

Physico-Chemical Studies and Diversity of Algae from River Panzara at Ner Village of Dhule, Maharashtra

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Abstract

Dhule district located between $20^{\circ}.98'$ and $22^{\circ}.3'$ North latitude and $73^{\circ}.47'$ and $75^{\circ}.11'$ East of longitude. River Panzara is a tributary of Tapti river.

Present paper deals with eleven physico-chemical characters of water from river Panzara of Ner village of Dhule. Study was carried out during July 2017 to January 2018. The diversity of freshwater algae was great in selected area. A total 23 genera belonging to Bacillariophyceae, Cyanophyceae, Chlorophyceae and Eugleniaceae were observed from this area.

Key Words: Physico-Chemical Parameter, Panzara, Dhule.

Introduction

Water is most vital resources for all kind of life. Such a water which is called life is becoming polluted by the activity of human beings through the increasing urbanization, industrialization developmental activities. The micro and macrophytes communities in a natural body are in definite order and they play an important role in keeping the water clean. However, pollution of any kind may alter the aquatic environment and there by affect the aquatic life.

Ganpati (1941, 1943) studied seasonal changes in physical and chemical conditions of garden pond. In Maharashtra hydrobiological studies were made by Gonzalves and Joshi (1943), Barhate and Tarar (1981), Goel et al (1985), Jagdale et al (1987), Nandan (1993), Ansari Ziya (1997).

Materials and Methods

i) **Collection of Water Samples:** Water samples for analysis were taken from

Panzara river by selecting 3 stations like S1, S2 and S3 bimonthly between 10 AM to 12 PM in acid washed 2-liter capacity plastic cans from the depth of 2-3 feet. For estimation of dissolve oxygen separate samples were collected in 250 ml BOD glass bottles and fixed in the field. Water temperature of each site was recorded periodically by using thermometer at the depth of about 2-4 cm., P^H of water was examined in the field at the time of collection by P^H paper and also checked by using buffer solution in laboratory.

ii) **Collection of algal samples:** Algal samples collected monthly. The attached and free-floating algal samples were collected and fixed with 4% formalin for further investigation.

iii) **Physico-Chemical analysis:** The Physico-chemical analysis of water samples of 3 stations of Panzara river was carried out by standard methods by APHA (1975) and Trivedi and Goel (1984). The changes in physico-chemical parameters such as water temperature, P^H , free CO_2 dissolved oxygen, carbonate, bicarbonate, total alkalinity, chloride, hardness and nitrate were recorded.

Results:

Physico-chemical analysis (Table-1)

- i) **Air Temperature:** The air temperature was obtained from Agricultural College, Dhule.
- ii) **Water Temperature:** Water temperature was recorded at all three stations. It was moderate during July to October, Low during November to January and Temperature rises gradually during January, it was $22.4^{\circ}C$ to $28.9^{\circ}C$.
- iii) **P^H :** The P^H values range from 7.00 to 7.9. Seasonal fluctuations were observed in P^H at all three stations.
- iv) **Dissolved Oxygen:** The dissolved oxygen ranged from 4.2 mg/lit. The maximum concentration of dissolved oxygen of 6.8 mg/lit was recorded in the month of October and minimum concentration in month of June.
- v) **Free CO_2 :** The values of free CO_2 ranged from 3.2 mg/lit. The maximum free CO_2 was recorded in the month of August and minimum in month of October.
- vi) **Total Alkalinity:** The highest concentration of total alkalinity value 148 mg/lit was recorded in the month of December and lowest 102 mg/lit in month of August. This may due to low rate of decomposition.
- vii) **Carbonate:** Phenolphthalein alkalinity is absent in all three stations
- viii) **Bicarbonate:** The values ranged from 102 mg/lit to 148 mg/lit. Highest in month of December and lowest in month of August.
- ix) **Chloride:** The values of chlorides are ranges from 46 mg/lit to 60.7 mg/lit. The maximum value 60.7 mg/lit was recorded in October and minimum 46 mg. Lit in August.
- x) **Hardness:** The values of hardness were ranged from 120 mg/lit to 150 mg/lit. The maximum value recorded 150 mg/lit in month of August and minimum 120 mg/lit in month of October.
- xi) **Nitrate:** The values of nitrate were ranges from 0.11 mg/lit to 0.26 mg/lit. The maximum value 0.26 mg/lit was recorded in October and minimum value 0.11 mg/lit in December.

Algal analysis: (Table-2)

The density of population of four groups viz. Bacillariophyceae, Cyanophyceae, Chlorophyceae and Euglenineae for different stations were studied from July 2017 to January 2018.

The highest population of algae was found in October. The maximum population of Chlorophyceae was recorded at three stations, while lowest population of Euglenineae was recorded at three stations. The maximum population of diatoms observed in December and minimum in in July.

Algal Composition: The algal flora was not constant at three stations through the investigation.

- a) **Bacillariophyceae:** Nine genera were mainly represented by species of *Cyclotella*, *Achnanthes*, *Calonies*, *Anornoeneis*, *Pinnularia*, *Navicula*, *Cymbella*, *Nitzschia* and *Gomphonema*. Diatoms were abundant at three stations.
- b) **Cyanophyceae:** Four genera were mainly represented by *Oscillatoria*, *Phormidium*, *Microcystis* and *Merismopedia*. All these observed abundantly when temperature starts increasing.
- c) **Chlorophyceae:** Eight genera were mainly represented by *Chlorella*, *Oocystis*, *Ankistrodesmus*, *Kircheriella*, *Scenedesmus*, *Cosmarium*, *Closterium* and *Ulothrix*. All these were abundant in all three stations.
- d) **Euglenineae:** This class consist only two genera *Euglena* and *Phacus*.

Table-1 The range and average value of physico-chemical parameters of 3 stations of Panzara river at Ner Village of Dhule.

| Sr. No. | Parameters | Stations-I | | Stations-II | | Stations-III | |
|---------|----------------------|---|---------------------|---|---------------------|--|---------------------|
| | | Range | Average | Range | Average | Range | Average |
| 1 | Air Temperature | 21.3 ⁰ C-32.2 ⁰ C | 28.5 ⁰ C | 21.3 ⁰ C-32.2 ⁰ C | 28.5 ⁰ C | 21.3 ⁰ C -32.2 ⁰ C | 28.5 ⁰ C |
| 2 | Water Temperature | 22.6 ⁰ C-28 ⁰ C | 26 ⁰ C | 22.4 ⁰ C-28.5 ⁰ C | 26.1 ⁰ C | 22.9 ⁰ C-28.9 ⁰ C | 26.4 ⁰ C |
| 3 | PH | 7.0-7.8 | 7.4 | 7.0-7.9 | 7.4 | 7.2-7.7 | 7.5 |
| 4 | Dissolved Oxygen | 4.6-6.4 | 5.5 | 4.3-6.8 | 5.5 | 4.2-6.7 | 5.4 |
| 5 | Free CO ₂ | 3.6-7.2 | 5.3 | 3.2-7.0 | 5.1 | 3.8-7.6 | 5.4 |
| 6 | Total Alkalinity | 102-142 | 123.25 | 110-148 | 126.0 | 107-145 | 125.0 |
| 7 | Carbonate | -- | -- | -- | -- | -- | -- |
| 8 | Bicarbonate | 102-142 | 123.25 | 110-148 | 126.0 | 107-145 | 125.0 |
| 9 | Chloride | 46.0-60.2 | 54.5 | 48-59.3 | 55.8 | 46.2-60.7 | 55.8 |
| 10 | Hardness | 120-140 | 130.5 | 124-146 | 133.0 | 126-150 | 133.7 |
| 11 | Nitrate | 0.12-0.23 | 0.15 | 0.11-0.26 | 0.17 | 0.13-0.24 | 0.16 |

- All parameters are expressed in mg/lit except air temperature and water temperature and P^H.

Table-2 Algal taxa recorded from 3 stations of Panzara river at Ner village of Dhule.

| Group | Genera | Station-I | Station-II | Station-III |
|-------------------|-----------------------|-----------|------------|-------------|
| Bacillariophyceae | <i>Cyclotella</i> | + | + | - |
| | <i>Achnanthes</i> | + | - | + |
| | <i>Caloneis</i> | - | + | - |
| | <i>Anornoeneis</i> | - | + | + |
| | <i>Pinnularia</i> | + | - | + |
| | <i>Navicula</i> | + | + | - |
| | <i>Cymbella</i> | + | + | + |
| | <i>Nitzschia</i> | + | - | + |
| | <i>Gomphonema</i> | + | - | + |
| Cyanophyceae | <i>Oscillatoria</i> | + | + | + |
| | <i>Phormidium</i> | + | + | + |
| | <i>Microcystis</i> | + | + | - |
| | <i>Merismopedia</i> | + | - | + |
| Chlorophyceae | <i>Chlorella</i> | + | - | + |
| | <i>Oocystis</i> | + | + | + |
| | <i>Ankistrodesmus</i> | + | + | + |
| | <i>Kircheriella</i> | - | - | - |
| | <i>Scenedesmus</i> | + | + | + |
| | <i>Cosmarium</i> | + | + | + |
| | <i>Closterium</i> | + | + | + |
| | <i>Ulothrix</i> | + | - | - |
| Euglenineae | <i>Euglena</i> | + | + | - |
| | <i>Phacus</i> | - | + | + |

Discussion:

The climate of Ner village is more or less dry divided into three distinct seasons, winter, summer and monsoon. Summer characterized high temperature, bright sunlight and hot climate. Winter season records low temperature with cloudless sky.

Average air and temperature are more or less in present investigation. Similar observations by Nandan and Patel (1984a).

The water temperature plays an important role in controlling the occurrence and abundance of algal flora. Nazneen (1980), Nandan and Patel (1984 a, b) it was verified in present investigation. P^H of water showed clearly direct relationship to dissolved oxygen. Nitrate showed relationship to P^H and free CO₂ reported by Zafar (1964) and Nandan (1983). Kant and Kachroo (1971) showed the effect of P^H on phytoplankton

population abundance. In present investigation nearly three stations showed alkaline nature. The concentration was greater in high temperature agreeing with the workers Zafer (1964), Munawar (1970). Green algae and diatoms were predominant in the three stations. Their seasonal percentage was greater as compared to the other groups as confirming the results of Nandan and Patel (1985). The members of Euglenoids were recorded very less at three stations.

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