

ABSTRACT

Nitrate is a nutrient that plays an important role in phytoplankton growth; therefore, changes in its concentration may influence phytoplankton abundance and community structure. This study aimed to analyze the dynamics of nitrate concentration and phytoplankton abundance, as well as the influence of nitrate on phytoplankton abundance and biological indices. The research was conducted from July to September 2025 at Lake Laut Tawar, Central Aceh Regency. Sampling was carried out at three depths: the surface, Secchi disk depth, and euphotic depth during both morning and midday periods. Data were analyzed using descriptive statistics, One-Way Anova, independent-sample t-tests, Kruskal-Wallis and Mann-Whitney tests, Spearman's correlation, and linear regression. The results showed a significant increase in nitrate concentration across the months, although no significant differences were observed between observation time or depths. Phytoplankton abundance ranged from 5,165 - 15,046 cells/L. Values for the diversity index ranged from 1,53 - 2,29, the evenness index from 0,70 - 0,88, and the dominance index from 0,12 - 0,26. Correlation and regression analyses indicated that nitrate concentration had a weak relationship and a weak influence on phytoplankton abundance and biological indices. It is concluded that changes in the phytoplankton community structure in Lake Laut Tawar are influenced not only by nitrate concentration but also by other environmental factors.

Keywords: Abundance, Biological indices, Lake Laut Tawar, Nitrate, Phytoplankton,

ABSTRAK

Nitrat merupakan salah satu unsur hara yang berperan dalam pertumbuhan fitoplankton, sehingga perubahan konsentrasinya diduga dapat mempengaruhi kelimpahan dan struktur komunitas fitoplankton. Penelitian ini bertujuan untuk menganalisis dinamika konsentrasi nitrat, kelimpahan serta pengaruh nitrat terhadap kelimpahan indeks biologi fitoplankton. Penelitian dilaksanakan pada bulan Juli - September 2025 di Danau Laut Tawar, Kabupaten Aceh Tengah. Pengambilan sampel dilakukan pada tiga kedalaman, yaitu permukaan, kedalaman Secchi Diks, dan kedalaman eufotik pada waktu pagi dan siang hari. Analisis data meliputi statistik deksriptif, One Way Anova independent sampel t-tes, Kruskal-Wallis, Mann-Whitney, korelasi spearman dan regresi linear. Hasil penelitian menunjukkan bahwa konsentrasi mengalami peningkatan yang signifikan antar bulan, namun pada waktu pengamatan maupun kedalaman tidak ada perbedaan yang signifikan. Kelimpahan fitoplankton berkisar antara 5.165–15.046 sel/L. Nilai indeks keanekaragaman berkisar antara 1,53–2,29, indeks keseragaman 0,70–0,88, dan indeks dominansi 0,12–0,26. Analisis korelasi dan regresi menunjukkan bahwa konsentrasi nitrat memiliki hubungan dan pengaruh yang lemah terhadap kelimpahan maupun indeks biologi fitoplankton. Berdasarkan hasil penelitian dapat disimpulkan bahwa perubahan struktur komunitas fitoplankton di Danau Laut Tawar tidak hanya dipengaruhi oleh konsentrasi nitrat, tetapi juga dipengaruhi oleh faktor lingkungan lainnya.

Kata kunci: Danau Laut Tawar, Fitoplankton, Indeks biologi, Kelimpahan,