ABSTRACT

Total nitrogen is a key nutrient influencing phytoplankton abundance in freshwater ecosystems. Nitrogen availability is thought to affect phytoplankton species composition, as certain species exhibit greater tolerance to high nitrogen levels. This study aimed to examine total nitrogen dynamics and phytoplankton abundance, as well as the influence of total nitrogen on that abundance and on phytoplankton biological indices. The research was conducted from July to September 2025 at Lake Laut Tawar, Central Aceh Regency. Samples were collected at three depths the surface, the Secchi disk depth, and the euphotic depth during both morning and midday periods. Data analysis involved descriptive statistics, One-Way ANOVA, independent sample t-tests, Kruskal-Wallis and Mann-Whitney tests, Spearman correlation, and linear regression. The results showed a significant increase in total nitrogen concentrations over the months, though no significant differences were observed regarding the time of observation or depth. Phytoplankton abundance ranged from 5,165 to 15,046 cells/L. Diversity index values ranged from 1.53 to 2.29, evenness indices from 0.70 to 0.88, and dominance indices from 0.12 to 0.26. Correlation and regression analyses indicated that total nitrogen concentration had a weak relationship with and minimal influence on phytoplankton abundance and biological indices. In conclusion, changes in the phytoplankton community structure in Lake Laut Tawar are influenced not only by total nitrogen concentrations but also by other environmental factors.

Keywords: Total nitrogen, phytoplankton, abundance, biological indices, Lake Laut Tawar.

ABSTRAK

Total nitrogen merupakan salah satu nutrisi penting yang mempengaruhi kelimpahan fitoplankton di perairan tawar. Ketersediaan nitrogen diduga dapat mempengaruhi komposisi spesies fitoplankton, dengan beberapa spesies lebih toleran terhadap kondisi nitrogen yang tinggi. Penelitian ini bertujuan untuk mengetahui dinamika total nitrogen, kelimpahan serta pengaruh total nitrogen terhadap kelimpahan dan indeks biologi fitoplankton. Penelitian ini dilaksanakan pada bulan Juli-September 2025 di Danau Laut Tawar, Kabupaten Aceh Tengah. Pengambilan sampel dilakukan pada tiga kedalaman, yaitu permukaan, kedalaman Secchi Disk, dan kedalaman eufotik pada waktu pagi dan siang hari. Analisis data meliputi statistik deskriptif One Way Anova independent sampel t-tes, Kruskal-Wallis, Mann-Whitney, korelasi spearmen 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 total nitrogen 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 total nitrogen, tetapi juga dipengaruhi oleh faktor lingkungan lainnya.

Kata kunci: Total nitrogen, fitoplankton, kelimpahan, indeks biologi, Danau Laut Tawar.