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A hand is shown from the bottom, holding a glowing blue and green globe of the Earth. The background is a dark blue digital interface with various data visualizations like bar charts, line graphs, and network diagrams. The text 'INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH' is overlaid in large white letters.

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# Ganga Water Algae Between Bithoor to Jajmau Kanpur and Their Role in Maintaining the Ganga Water Quality

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**ABSTRACT:** Present study deals with the study of algae in Ganga water from Bithoor to Jajmau, Kanpur (U.P.). During present study a total number of 316 algal species spread over 83 chlorophyceae, 108 cyanophyceae, 121 bacillariophyceae, and 4 euglenophyceae were recorded from Ganga water between Bithoor to Jajmau. Algae are a very large group of autotrophic aquatic organisms. Algae showing luxuriant growth and qualitative abundance are of major significance and their implications in pharmacy, human health, nutrition, self-purification, disease spread, and maintenance of water quality is crucial. Usually marine algae have been used as food and medicine for a long time. Algae are used as important source of medicine due to their antiviral, antioxidant, anticancer, antibacterial, antiallergic, antifungal, antimicrobial properties. Out of these some important algal species 14 genera *Chlorella*, *Cladophora*, *Hydrodictyon*, *Chlorococcum*, *Scenedesmus*, *Spirulina*, *Anabaena*, *Nostoc*, *Arthrospira*, *Nodularia*, *Lyngbya*, *Microcystis*, *Nitzschia*, *Navicula* spread over 39 species play important role in human health and water quality in addition to other algae discussed here.. Algae play important role in determination of pollution and quality of water. Certain algae play important role as indicator of water quality and show specific colour, odour, taste and pollution extent.

**KEYWORDS:** Human health , Self-purification, antioxidant, , Indicator

## I. INTRODUCTION

The life of indogangetic plains pulsates through ganga as a perennial source of water from times immemorial. The lotic water of river Ganga is closely wedded to human life that it is difficult to discern the service of river to the vast humanity. Ganga has been always looked upon with a sentiment of religious fervor for its pristine purity of water.

Kanpur is situated at 26.58° N latitude and 80.34°E longitude at an elevation of 110 meters from level on the Bank of river Ganga. The river receives domestic and industrial wastes and the water shows high degree of pollution. Algae have been reported from different localities of Kanpur. Algae are the organisms with multiple significance, more so they are looked upon as organisms for excellence in environmental studies. The environmental requirements of algae are little known. There are plenty of species capable of tolerating varying degree of organic pollution and hence can be used as indicators of organic pollution. There is evidence of algae as source of Pharmaceutical, medicine, cosmetic and food, (S. Pooja, 2014,), as organic pollution (Ingram and Palmar 1952; Kulikova 1960; Palmer 1980; Tripathi 1991). There are as yet only few studies exploiting algae as the biological indicators of pollution. (Palmer 1969; Moore 1974; Hosmani and Bharti 1980; Prasad and Singh 1982; Kant 1983; Somoshekar and Rama Swami 1983). But little is known about algae as source of toxin (Hughes, Gorban and Zehander 1958; Aziz 1979; Michael 1981). Significance of such pollution indicators have wide application for creation of cleaner water. Utilization of diatoms as biological indicators of water quality (Whitton 1975; Palmer 1980; Tripathi and Shukla 2001) are in nascent stage and need greater attention for monitoring and abatement of river pollution. There are certain diatoms which play an important role in disease spread (Shukla 1983; Nigam 1986; Tripathi 1991; Gupta 1991; Tiwari 1991) in cattle, animals and human beings. Role of diatoms as fish food is also in record (Venkatraman and Becker 1982; Shukla 1983; Tripathi and Shukla 2001) Diatoms have been reported from flowing water by Nair 1967; Shukla 1983; Tripathi and Shukla 1989; Tripathi, Gupta and Tiwari 1989; Tripathi 1991 from river Ganga water; Nigam 1980 from Agra canal Delhi. Present investigation deals with the role of algae in Ganga water as biological indicator of water quality vis-a-vis odor, toxicity, taste, pollution extent etc.

## II. RESULTS AND DISCUSSION

During present study a total number of 316 algal species spread over 83 chlorophyceae, 108 cyanophyceae, 121 bacillariophyceae, and 4 euglenophyceae were recorded from Ganga water between Bithoor to Jajmau .

### ROLE OF ALGAE IN MAINTAINING THE GANGA WATER QUALITY

Algae play a number of important roles in maintaining the Ganga water quality. Some important roles are as follows:

#### ALGAE CAUSING NATURAL SOFTENING OF WATER

Following algae have been earlier reported for causing natural softening of waters and have also been reported from Ganga river at various sampling stations between Bithoor and Jajmau

[1] *Anabaena* [2] *Cosmarium* [3] *Scenedesmus* [4] *Synedra*

#### EUTROPHIC ALGAE

Algae are invariably involved as representing part or most of the increased growth stimulated by eutrophication. The quantitative and qualitative assessment of algae in Ganga river stretching between Bithoor and Jajmau shows the growth of following algae indicating eutrophic state of water.

[1] *Actinastrum* [2] *Ankistrodesmus* [3] *Closterium* [4] *Cosmarium* [5] *Mougeotia* [6] *Oocystis* [7] *Pediastrum* [8] *Staurastrum* [9] *Sphaerocystis* [10] *Scenedesmus* [11] *Spirogyra* [12] *Ulothrix* [13] *Asterionella* [14] *Diatoma* [15] *Fragilaria* [16] *Gyrosigma* [17] *Melosira* [18] *Nitzschia* [19] *Synedra* [20] *Surirella* [21] *Anabaena* [22] *Calothrix* [23] *Lyngbya* [24] *Microcystis* [25] *Oscillatoria* [26] *Spirulina* [27] *Euglena*.

#### SEWAGE ALGAE

Following algae have been recorded from river Ganga between Bithoor and Jajmau which indicates the presence of sewage discharge in the river.

[1] *Ankistrodesmus* [2] *Actinastrum* [3] *Chlorococcum* [4] *Cladophora* [5] *Closterium* [6] *Cosmarium* [7] *Golenkinia* [8] *Oocystis* [9] *Pediastrum* [10] *Scenedesmus* [11] *Selenastrum* [12] *Sphaerocystis* [13] *Selenastrum* [14] *Stigeocionium* [15] *Spirogyra* [16] *Tetraedon* [17] *Zygnema* [18] *Cyclotella* [19] *Epithemia* [20] *Fragilaria* [21] *Gomphonema* [22] *Hantzschia amphioxys* [23] *Melosira* [24] *Navicula* [25] *Nitzschia* [26] *Surirella* [27] *Synedra* [28] *Anabaena* [29] *Calothrix* [30] *Lyngbya* [31] *Microcystis* [32] *Oscillatoria* [33] *Phormidium* [34] *Spirulina subtilissima* [35] *Euglena* [36] *Phacus*

#### ALGAE OF MEDICINAL IMPORTANCE

Algae listed below contain antibiotic substances and were found growing in the river Ganga stretching from Bithoor and Jajmau. This resource could be used for obtaining algal clones for mass culture of antibiotic substance, yielding algae.

[1] *Chlorella vuldaris* [2] *Hydrodictyon reticulatum* [3] *Lyngbya majuscula* [4] *Oscillatoria princeps*. [5] *Spirulina*

#### ALGAE OF ALLERGENIC SIGNIFICANCE

Following algae recorded during investigation are reported to cause allergenic diseases of skin bronchial tract and eye inflammation.

[1] *Chlorococcum humicola* [2] *Chlorococcum infusionum* [3] *Chlorella vulgaris* [4] *Scenedesmus acuminatus* [5] *Scenedesmus dimorphus* [6] *Scenedesmus obliquus* [7] *Scenedesmus prismaticus* [8] *Scenedesmus quadricauda* [9] *Scenedesmus abundans* [10] *Scenedesmus bijuga* [11] *Scenedesmus arcuatus* [12] *Anabaena sphaerica* [13] *Anabaena planktonica* [14] *Anabaena fertilissima* [15] *Anabaena oscillaroides* [16] *Microcystis aeruginosa* [17] *Nostoc Linckia var. arvens* [18] *Nodularia spumigena* [19] *Oscillatoria anguina* [20] *Oscillatoria limnetica* [21] *Oscillatoria okeni* [22] *Oscillatoria formosa*.

#### POLLUTION ALGAE

The variation in algal population at different points or under different conditions of organic pollution constitutes one of the indices that can be applied to any desired location in the stream to determine the presence or absence of domestic sewage or other putrescible wastes or to measure the degree of recovery from pollution. With these wastes the algae represent a conspicuous and significant group in this continuously changing population in a stream. Following algae have been recorded from Ganga river stretching from Bithoor and Jajmau which indicate the pollutional load in to river.



#### TASTE AND ODOR ALGAE TABLE-

Algae are the indicators of specific taste and odor and have been observed growing in Ganga river between Bithoor and Jajmau

[1] *Hydrodictyon reticulatum* [2] *Pediastrum tetras* [3] *Scenedesmus abundans* [4] *Cyclotella comta* [5] *Fragilaria construens* [6] *Synedra ulna* [7] *Anabaena circinalis* [8] *Anabaena planctonica* [9] *Microcystis aeruginosa* [10] *Cylindrospermum muscicola* [11] *Oscillatoria curviceps*.

#### TOXIC ALGAE

Following algae have been recorded from Ganda river stretching from Bithoor and Jajmau and reported as indicators of toxicity in waters probably due to production of toxins under circumstances of profuse growth.

[1] *Anabaena circinalis* [2] *Gloeotrichia echinulata* [3] *Lyngbya contorta* [4] *Micropystis aeruginosa* [5] *Microcystis flos-aquae* [6] *Nodularia spumigena*.

#### INDICATOR ALGAE

Following algae indicate the nature of pollution stage of waters and have been recorded from Ganga river at various stations between Bithoor and Jajmau.

[1] *Microcystis* [2] *Microcystis* [3] *Apkistrodesmus* [4] *Chlorella* [5] *Closterium* [6] *Cocconeis* [7] *Cyclotella* [8] *Gomphonema* [9] *Melosira* [10] *Navicula* [11] *Nitzschia* [12] *Oedogonium*. [13] *Oscillatoria* [14] *Phacus* [15] *Phormidium* [6] *Scenedesmus* [17] *Selenastrum* [18] *Stigeoclonium*. [19] *Synedra* [20] *Euglena*

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