

The Effect of Temperature on Primary Productivity of Phytoplankton Khor Al-Zubair Lagoon in Basra City, Iraq

Muaaid A. Hazza, Adel K. Jassim*

Department of Fisheries and Marine Resources, College of Agriculture, University of Basra, Iraq

*Corresponding Author: adelkassim71@gmail.com

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ABSTRACT

This study aimed to assess the effect of temperature on the primary productivity of phytoplankton in the waters of Khor Al-Zubair lagoon in Basra City, Iraq, through a seasonal analysis of two stations. Environmental factors such as water temperature, permeability, salinity, pH, nitrates, and phosphates were measured. In addition, chlorophyll *a* along with primary productivity were evaluated using light and dark bottles. The results indicated that temperature had a greater impact on primary productivity than other environmental factors, particularly nitrates and phosphates, which were abundantly available in the study area. The highest productivity values were observed during the moderate climate of spring and autumn seasons, with the spring season recording the peak productivity values of 309.37 and 437.5mg C/m³/h for the first and second stations, respectively. The first station was classified as nutrient-rich, while the second station was identified as nutrient-limited during the spring phytoplankton bloom, based on chlorophyll *a* concentrations.

INTRODUCTION

Phytoplankton, the most important primary producers in marine ecosystems, play a crucial role in carbon sequestration and oxygen production in the global ocean (Tao *et al.*, 2020). The productivity of phytoplankton is highly sensitive to temperature, with both positive and negative effects reported in various studies (Cabrerizo *et al.*, 2021). For instance, slight increases in temperature can enhance phytoplankton growth, as higher temperatures can accelerate cellular processes and enzyme activity (Sigman *et al.*, 2012). However, beyond an optimal range, elevated temperatures may negatively impact primary productivity by reducing photosynthetic capability, increasing respiration rates, and causing cellular damage. Additionally, temperature interacts with nutrient limitations and light intensity to further influence phytoplankton productivity (Zhang *et al.*, 2018).

Overall, the relationship between temperature and phytoplankton primary productivity is complex and depends on the specific species involved and their environmental conditions