Comparative analysis of antioxidant activity in mustard grown under different lighting conditions

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- Antioxidant activity of leafy vegetables is an important aspect of its nutritional value. Light can be used as a natural factor to alter the antioxidant activity during harvest and prolong the shelf-life.
- It is important to understand how efficiently plants use the light they receive, that kind of knowledge may help to reduce energy costs and impact profitability, and productivity.
- Our aim was to determine if the spectral composition affects antioxidant activity of mustard microgreens at the same light intensity.

Growing conditions

Mustard microgreens (*Brassica juncea*) were grown in a peat substrate

in a (I) greenhouse natural light was supplemented with white light-emitting diodes (LEDs) lighting (16h)

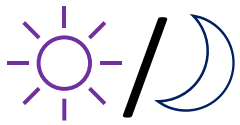
(II) in controlled-environment chamber under lighting consisted of $R_{61\%}$, $B_{20\%}$, $W_{15\%}$, and $FR_{4\%}$ spectral composition LED's.

20±3 °C temperature was maintained

total PPFD of 150, 200 and 250 µmol $m^{-2}s^{-1}$ was maintained in both treatments.

Samples

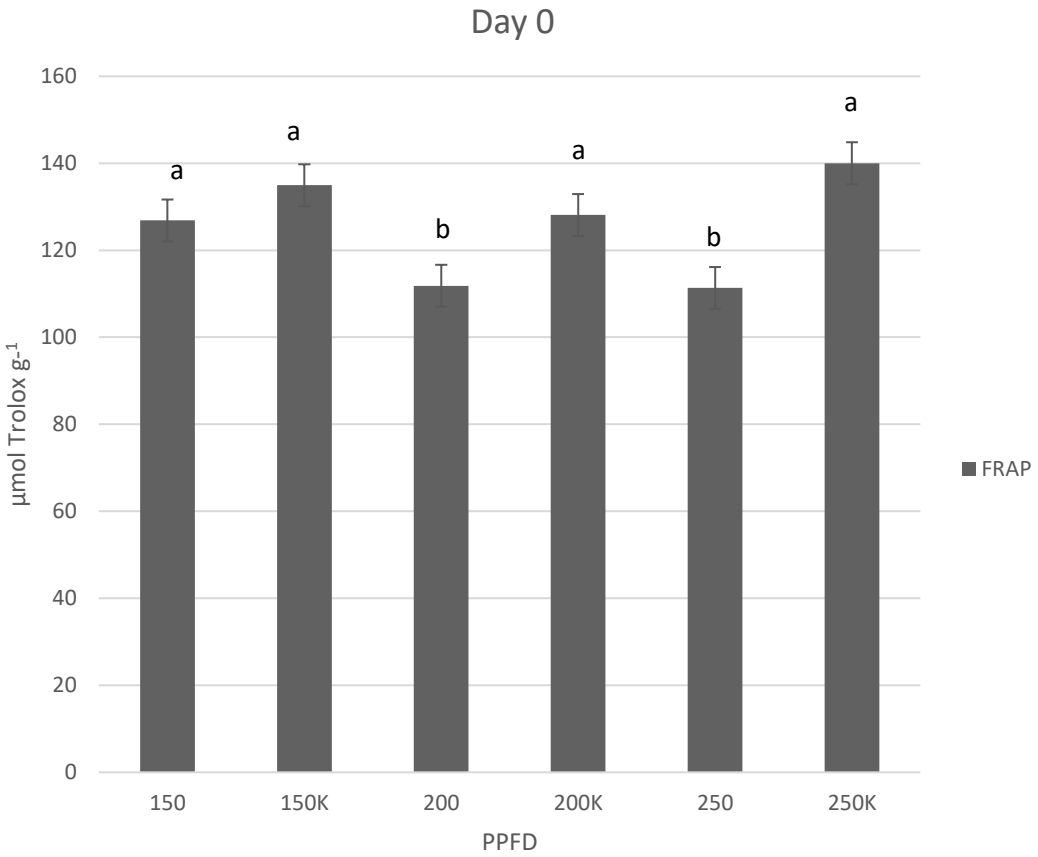
Samples were taken on a harvest day (D_0), one (D_1) and three (D_3) days after harvest



Samples taken after harvest were held in the light or dark at +4°C

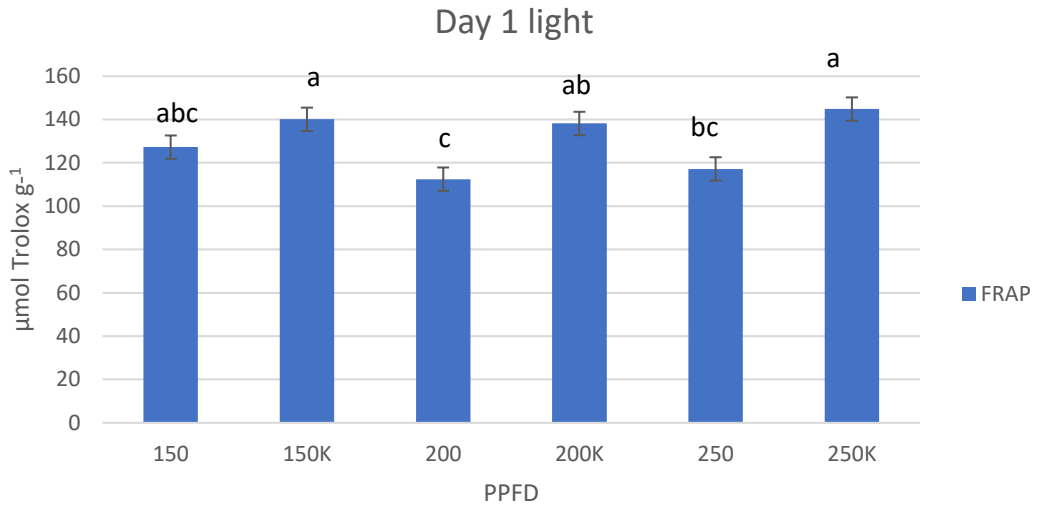
Results (1)

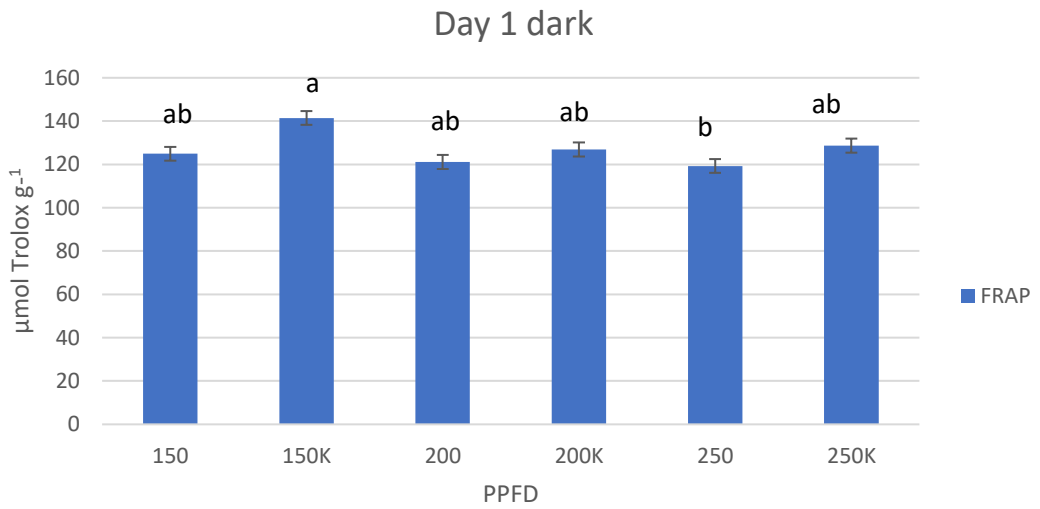
- On harvest day significantly the lowest antioxidant activity was found to be in plants grown in a greenhouse under white light when PPFD was 200 and 250 µmol $m^{-2}s^{-1}$.



RESULTS (2)

- After 1 day of postharvest storage significantly the lowest FRAP antioxidant activity was detected in mustards grown under 200 µmol $m^{-2}s^{-1}$ PPFD white light and held in light during storage.
- Between the samples held in the dark there were no significant differences in FRAP antioxidant activity.





RESULTS (3)

- After 3 days of postharvest storage there were found significant differences in mustard grown under white light in a green house and under $R_{61\%}$, $B_{20\%}$, $W_{15\%}$, and $FR_{4\%}$ light in a controlled environment chamber. All three PPFD treatments resulted in a higher FRAP antioxidant activity when grown in a controlled environment chamber, compared to those under same PPFD treatment in a greenhouse.

Conclusions (1)

- Results showed that on harvest day the lowest FRAP antioxidant activity was found in plants grown under white light when PPFD's were 200 and 250 µmol $m^{-2}s^{-1}$.
- During postharvest storage after 3 days there was a visible tendency where plants grown under white light in a greenhouse had a significantly lower FRAP antioxidant activity than those grown in a controlled environment chamber under $R_{61\%}$, $B_{20\%}$, $W_{15\%}$, and $FR_{4\%}$ light.

Conclusions (2)

- Our findings show that even separate light components such as PPFD can enable in a higher efficiency.
- Concluding by manipulating the spectral composition of the light during mustard microgreen growth, antioxidant activity may be altered during storage.