EFFECT OF LED LIGHTING ON GROWTH AND PHENOLIC CONTENT ON IN VITRO SEEDLINGS OF OCIMUM BASILICUM L. CULTIVAR AROMAT DE BUZAU


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Outlines

- Introduction
- *Ocimum basilicum* (basil)
- Plant tissue culture
- Material and methods
- Results
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**Ocimum basilicum L. cv. „Aromat de Buzau”**

- It is recently created in 2010 by the researchers from Research Station for Vegetable Growing Buzau (hence the name);
- It is well adapted to the environmental conditions in our country and thus can be cultivated in an ecological system because of its resistance to specific diseases and pests;
- It is a cultivar with a specific flavor and aroma due the high content of linalol that is present in its essential oil;

It is strongly branched, the flowers are white and leaves are light green.
Benefits of *O. basilicum*

- Anti bacterial (gram positive & gram negative bacteria).
- Anti-inflammatory
- Strong antioxidant activity
- Anti proliferative effect
- Anti cancer
- Antiviral
- Antifungal activity
- In cuisine, it has become the symbol of ligurian cuisine as the main ingredient of "pesto" as well as campanian cuisine, added to spaghetti with tomato.
Plant Tissue Culture

- Eliminates the possibility of transmitting viruses to offsprings
- Or allows the obtaining of healthy early plants;
- It is a method of obtaining a very large number of healthy plants in very short time;
- It is a modern method of multiplication that preserves the fidelity or the variety, but the costs for the equipement and consumables are very high;
- The illumination of plant growth chambers is typically based on conventional light sources as fluorescent light but these light sources have limitation due to their short life time, high electrical consumption and heat emission;
- Leds are particularly suitable for plant growth chambers, because of their light weight, small volume and long life.
Aim of The work

To study the efficiency of using plant tissue culture techniques for the production of phenolics compounds in basil

The objectives of this research were:

(1) to investigate the effect of LED lighting on morphological characteristics of ,, Aromat de Buzau,, basil cultivar in vitro;

(2) to determine the best light quality treatment for increase phenolics production in basil.
Materials and Methods

In vitro seed germination

- Isolation of meristematic apices
- Inoculation of meristematic apices

M Murashige – Skoog agar medium;
Illumination with fluorescent tubes emitting white light and LEDs emitting colored light

Extraction & determination of flavonoids and total phenolics
Data analysis
Figure 1. Morphological aspects of in vitro seedlings basil illuminated with FL (control) and LED after 60 days of culture
### Results

**Morphological measurements**

<table>
<thead>
<tr>
<th>Indices</th>
<th>Control</th>
<th>Blue light</th>
<th>Red light</th>
<th>Yellow light</th>
<th>Green light</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stem height (cm)</td>
<td>5.92(^b)±0.05</td>
<td>4.08(^a)±0.08</td>
<td>6.06(^b)±0.07</td>
<td>5.08(^b)±0.09</td>
<td>5.82(^b)±0.06</td>
</tr>
<tr>
<td>Root length (cm)</td>
<td>6.94(^b)±0.06</td>
<td>5.1(^a)±0.02</td>
<td>7.2(^b)±0.08</td>
<td>5.4(^a)±0.04</td>
<td>7.12(^b)±0.06</td>
</tr>
<tr>
<td>Number of leaves</td>
<td>4.6(^b)±0.21</td>
<td>4.2(^b)±0.21</td>
<td>5.4(^b)±0.17</td>
<td>3.4(^a)±0.21</td>
<td>3.6(^b)±0.21</td>
</tr>
</tbody>
</table>

**Table 1.** Morphological indices of *Ocimum basilicum* L. grown at different LED colors after 60 days (Average of 5 measurements ± standard error, different letters between rows represent significant statistical differences)
Figure 2. Total **phenolic** content of basil extracts ‘Aromat de Buzau’ cultivated under different color LED lights. The mean difference is significant at the 0.05 level compared to control.
Figure 3. Total **flavonoid** content of basil extracts ‘Aromat de Buzau’ cultivated under different color LED lights. The mean difference is significant at the 0.05 level compared to control.
Figure 4. **Free radical scavenging capacity** of basil extracts ‘Aromat de Buzau’ cultivated under different color LED lights. The mean difference is significant at the 0.05 level compared to control.
Conclusions
These findings are also beneficial in providing a useful benchmark in determining the optimum colour of light from this species at its best, most promising antioxidative effects.

Total phenolic content of basil plants was significantly higher under blue LED illumination compared to the rest of the treatments.

LEDs increased the amount of flavonoids compared to FL light.

Blue light determine a reduction in stem height and root length compared to conventional fluorescent. Red light is stimulated growth of basil plants.

It may serve as a basis for even more extensive researches to be done on this species with the focus of interest directed towards its phytomedicinal values.

Further investigations will establish the effect of different light combinations and intensities to determine the optimum treatment for obtaining optimum growth and phenolic compounds synthesis.
Thank you!