

An Experimental Platform to Study the Impact of Artificial Light on Flora

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Problematic

- Fruits and vegetables grown in greenhouses are often bland
- In these greenhouses all factors (such as humidity and temperature) are studied and ideal to optimise rapid growth. But, is the lighting used ideal for plant quality?
- In other words, do wavelengths have an impact on plant yield and quality?

Objective

- Distinguish the effect of two types of lamps on plants
 - HPS lamps (usually used in greenhouses) and;
 - a customized solar lamp that imitates the spectrum of sunlight
- The platform includes a custom automation system controlling the variables of the environment (humidity, temperature) from an open source arduino microcontroller

Lamps

- HPS bulbs, commonly used by the greenhouse industry
- Customized lamp designed by our research group
 - The spectral distribution of our innovative lamp can mimic the sun's light
- One should note the light intensity was monitored and similar during growth period on both lighting conditions (between 100 and 150 PAR units ; $\mu\text{mol photons m}^{-2}\text{s}^{-1}$).

Methodology

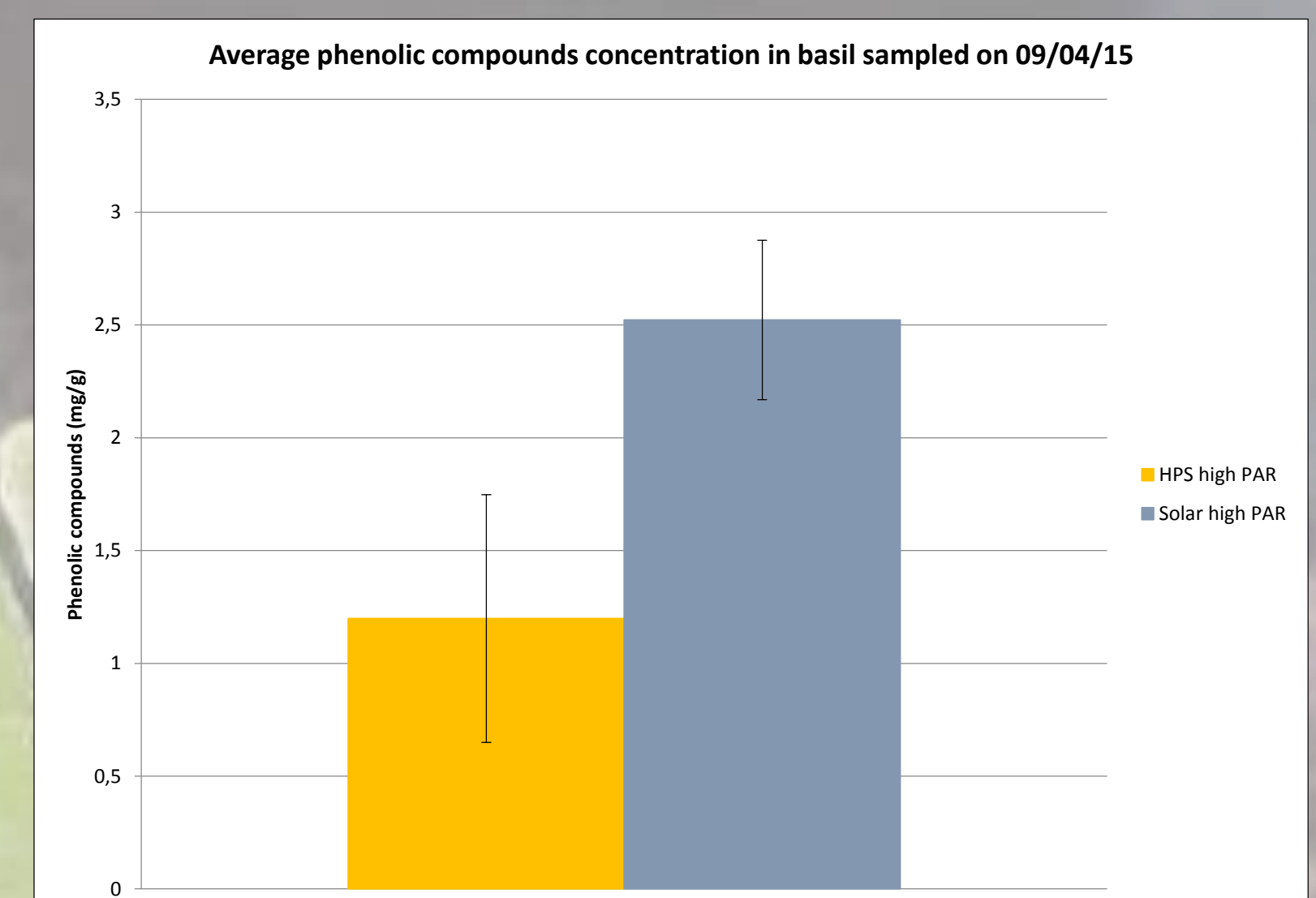
The development of the plants was quantified in the following ways:

- Height;
- Number of leaves;
- Color;
- Biometric characteristics.

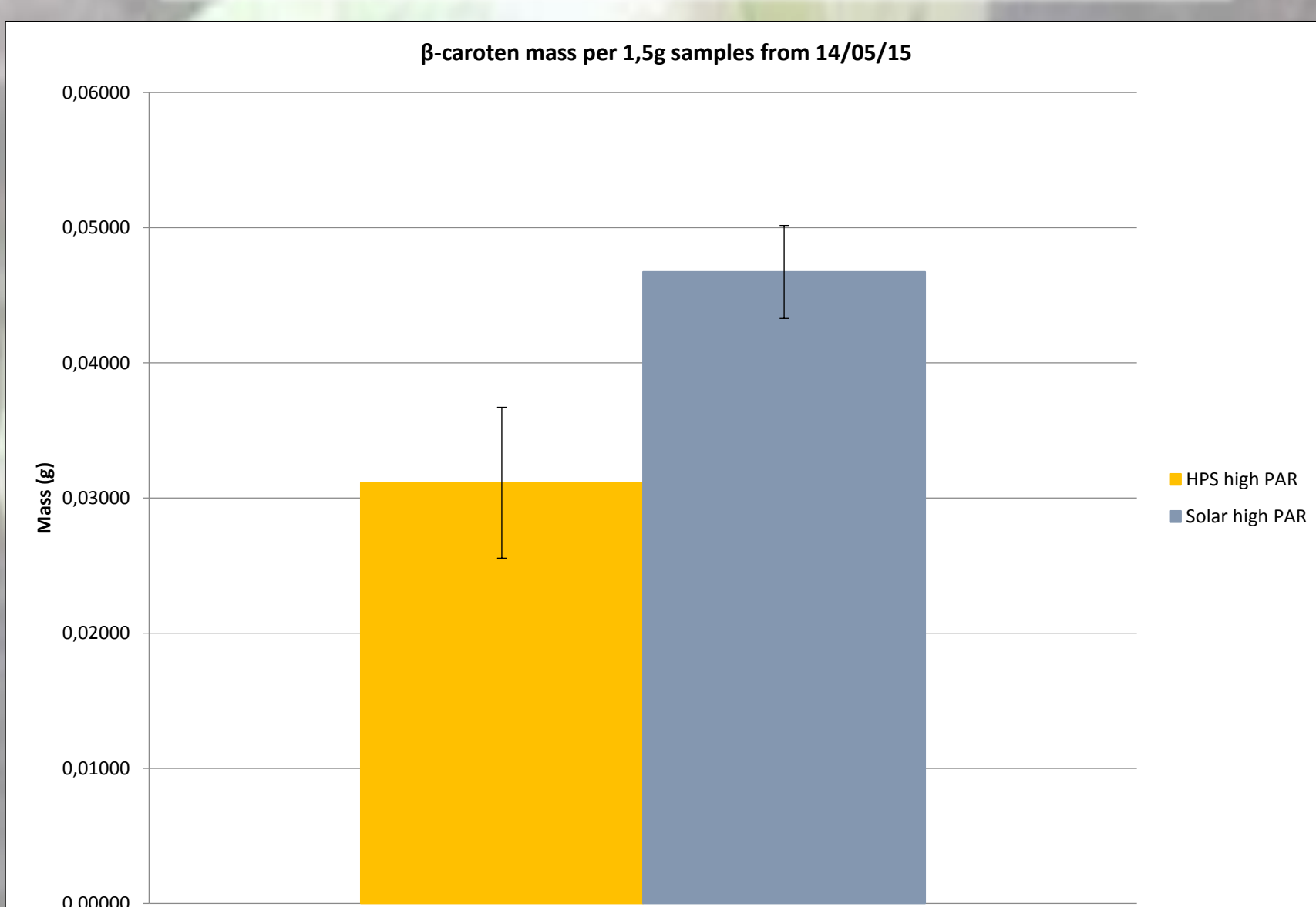
The following compounds were dosed :

- Carotenoids;
- Chlorophyll;
- Phenolic compounds.

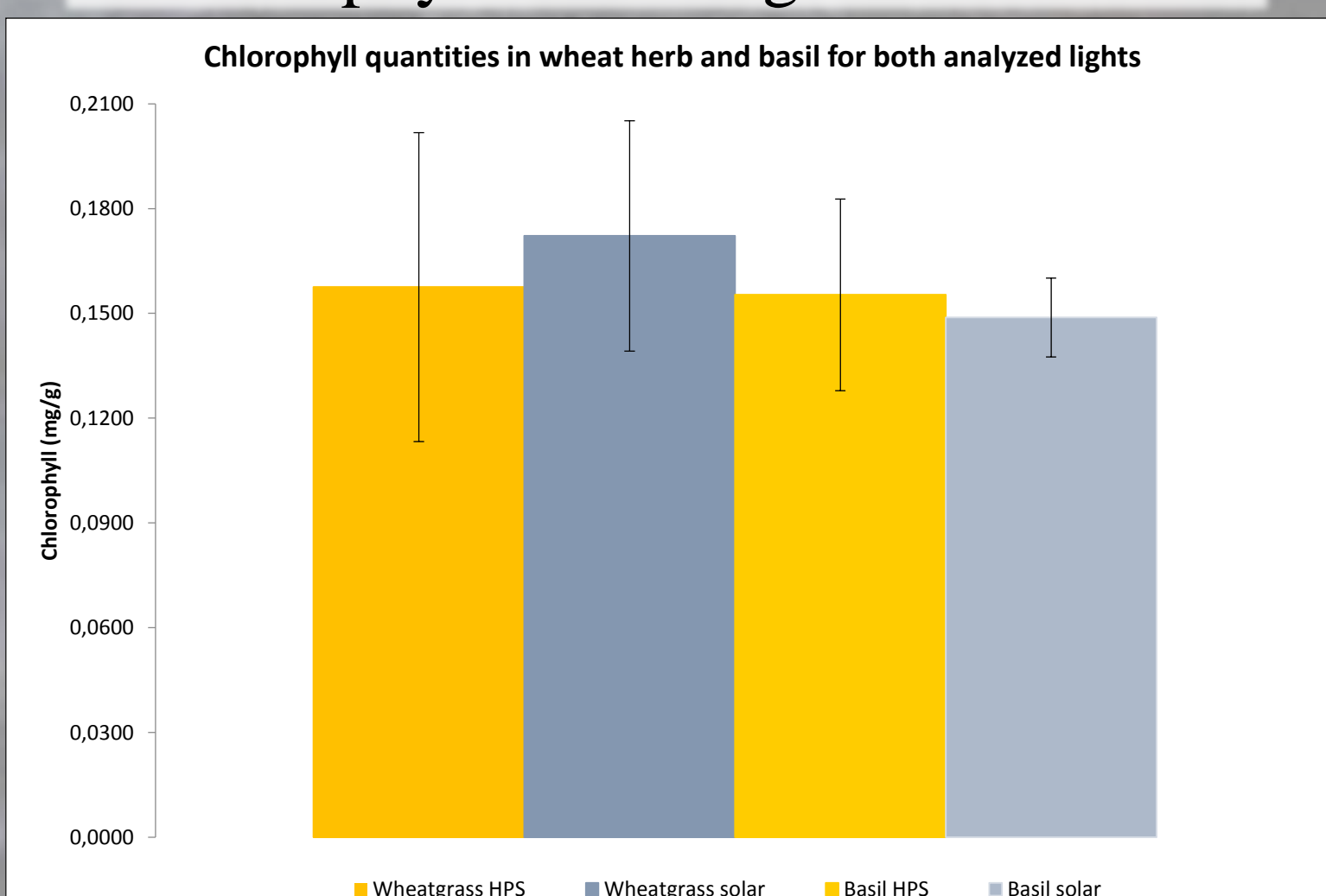
Phenolic compounds in basil



Carotenoids in wheatgrass



Chlorophyll in wheatgrass and basil

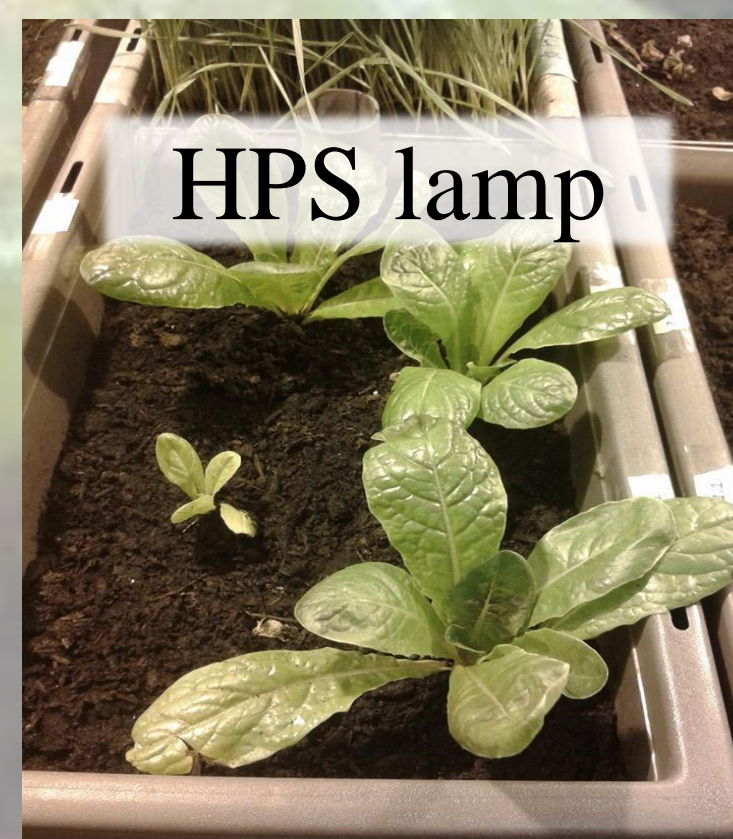
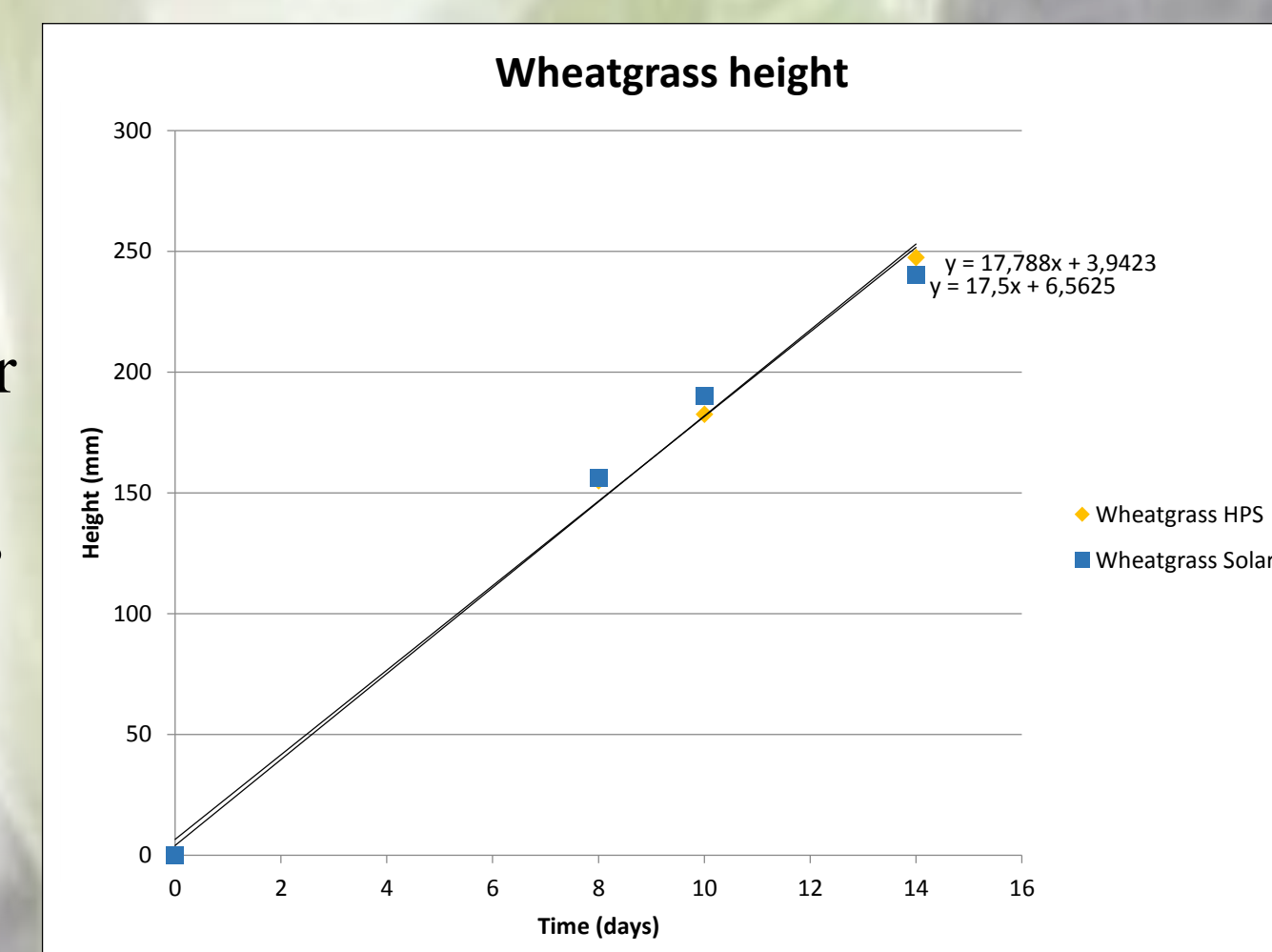


Height and number of leaves

The basil seems to grow equally or a little less under sun light.

The wheatgrass and the lettuce had a similar growth under the two types of light, but lettuces under HPS lamp have larger leaves and a bigger fresh weight.

The wheat herb, basil and lettuce general appearance also changed according to the type of light.



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Our lamp

- There is more phenolic compounds in the basil
- Wheat herb contains more carotenoids

HPS lamp

- The basil seems to grow equally or a little more
- There is more phenolic compounds in the wheat herb
- Lettuces have larger leaves and a bigger fresh weight

Similarities

- The wheat herb had a similar growth under the two types of light
- The height of the lettuces are similar under the two types of lights
- The concentration of chlorophyll seems to change depending of the plant, but to stay constant between the two lights conditions