

## Comparative analysis of cyanophyceae, chlorophyceae and bacillariophyceae abundance in soils of Hassan district

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### ABSTRACT

A comprehensive investigation into the relative abundance of Cyanophyceae, Chlorophyceae, and Bacillariophyceae within the soils spanning the eight taluks of Hassan district has been conducted. The gathered data underwent meticulous collection and thorough analysis to elucidate the distributional patterns and compositional variances characterizing these algal taxa across diverse geographical zones. Employing a sophisticated amalgam of qualitative and quantitative methodologies, the study discerned both the numerical count and the proportional representation of each algal group within the scrutinized soil samples. Noteworthy is the observation that Alur exhibits the highest species richness, tallying an impressive count of 88 species, in stark contrast to Hassan, which presents the lowest count of 60 species. Furthermore, it is noteworthy that Sakleshpur lays claim to the highest proportion of Cyanophyceae, boasting a dominance of 84.25%. Conversely, Hassan emerges as the epicenter of Chlorophyceae and Bacillariophyceae dominance, registering percentages of 30% and 16.66%, respectively. These findings not only offer profound insights into the ecological dynamics of the region but also underscore the potential environmental implications stemming from the presence and distribution of these algal populations within the district's ecosystem.

**Keywords:** Cyanophyceae, Chlorophyceae, Bacillariophyceae, soil, abundance.

### INTRODUCTION

Algae play a crucial role in various ecosystems, including terrestrial habitats such as soils. Cyanophyceae, Chlorophyceae, and Bacillariophyceae are three important groups of algae, each characterized by distinct features with ecological roles found in soil environments. They contribute to ecosystem functioning, nutrient cycling, and have various applications in scientific research and industrial sectors. Understanding their abundance and distribution patterns in different environments is crucial for assessing and managing the health of ecosystems. *Cyanophyceae (Blue-Green Algae)*: Cyanophyceae, commonly known as blue-green algae, are a group of prokaryotic microorganisms that possess chlorophyll a and phycobiliproteins. They are unique among algae as they can perform photosynthesis in the absence of a nucleus and other membrane-bound organelles. Cyanophyceae are found in diverse environments such as freshwater, marine, and terrestrial habitats (Goyal and Venkataraman, 1971). They play a significant role in nitrogen fixation, contributing to the availability of this essential nutrient in various ecosystems. Cyanophyceae can form colonies

or filamentous structures, and some species produce toxins under certain conditions, posing risks to human and animal health (Kaushik, 1994; Gupta *et al.*, 2022). *Chlorophyceae (Green Algae)*: Chlorophyceae, or green algae, are a diverse group of eukaryotic microorganisms that contain chlorophyll a and b. They are often found in freshwater habitats such as lakes, ponds, and rivers, but they can also occur in soil, moist terrestrial environments, and even in symbiotic associations with other organisms. Chlorophyceae exhibit a wide range of morphological forms, including unicellular, colonial, filamentous, and multicellular species. Some green algae are important primary producers, contributing to the food chain and oxygen production. They also serve as model organisms for studying various biological processes and have economic importance in industries such as food, pharmaceuticals, and biofuels (Sannagoudar *et al.*, 2023; Yagya and Shreeti, 2012; Baral *et al.*, 1988).

*Bacillariophyceae (Diatoms)*: Bacillariophyceae, commonly known as diatoms, are a major group of eukaryotic microalgae characterized by their unique cell walls composed of silica. They are found in both marine and freshwater environments and are

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known for their immense ecological significance. Diatoms are important primary producers, responsible for a significant portion of the world's oxygen production and carbon fixation. They have diverse shapes and sizes, ranging from unicellular to colonial and filamentous forms (Baradwal *et al.*, 2023; Ghosh *et al.*, 2020; Rajanna *et al.*, 2023). Diatoms play a crucial role in nutrient cycling, as well as in aquatic food webs, serving as a food source for many organisms. Due to their distinctive frustule (cell wall) structure, diatoms have immense scientific and ecological importance, often used in environmental monitoring and paleoclimate studies (Kim, 2006; Dey *et al.*, 2010; Gafur and Parvin, 2008).

Understanding their relative abundance and distribution patterns can provide valuable information about the ecological health and environmental conditions of a given area. In this study, we investigated the abundance of these algal groups in the soils of the eight taluks in the Hassan district.

## MATERIALS AND METHODS

**Study Area:** The study was conducted in the Hassan district, which is located in on the leeward side of Western Ghats. Eight taluks, namely Alur, Arakalagudu, Arasikere, Belur, Channarayapattana, Hassan, Holenarasipura, and Sakleshpur, were selected as sampling sites (Fig.1).

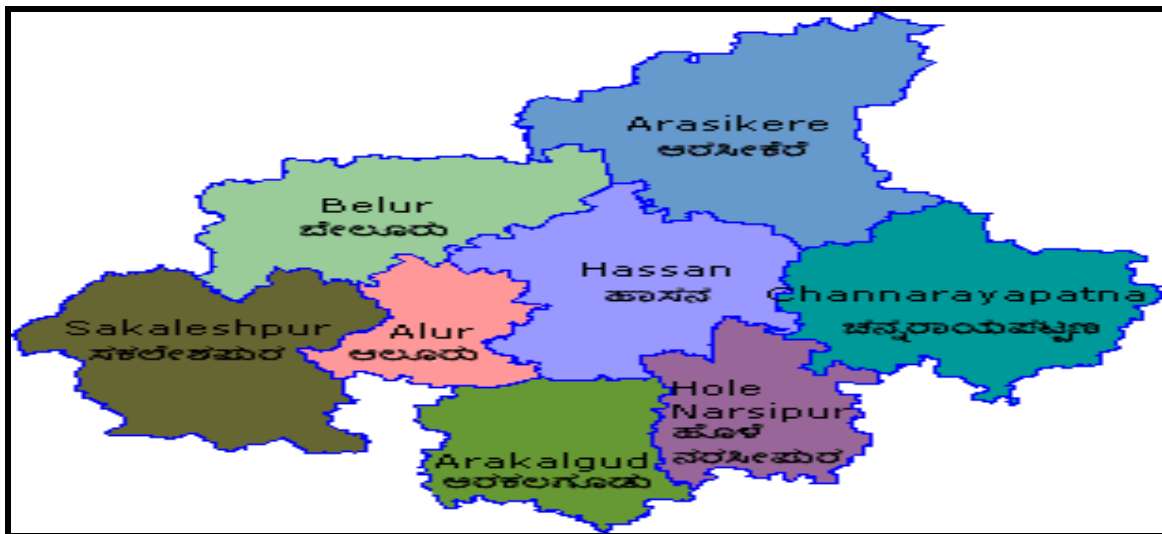


Fig.1: The map of study area of Hassan District

**Data Collection:** Soil samples were collected from multiple locations within each taluk using standard soil sampling techniques. A total of [provide sample size] samples were collected and analyzed.

**Laboratory Analysis:** The soil samples were processed in the laboratory to extract the algal biomass. Identification of Cyanophyceae, Chlorophyceae, and Bacillariophyceae species was carried out using microscopic examination and taxonomic keys. The number of species recorded for each algal group was documented.

## RESULTS AND DISCUSSION

The number of species recorded for Cyanophyceae, Chlorophyceae, and

Bacillariophyceae in the examined soils of the eight taluks of Hassan district is presented in Table 1. The highest number of species was observed in Alur (88 species), while the lowest was recorded in Hassan (60 species). The percentage distribution of Cyanophyceae, Chlorophyceae, and Bacillariophyceae in the soils of the eight taluks is presented in Table 2. The highest percentage of Cyanophyceae was found in Sakleshpur (84.25%), while the highest percentages of Chlorophyceae and Bacillariophyceae were observed in Hassan (30 % and 16.66 %, respectively). Similar observations were recorded by Mandal *et al.* (1999) on wetland rice fields; Nedumaran and Manokaram (2009) in in some salt pans of Pudukkottai; Reynaud and Roger (1976) in Senegal rice fields.

Table 1: Relative abundance of Cyanophyceae, Chlorophyceae, Bacillariophyceae in the examined soils of the eight taluks of Hassan district

| Place             | No. of species recorded |               |                   | Total |
|-------------------|-------------------------|---------------|-------------------|-------|
|                   | Cyanophyceae            | Chlorophyceae | Bacillariophyceae |       |
| Alur              | 75                      | 10            | 03                | 88    |
| Arakalagudu       | 70                      | 12            | 03                | 85    |
| Arasikere         | 65                      | 14            | 04                | 83    |
| Belur             | 54                      | 13            | 08                | 75    |
| Channarayapattana | 40                      | 16            | 06                | 62    |
| Hassan            | 32                      | 18            | 10                | 60    |
| Holenarasipura    | 66                      | 17            | 05                | 88    |
| Sakleshpur        | 71                      | 11            | 07                | 89    |

The results indicate variations in the abundance and composition of algal groups across the taluks of the Hassan district (Biradar *et al.*, 2023; Baradwal *et al.*, 2022; Ghosh *et al.*, 2021; Gupta *et al.*, 2020). The high number of species recorded in Alur suggests a diverse algal community in that region. The dominance of Cyanophyceae in Sakleshpur and the high

percentages of Chlorophyceae and Bacillariophyceae in Hassan indicate different ecological conditions and potential environmental factors influencing the algal distribution. Similar observations were recorded by Sahu *et al.* (1996) in rice fields of Orissa State.

Table 2: Percent Cyanophyceae, Chlorophyceae, Bacillariophyceae in the examined soils of the eight taluks of Hassan district

| Taluk Name        | Cyanophyceae | Chlorophyceae | Bacillariophyceae |
|-------------------|--------------|---------------|-------------------|
| Alur              | 85.22        | 11.76         | 3.52              |
| Arakalagudu       | 82.35        | 13.63         | 3.40              |
| Arasikere         | 78.31        | 16.86         | 4.81              |
| Belur             | 72           | 17.33         | 10.66             |
| Channarayapattana | 64.5         | 25.80         | 9.67              |
| Hassan            | 53.33        | 30            | 16.66             |
| Holenarasipura    | 61.59        | 14.65         | 7.89              |
| Sakleshpur        | 84.25        | 15.49         | 10.24             |

## CONCLUSION

This study provides valuable insights into the relative abundance and distribution of Cyanophyceae, Chlorophyceae, and Bacillariophyceae in the soils of the eight taluks of Hassan district. The variations observed

highlight the need for further investigations to understand the environmental factors shaping the algal communities in different regions. The findings contribute to our understanding of the ecological dynamics of algal populations in soils and their potential implications for ecosystem health and functioning.

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