

Differences in Growth and Survivability in *Chlorella* sp. During 96 Hours of UV-B Exposure

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Structured Abstract

Background: Increased global warming and deterioration of the ozone layer in the stratospheric region could potentially threaten photosynthetic microorganisms including *Chlorella* sp. Prolonged exposure of the UV-B radiation could negatively impact the cell integrity and viability. This situation has become a major concern for the *Chlorella* sp. since they are continuously being exposure to the UV-B radiation.

Methods: *Chlorella* sp. was cultured in BG-11 medium at 24°C under continuous photosynthetically active radiation (PAR). The growth curve was determined using indirect turbidity via spectrophotometer readings at 750 nm every 24 hours and direct cell counting using a hemocytometer with Trypan Blue. A set of petri dishes were prepared to be exposed to UV-B for 96 hours and PAR as controls. Samples were collected every 24 hours to monitor changes. Cell survival was assessed by hemocytometer counts and the results were analyzed using t-tests to compare treated and control groups.

Results: The growth curve of *Chlorella* sp. took overall 10 days to complete. On day 1, the OD and concentration of viable cells are still low. However, the growth of *Chlorella* sp. rise for 5 days and declined significantly on day 10. The percentage of survival cells was high (96.47%) at the first 24 hours UV-B exposure indicates the mechanism resilience of *Chlorella* sp. to combat UV-B stress. However, the percentage of survival cells continues to decline over time where it reached 59.26% after 96 hours of UV-B exposure which suggests irreversible damage by UV-B radiation. The statistical t-test analysis showed a significant difference in the viability of the *Chlorella* cells in UV irradiated and Non-UV.

Conclusion: In conclusion, the growth curve of *Chlorella* sp. takes about 10 days to complete. When exposed to UV-B radiation for 96 hours, the survival rate dropped to approximately 59.26%. Meanwhile, under non-UV conditions, about 70 cells remained viable, compared to only 48 in the UV group, highlighting the stress induced by UV-B. Further study on photosynthetic activity, metabolite analysis and ROS assay may be conducted to improve the understanding on the impact of UV-B towards *Chlorella* cells.

Keywords: *Chlorella*, UV-B radiation, Growth, Survivability

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