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Research Article

Diversity and Distribution of Cyanobacteria in Camel Barn Soil in Libya

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Abstract: Libya features semi-arid lands that are predominantly pastoral, and its microbiological diversity remains largely unexplored. The objectives of the present study were to evaluate the distribution and diversity of cyanobacteria in the soil of camel barns and to determine how physical and chemical variables affect cyanobacteria species and the communities in three semi-arid areas east of Al-Qubbah city during May (summer) of 2024. In this work, 23 cyanobacterial species belonging to 14 genera, representing five common orders (Chroococcales, Oscillatoriales, Nostocales, Scytonematales, and Spirulinales), were identified using morphological features and the culture-dependent technique. Biodiversity indicators showed that camel barn sites are richer in cyanobacteria species than sites outside the barns; the first site had the highest species richness with (5.882±0.2 species/stand), Shannon index (2.89±0.42), and overall abundance (0.78±0.08). Four groups of cyanobacteria were identified using Pearson correlation, principal component analysis, and multivariate analysis; their presence was positively correlated with the quantity of organic matter, soil moisture, potassium, and nitrate content. Cyanobacteria and the amount of sand in the soil were shown to be strongly negatively correlated. Most sites were dominated by the orders Oscillatoriales and Nostocales. *Woella saccata* was documented (100/100) at every site under study. This work highlights the potential applications of animal waste as a new source for cultivating microorganisms in semi-arid regions.

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1. Introduction

Cyanobacteria (blue-green algae) are prokaryotic organisms and a major phylum of Gram-negative bacteria (Bishoyi et al., 2022). Dating back to the Archean, they are among the oldest photoautotrophic organisms that release oxygen during photosynthesis (Büdel, 2024). Cyanobacteria contain three pigments: green (chlorophyll), blue, and red (beta-carotene) (Jassim et al., 2023). Cyanobacteria produce a range of bioactive compounds, including flavonoids, phenolic acids, alkaloids, terpenoids, tannins, polysaccharides, cyclic peptides, phenols, and vitamins, which exhibit effects against various human cancer types, as well as antibacterial and antifungal properties, and antioxidant activity (Bouyahya et al., 2024; Khan et al., 2024). Furthermore, these bacteria offer new insights into their agronomic importance by reducing reliance on synthetic nitrogen fertilizers through natural