



A Temperature Programmable One Dimensional Thermogradient Table with LED Lighting for Germination and Seedling Research



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Introduction

Thermogradient tables are frequently used for seed germination testing over a wide range of temperatures simultaneously. They are also used for testing the temperature performance of seed coating materials and treatments at different temperatures. For example, a gradient table would allow to quickly test the effects of seed priming treatments at different temperatures.

Results

We have developed gradient tables made of water resistant polymers that have programmable circulating water baths. The tables can maintain a gradient from zero to 50 degrees C and if required temperatures can be programmed to change over time. The use of LED grow lights enables experiments to be conducted over a broad range of temperatures with light.



Thermogradient table with cover partially removed revealing the aluminum plate where the temperature gradient is maintained. LED grow lights provide light in the photosynthetic range without adding significant heat to the system.



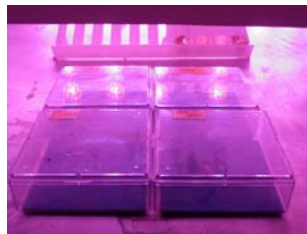
Small potted seedlings can be grown on the gradient table although the gradient dissipates above the aluminum plate surface.



LED grow lights are compact and mounted within the gradient table cabinet since heat output is minimal.



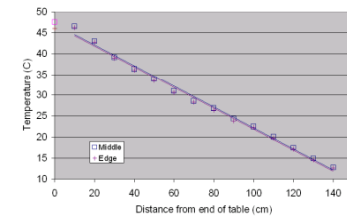
Gradient tables are well suited for Petri dish experiments where samples must be incubated over a range of temperatures simultaneously.



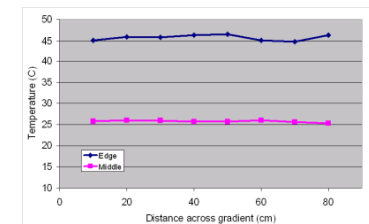
Gradient table experiments can be conducted in sandwich boxes (foreground) or other culture tubes (background).

Other Applications

Other types of research can be conducted on gradient tables as well. Testing effects of temperature on insect migration and reproductive behavior, screening cell cultures for temperature tolerance, and the investigation of the physical properties of materials are a few applications where gradient tables have been used effectively in addition to seed testing.



Graph shows plate surface mean temperatures with a gradient set between 50C/10C. Temperature measurements were logged by 16 miniature logging devices (Watch Dog Button, Spectrum Technologies), set to record at 5 minute intervals. The temporal median standard deviation at the high temperature edge was 0.32 degrees C



Mean temperatures logged across the middle and ends of the table with an established gradient from 50 to 10 degrees C.

Conclusions

LED-lighted thermogradient tables provide a cost effective alternative to growth chambers for research applications requiring testing of low profile samples over a wide range of temperatures.