

ABSTRACT

To potentially increase the effective depth and effect a 24-hour operation of High Rate Algal Ponds (HRAPs), thereby increasing algae production, *Chlorella* algae was grown indoors in tanks at the Cooper Union Environmental Laboratory, using embedded red blue 2:1 LED grow lights in waterproofed clear plastic tubes oriented vertically in opaque plastic containers. The tanks' surface was under constant 24 hour overhead fluorescent lighting, in addition to the continuous lighting provided by the submerged LEDs. Lighting elements were varied by count and placement within the tanks to determine whether embedding LEDs in growing tanks provided a significant yield to algae productivity compared to a control tank with no LEDs. External lighting, nutrient concentrations, and temperature were held constant.

Samples were collected weekly, after thorough mixing, in triplicate, from each tank at the same time, dried for 24 hours in an oven at 130°F, then weighed to measure the change in growth of algae within a tank. Two runs were performed, each lasting 30 days, using the same arrangement to verify the results from the first run. In both runs, it was shown that embedding LEDs in the tanks significantly improved algae productivity by a maximum of 62% after 9 days compared to the control. In both runs, embedding three strips of LEDs in a linear arrangement was found to be the optimal array, after which adding additional lighting elements was counterproductive.