Development and Use of a Low Cost Luxmeter to Predict Plant Success

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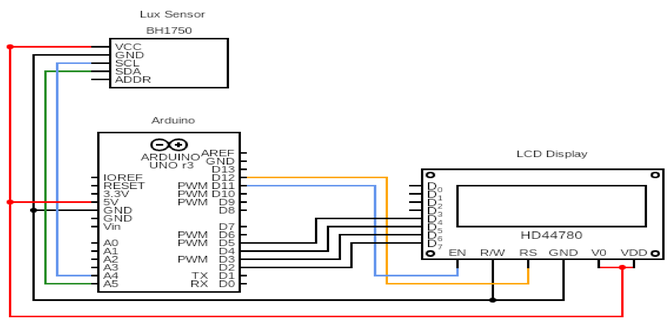
INTRODUCTION & BACKGROUND

One of the more common reasons for failure of plants is due to lack of proper light. Many devices on the market allow consumers to check their environment for various factors except for light. This is compounded by the fact that industry terms like partial sun, shade, etc. are used and can be confusing for consumers. However, luxmeter hardware is readily available and low-cost, so a potential solution could be created.

Looking at accessible hardware, luxmeters are available, but do not give a true accurate reading for photosynthetically available light. A solution could be created that gives an adequate correlation between a lux/lumens and these industry terms. This new device could then display shade, partial shade, partial sun, etc. to aid the consumer.

To test out this device, commercially available bare spot repair turf grass is a good model. The product is readily available in large quantities and performs poorly when grown outside of direct sunlight. The product used in this study was a mix of *Festuca arundinacea*, *Lolium perenne*, and *Festuca perennis.*

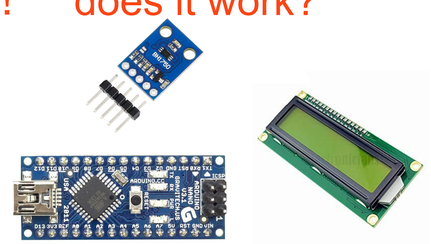


HYPOTHESIS

While luxmeters don't give a truly accurate reading of photosynthetically available light, a luxmeter that takes multiple readings over a period during the brightest part of the day should be able to predict the success of common turf grass.

Expensive!

Inexpensive, but does it work?



Lux Values and their Correlated Light Term Used in the Project

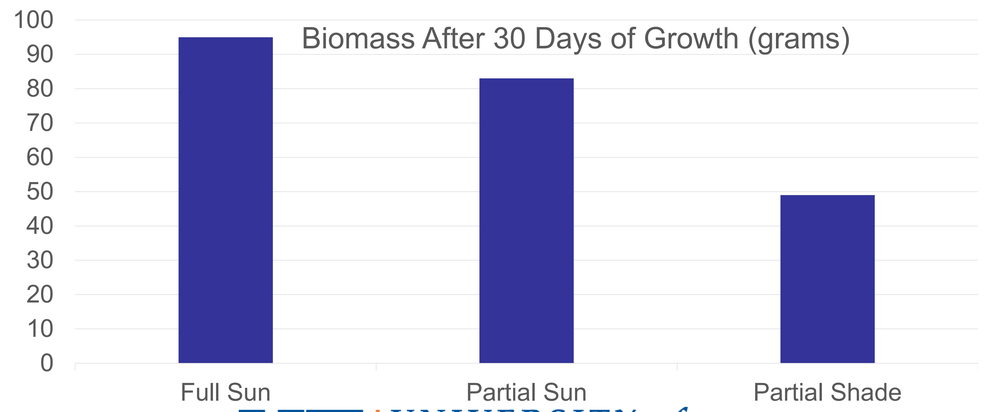
Lux	Light Term
+30,000 Lux	Full Sun
10,000-29,999 Lux	Partial Sun
1,000-9,999 Lux	Partial Shade
<1,000 Lux	Full Shade

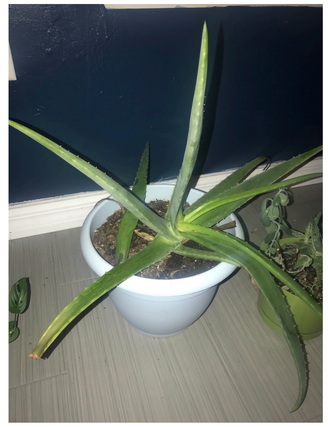
METHODS

- 3 trials with 20 grams of Pennington Bare Spot Repair Mixture in full sun, partial sun, and partial shade locations.
- 3 window box containers with a volume of 17.77 liters.
- Light term was determined by placing the luxmeter at 10:00 AM, 12:00 PM, and 2:00 PM at the locations.
- Lux readings were averaged for each location and referred to the table to determine light term.

RESULTS

- Grass grew for 45 days.
- Watering was potentially variable between the locations. One location was in a greenhouse while the another two were outdoors.
- After the 45 days, the grass was pulled from the pots and weighted.
- Full sun weighted 95 grams, partial sun was 83 grams, and partial shade was 49 grams.
- Partial sun had 12.63% lower biomass than full sun.
- Partial shade had 49% lower biomass than full sun.





A neglected Aloe. Many succulents are commonly grown as houseplants in light that is incompatible. A luxmeter could help a consumer pick a more appropriate plant.

CONCLUSIONS

The optimal light for turf grass is full sun. This mix of turf grass is meant to grow in full sun to partial sun. The highest biomass was observed in the full sun growing location followed by the partial sun location. This supports the hypothesis that a luxmeter taking multiple readings should be able to predict the success of common turf grass.

Future studies should research if a luxmeter can predict the success of succulents and other ornamentals.

FUTURE USE

A potential use of this technology would be integration into existing smart-tag technology. Currently these tags display a QR code and allow the end consumer to lookup detailed information about the growing conditions. The plant success luxmeter could be refined and incorporated into existing smart tags to allow consumers to check if plant has enough light.

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