

MDPI Horticulturae

1. General overview of the manuscript

The manuscript investigates the effect of full-spectrum LEDs with different color temperatures (3000 K, 4000 K, 5000 K) vs. HPS on radish morphology and leaf spectral reflectance. The topic is within the scope of Horticulturae, which routinely publishes studies on light quality, controlled environment agriculture, spectral optimization, physiological responses, and phenotyping methods.

Overall impression:

Experiment is well-designed with clear presentation of results relevant for CEA lighting optimization. However, novelty is moderate, methods are technically sound but not innovative enough for novelty expectations, unless reframed and english requires substantial editing. Interpretation of results are sometimes overstated relative to statistics and some methods lack essential detail for reproducibility which is accompanied that some statements do not fully align with Table S1 ANOVA results.

2. Novelty Assessment

MDPI Horticulturae expects either: novel LED/light-quality treatments, novel physiological measurements and novel interpretation linking spectral responses with cultivation outcome. **With regards to novelty** three custom-developed LED fixtures (AFI-1/2/3) based on violet pump + tri-phosphor blend, simulating sunlight at different CCTs, integration of leaf reflectance indices with morphological traits ChlRI, SIPI, PRI, ARI-1/2 applied together to radish and connection between reflectance patterns and yield. Also, the combined interpretation is less present highlighting the use of two genetically related radish cultivars differing in morphology.

However, the use of full-spectrum LEDs at different color temperatures (3000/4000/5000 K) is now widespread in literature and also measurements on physiological parameters (root mass, leaf mass, leaf area, etc.) are standard. Also, reflectance spectroscopy indices (ChlRI, PRI, ARI, SIPI) are not newly developed, they are well-established, although application to radish is valid.

Suggestions for improvement:

Emphasise custom engineering of AFI LED modules

Emphasise linking reflectance indices with yield prediction

To do not highlight “mechanistic” claims unless statistically supported

3. Major Issues (Require Revision)

3.1. Methods: Reproducibility Needs Improvement

Several key methodological details are missing:

LED fixture specifications: spectral distribution as actual SPD curves (only relative proportions given)

LED manufacturer/power consumption, distance from lamp to canopy, uniformity of light distribution (PAR mapping).

State whether repetitions are biological or technical, as it is unclear whether statistics is used pooled or independent replicates

Leaf reflectance measurement needs more detail: contact angle and probe distance, calibration procedure, number of measurements per plant vs. per treatment, whether spectra were averaged before indices calculation

Missing description of how color temperature differences were engineered. For novelty, the engineering specifics of AFI-1/2/3 must be described more concretely.

3.2. Overinterpretation in Discussion (Not supported by statistics)

The manuscript states that 5000 K LEDs result in maximum root mass due to blue light proportion.

However, Table S1 shows:

Root mass: genotype highly significant ($p=0.000$), but light environment is not significant ($p = 0.372$)

This contradicts the narrative.

Recommendation:

Adjust the claims: emphasize tendencies rather than significant effects.

The manuscript attributes high PRI under LED light to “down-regulation” and midday depression analogies. This conclusion is speculative without photosynthetic gas exchange data. If possible include this data, or omit this in discussion.

“Efficiency of photosynthetic apparatus is higher in AFI-3”. This is overstated. Indicators (reflectance indices) suggest changes, but do not directly quantify efficiency.

Recommendations for major improvement

To strengthen novelty, you should: emphasise that radish is understudied in reflectance-spectroscopy context; clearly state why full-spectrum LEDs require assessment across genotypes and explain how the AFI LEDs differ from commercial white LEDs

Also, several manuscript statements contradict or do not cite the ANOVA results, such as “light environment significantly influenced leaf area” ($p=0.018$), so this claim should explicitly cite Table S1., “there were no significant differences in leaf mass” is correct ($p=0.607$), but manuscript sometimes describes trends without stating non-significance, or “root mass increased toward AFI-3” should be softly described.

Minor Issues (English, Formatting, Clarity)

English grammar requires extensive editing.

1. “Light source” vs. “lighting environment” inconsistently used.
2. Units should follow MDPI standards: $\mu\text{mol m}^{-2} \text{s}^{-1}$, not $\mu\text{mol} / (\text{m}^2 \times \text{s})$.
3. Figures need clearer legends (symbols for cultivars, meaning of letters).
4. Equation formatting needs LaTeX or clearer structure.
5. Reference formatting inconsistent.
6. Table S1 check and write in the manuscript consistently.

Suggestions for improvement:

Genotype has large effect on root mass, leaf mass, leaf number.

Light environment significantly affects E_i , A_i , leaf area, leaf thickness.

Interaction effects mostly non-significant except root shape index.

Root length significance ($p=0.631$) never mentioned

Rosette height and diameter also not discussed

“higher root mass under AFI-3” is not statistically significant

“root diameter significantly affected by light” is correct but not discussed in main text

“light significantly affects leaf number” is correct, but manuscript incorrectly states “no significant differences in leaf number were found”

Conclusion

The manuscript fits Horticulturae IF revised, especially regarding methodological clarity and more cautious interpretation.

Recommendation: Major Revision

Required for acceptance:

Strengthen methodological description, correct statistical interpretations (especially Table S1 inconsistencies), remove speculative physiological explanations, improve English style and scientific clarity, emphasize the novelty more clearly, improve figures/legends, rephrase all claims of “significant effect” only when supported by ANOVA

If these revisions are made, the manuscript should be suitable for publication.