

## **Effect of Different UV-B Irradiation Time Exposure on the Growth and Cell Viability of *Cyanobacteria* sp.**

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### **Structured Abstract**

**Background:** In many ecosystems, cyanobacteria are essential, and they may find use in biotechnology. It is crucial to comprehend their growth dynamics and survival under UV-B radiation in order to investigate their adaptability and resilience. The growth profile and cell viability of MA7 cyanobacteria are examined in this study using optical density and hemocytometer cell count. The survival of the bacteria following UV-B exposure is assessed using percentage survival analysis. By analysing these factors, this study sheds light on cyanobacteria's response to UV-B stress, contributing to larger studies on microbial photoprotection and adaptation.

**Methods:** In BG-11 medium, MA7 cyanobacteria were cultivated under controlled conditions. The growth of the bacteria was tracked using a hemocytometer cell count and optical density (OD750). Exponentially growing cultures were exposed to  $\sim 1 \text{ Wm}^{-2}$  UV-B radiation for different durations (24, 48, 72, and 98 hours), while controls remained under fluorescent light. Cell viability was determined using OD750 measurements and direct microscopic observation. Morphological changes were also documented. Survival rates were calculated using percentage survival analysis. This experimental approach enabled the study of cyanobacteria growth patterns and responses to UV-B stress.

**Results:** The structure, growth dynamics, and survival of cyanobacteria MA7 under UV-B exposure were examined in this study. Microscopic observation revealed a filamentous structure with photosynthetic pigments that aid in survival. Growth analysis revealed that the log phase (Days 3-6) was the best time for UV-B experiments, with the highest viability at Day 6 ( $4.94 \times 10^6$  cells/mL). UV-B exposure resulted in a significant decline in cell survival, with viability falling from 94.86% at 24 hours to 58.29% at 96 hours. This suggests that although cyanobacteria have UV-photoprotective compounds, prolonged exposure overwhelms their defences, causing cumulative damage and cell death.

**Conclusion:** The log phase of cyanobacteria occurs between Days 3-6, followed by the stationary phase from Days 6-8. UV-B exposure significantly impacts growth and viability, with minimal effects at 24 hours but a sharp decline after 48 hours. Prolonged exposure causes cumulative damage, highlighting the limited tolerance of Cyanobacteria MA7 to UV-B stress.

**Keywords:** Cyanobacteria, UV-B irradiation, growth curve, percentage survival

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