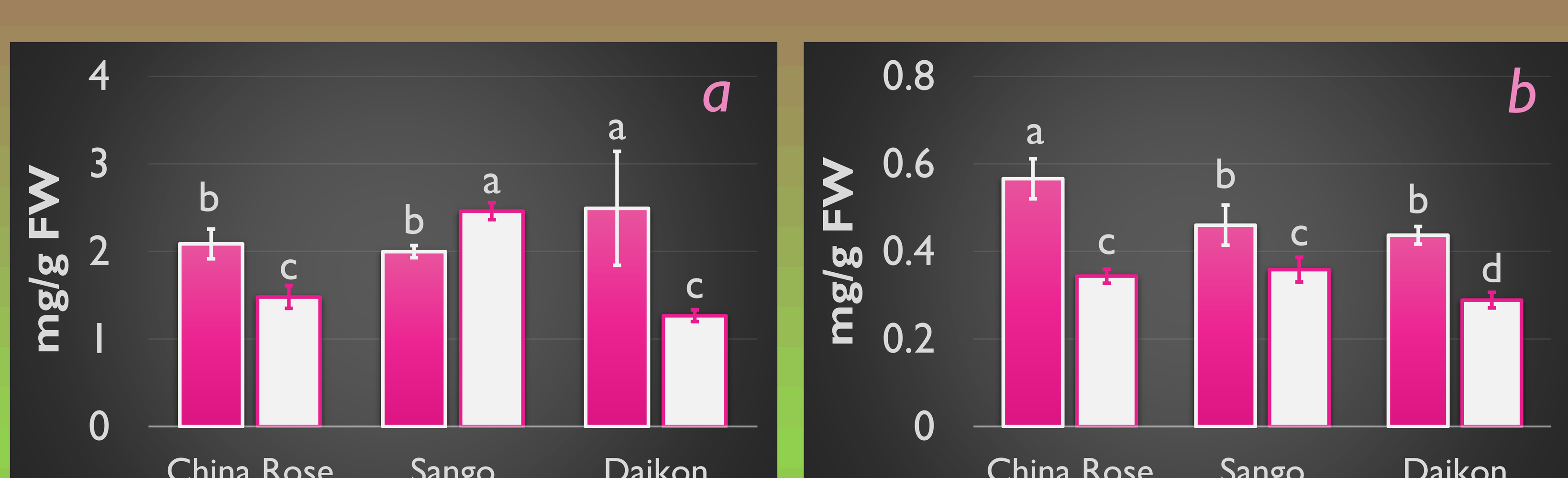

Figure 4. The content of total phenolics (*a*) and ascorbic acid (*b*) determined in radish microgreens grown at purple and white LED lighting. Data are represented as means ± SD, different letters represents statistical difference at p<0,05 (ANOVA, LSD).

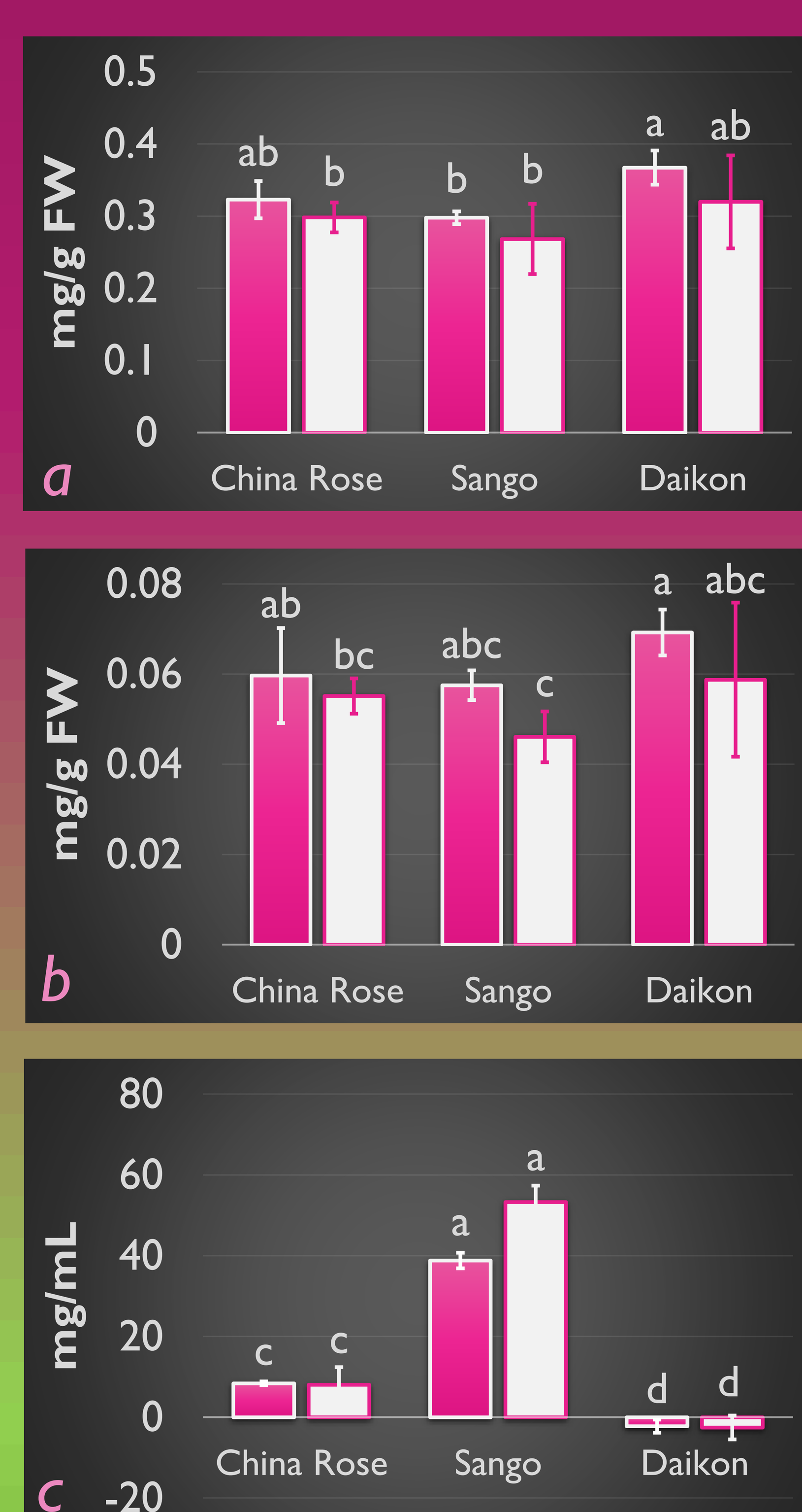

Figure 5. The total chlorophyll (*a*), carotenoids (*b*) and monomeric anthocyanin (*c*) concentrations wrere measured in radish microgreens grown at purple and white LED lighting. Data are represented as means ± SD, different letters represents statistical difference at p<0,05 (ANOVA, LSD).

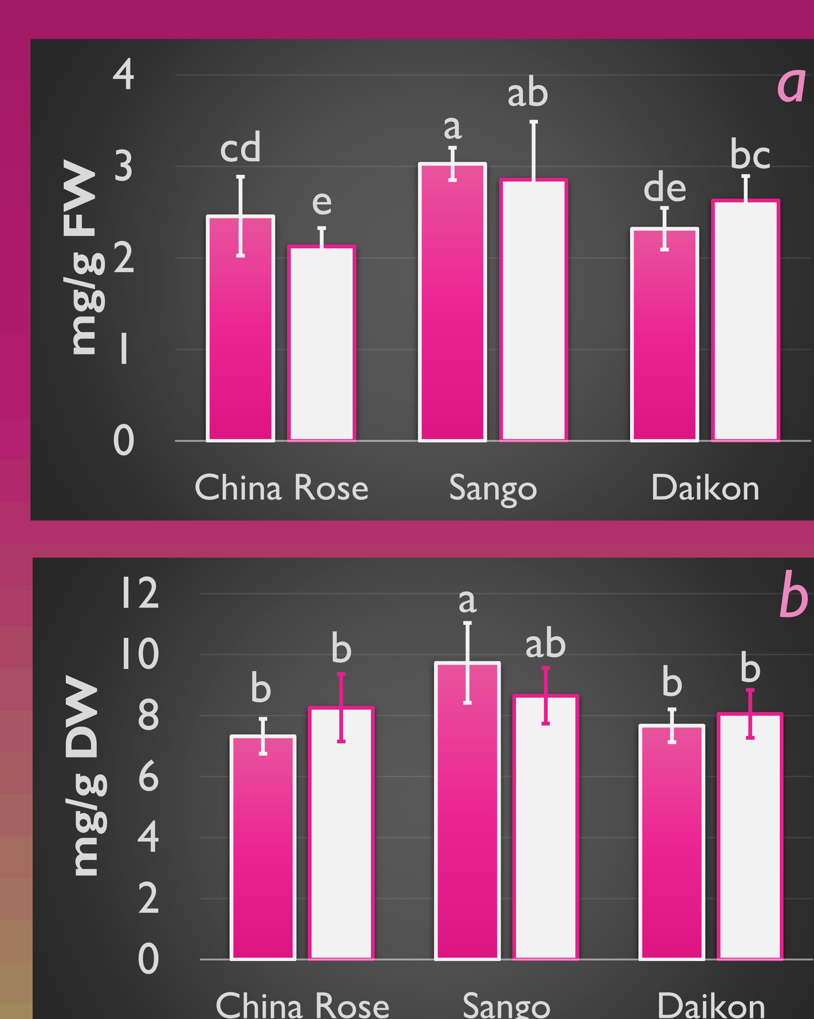

Figure 6. Total protein (*a*) and soluble sugars (*b*) concentration determined in radish microgreens grown at purple and white LED lighting. Data are represented as means ± SD, different letters represents statistical difference at p<0,05 (ANOVA, LSD).

CONCLUSION

Our results showed that white light provoked higher PHE and ANTH in Sango cultivar. However, purple light induced higher antioxidant capacity, PHE and AA in China rose and Daikon cultivars as well as higher AA and protein concentrations in all three cultivars. Therefore, purple LED lighting had more beneficial influence on antioxidant properties of radish microgreens compared to white LED lighting.

REFERENCES

[1]**Zhang** *et al.* Trends Food Sci Tech (**2020**) 99:203-216; [2]**Meas** *et al.* Sci Hortic (**2020**) 265:109204; [3]**Bibi Sadeer** *et al.* Antioxidants (**2020**) 9:709; [4]**Singleton** *et al.* Am J Enol Vitic (**1965**) 16:144-158; [5]**Foster** *et al.* J Vis Exp (**2010**) 37:e1745; [6]**Bradford** Anal Biochem (**1976**) 72:248-254; [7]**Benderitter** *et al.* Fundam Clin Pharmacol (**1998**) 12:510-516; [8]**Lichtenthaler** Meth Enzymol (**1987**) 148:350-382; [9]**Lee** *et al.* J AOAC Int (**2005**) 88:1269-1278