



Diversity in Zooplankton at Sagra Talab of District Gonda, Uttar Pradesh, India

R.B.Tripathi¹ and Anjani Kumar Shukla²

¹P.G. Department of Zoology, M.L.K.P.G. College, Balrampur (U.P.), India

²P.G. Department of Zoology, Kisan P.G.College, Bahraich (U.P.), India

Corresponding author: R.B., Tripathi, E-mail: drbtripathi.77@gmail.com

Abstract

The zooplankton constitute is an important component of freshwater talab biodiversity in which a large number of organisms depend throughout the year. Freshwater zooplankton is an important component in aquatic ecosystem whose main function is to act as primary and secondary link in the food chain.

In the present study samples were collected from the littoral, pelagic and polluted region at Sagra talab of district Gonda, Uttar Pradesh State from October 2019 to September 2020 on the monthly basis for the study of diversity in zooplankton. During the present investigation, a total of 24 genera and 23 families of zooplankton belonging to four major groups viz. Protozoan, Rotifers, Crustacean and Meroplanktonic organisms. The maximum Heterogeneity index of zooplankton was recorded in the month of May ('H': 0.94) and minimum in the month of February ('H': 0.14). Zooplankton showed distinct qualitative and quantitative variations. Number of zooplankton increased in the summer months while decreased in the winter months. Different groups of zooplankton exhibited their distinct peaks in different months of the year. In Sagra talab, meroplanktonic organisms have been found to be dominant among zooplankton, generally Anopheles larvae, Culex larvae, Eristalis larvae and Ptychoptera larvae present in water body, which indicate the polluted nature of the talab. Thus keeping in view the importance of study, steps should be taken for conservation and maintenance of Sagra talab.

Keywords: Zooplankton, diversity and Sagra talab.

Introduction

Lakes and talabs are freshwater habitats for aquatic plants and animals which play a key role in maintaining regional biodiversity. The important component of the ecological pyramid of the freshwater ecosystem is plankton. Planktonic communities in natural aquatic ecosystem serve as a key group for energy production (Mishra, 1968).

All aquatic animals depend directly or indirectly on the plankton and a healthy zooplankton community in aquatic ecosystem is necessary for productivity of the system. Zooplankton form a component of grazing

ARTICLE INFO

Article History:

Received 5th December 2020

Received in revised form 17th December, 2020

Accepted 3rd January, 2021

Published online 30th January, 2021

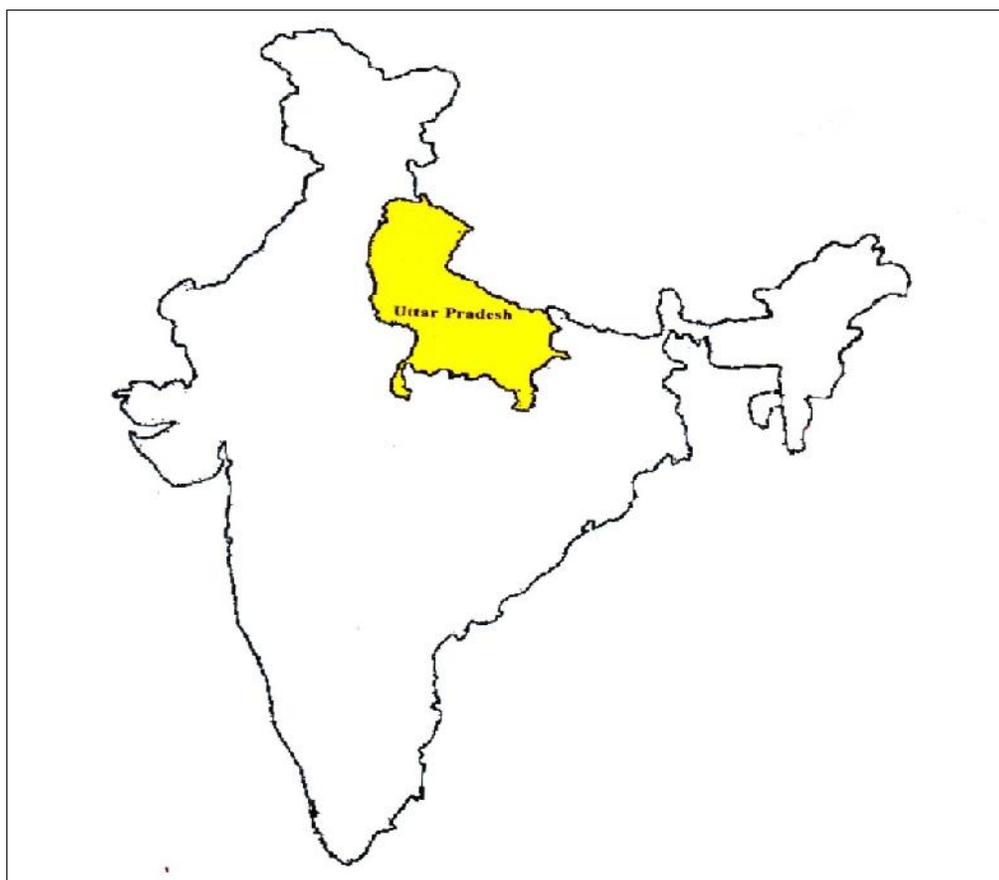
food chain in aquatic ecosystem and these are useful in cycling the organic matter in an aquatic ecosystem. Zooplankton are present in each and every water body of the world with different characteristics and different trends in their diversity and density associated with the fluctuating water parameters. Every lake and pond has unique kind of zooplankton which fluctuate monthly as well as seasonally with respect to seasonal water parameters of the talab basin. The studies of zooplankton in our country were undertaken by investigators like Jha (1968), Mishra (1968), Sahai (1969), Chaturvedi (1999), Sharma and Hussain (2001), Tripathi (2006,a), Lalita Sukhija (2007), Ahmad (2012), Tripathi (2016), Singh (2019) and Tripathi (2019).

But still the studies on qualitative and quantitative assessment of a Sagra talab ecosystem in city of district Gonda, Uttar Pradesh state region are not taken for research by any investigator. Looking from this point of view the diversity in zooplankton at Sagra talab studies were undertaken to know the types of zooplankton present during the study period.

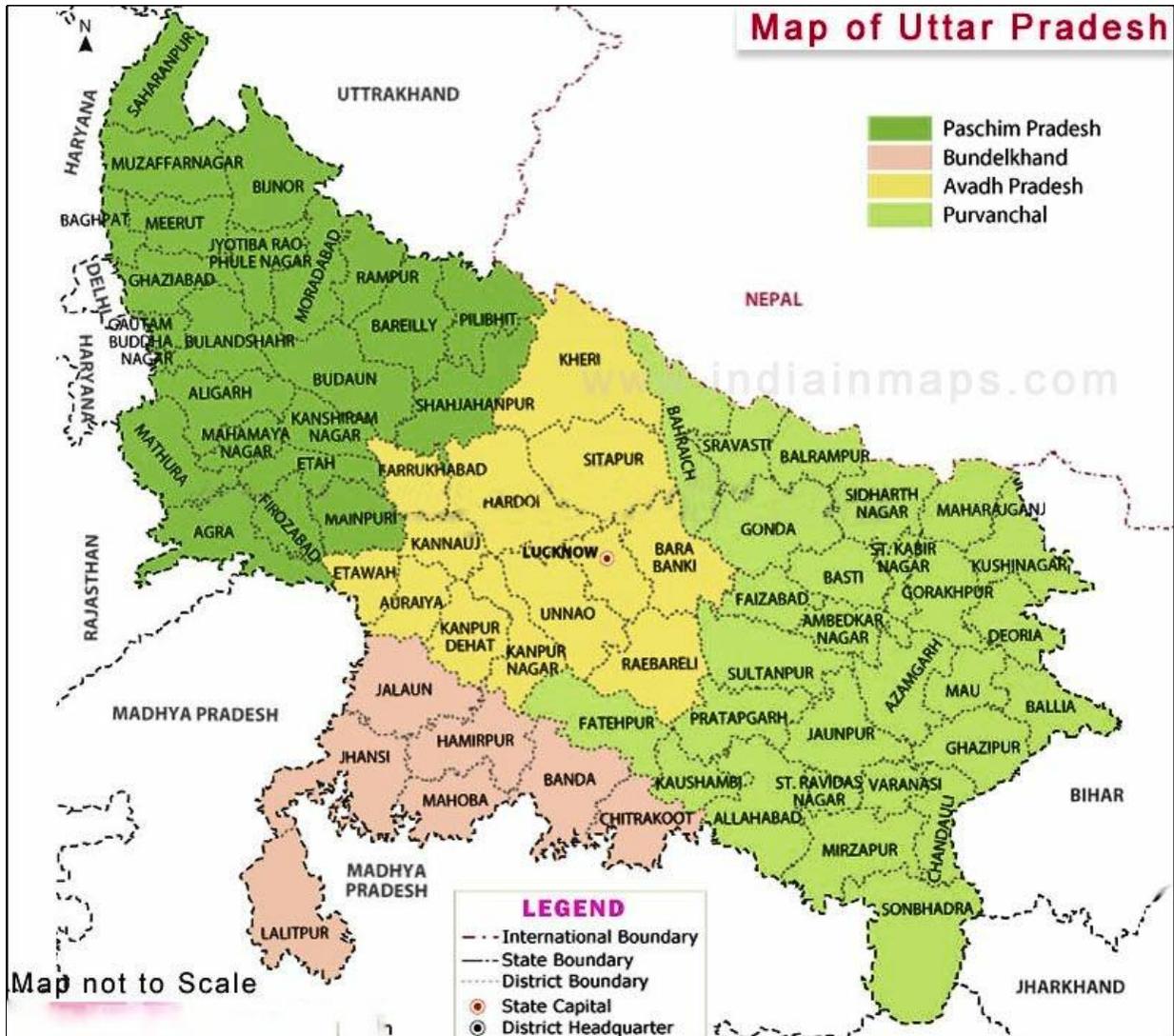
Materials and Methods

Location of study area: Gonda district is located in Devipatan commissionerary in Puravanchal of Uttar Pradesh state. District Basti on the eastern boundary, Bahraich district in the west, Balrampur district in the north and Faizabad and Barabanki district in the south. In the map of the world, the district Gonda is situated between 26°41' to 27°51' degrees north latitude and 81°30' to 82°06' east in the middle of the longitude. The total area of district is 4003 Sq km, which is 28.13% of area of the Devipatan commissionerary (Map-1, 2 & 3).

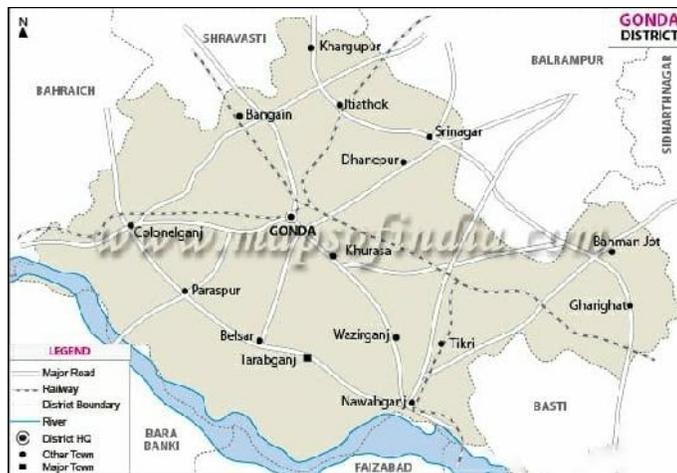
Sagra talab is located in city at the bus station road, Jhanjhari block of district Gonda. The Sagra talab constructed by Maharaja Devi Bakash Singh's ancestor is still increasing the beauty of the city and covers the area about 12 acres (Fig.-1).



Map -1: Location of study area in India



Map -2: Location of study area in Uttar Pradesh



Map-3: Location of district Gonda (U.P.), India



Fig.-1: Sagra talab in city of district Gonda

Sampling and preservation:

Zooplankton samples at Sagra talab were collected during first week of each month between 09.00 AM to 11.00 AM. They were taken from different sampling stations fixed up in littoral region (Site-I, Site-II), pelagic region (Site-III, Site-IV) and polluted region (Site-V, Site-VI, Site-VII) and were transported to the laboratory of P.G. Department of Zoology, M.L.K.P.G. College, Balrampur, Uttar Pradesh.

For the collection of zooplankton, plankton net which is a ring type terricot net (24 mesh /mm²) was used. Total of 10 liters of water was filtered through plankton net and the filter water was collected in 125 ml reagent bottle. The zooplankton were preserved in 5% formaldehyde solution on the spot and were brought to the laboratory for identification. For the identification of zooplankton using standard taxonomic literatures (Ward and Whipple, 1959). Zooplankton community composition, percentage abundance and heterogeneity index worked out according to Mishra (1968).

Results and Discussion

During present investigation, total of 24 genera and 23 families of zooplankton belonging to four major groups viz. Protozoan, Rotifers, Crustacean and Meroplanktonic organisms have been reported from seventh selected site at

Sagra talab for a period of one year October 2019 to September 2020. Monthly variation of zooplankton community is documented in Table-1 and zooplankton diversity Heterogeneity index is documented in Table-2. The maximum zooplankton genera recorded at polluted region followed by littoral and pelagic region respectively. In Sagra talab among Protozoan: *Amoeba* sp. (Amoebidae), *Arcella* sp. (Arcellidae), *Diffugia* sp. (Diffugiidae), *Euglena* sp. (Euglenaceae), *Loxodes* sp. (Loxodidae) and *Trichodina* sp. (Trichodinidae) recorded from all sites. Among Rotifers: *Brachionus* sp. (Brachionidae), *Euchlanis* sp. (Euchlanidae), *Filinia* sp. (Filinidae), *Lecane* sp. (Lecanidae), *Lepadella* sp. (Colurellidae) and *Trichocerca* sp. (Trichocercidae) recorded from all sites. Among Crustacean: *Bosmina* sp. (Bosminidae), *Daphnia* sp. (Daphniidae), *Diaptomus* sp. (Diaptomidae), *Moina* sp. (Moinidae), *Polyphemus* sp. (Polyphemidae) and *Sida* sp. (Sididae) recorded from all sites. Among Meroplanktonic organisms: *Anopheles* larvae (Culicidae), *Culex* larvae (Culicidae), *Eristalis* larvae (Syrphidae), *Ptychoptera* larvae (Ptychopteridae), *Tabanus* larvae (Tabanidae) and *Hydroporus* larvae (Dytiscidae) recorded from all sites. The maximum heterogeneity index of zooplankton was recorded in the month of May ('H'-0.94) and minimum in the month of February ('H'-0.14) is documented in Table-2.

Table-1: Monthly variation of zooplankton community recorded from Sagra talab of district Gonda, Uttar Pradesh, India

(Data of October 2019 to September 2020)

| S.No | Zooplankton | Months | | | | | | | | | | | |
|------|--|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| | | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
| | Genera | | | | | | | | | | | | |
| | Protozoa | | | | | | | | | | | | |
| 1 | Amoeba sp. Family-Amoebidae | + | + | - | + | + | + | + | + | + | + | + | + |
| 2 | Arcella sp. Family-Arcellidae | + | + | + | - | - | + | + | + | + | + | + | + |
| 3 | Diffflugia sp. Family-Difflugiidae | + | + | - | + | + | - | + | + | + | + | + | + |
| 4 | Euglena sp. Family-Euglenaceae | + | + | + | - | + | + | + | + | + | - | + | + |
| 5 | Loxodes sp . Family-Loxodidae | + | + | - | + | - | - | + | + | + | + | + | - |
| 6 | Trichodina sp. Family-Trichodinidae | + | - | - | + | - | + | + | + | + | + | + | + |
| | Rotifera | | | | | | | | | | | | |
| 7 | Brachionus sp. Family-Brachionidae | - | - | - | + | + | - | + | + | - | + | - | - |
| 8 | Euchlanis sp. Family-Euchlanidae | + | + | + | - | - | + | - | + | + | + | + | + |
| 9 | Filinia sp. Family-Filiniidae | + | - | + | - | - | + | + | + | + | + | + | + |
| 10 | Lecane sp. Family-Lecanidae | + | + | - | - | - | - | - | + | + | + | + | + |
| 11 | Lepadella sp. Family-Colurellidae | + | - | + | - | - | - | - | + | + | + | + | + |
| 12 | Trichocerca sp. Family-Trichocercidae | + | - | - | + | - | + | + | + | - | + | - | + |
| | Crustacea | | | | | | | | | | | | |
| 13 | Bosmina sp. Family-Bosminidae | + | - | - | - | - | - | + | + | + | - | - | + |
| 14 | Daphnia sp. Family-Daphniidae | + | - | - | - | - | - | - | + | + | - | - | + |
| 15 | Diaptomus sp. Family-Diaptomidae | + | - | + | - | - | - | - | + | + | - | + | - |
| 16 | Moina sp. Family-Moinidae | - | + | - | - | - | + | + | + | - | + | + | - |
| 17 | Polyphemus sp. Family-Polyphemidae | - | - | + | + | - | + | - | + | - | + | - | + |
| 18 | Sida sp. Family-Sididae | + | + | + | - | - | + | + | + | + | - | - | + |
| | Meroplankton | | | | | | | | | | | | |
| 19 | Anopheles larvae Family-Culicidae | + | + | + | + | + | + | + | + | + | + | + | + |

| | | | | | | | | | | | | | |
|----|---|----|----|----|----|----|----|----|----|----|----|----|----|
| 20 | Culex larvae Family-Culicidae | + | + | + | + | + | + | + | + | + | + | + | + |
| 21 | Eristalis larvae Family-Syrphidae | + | + | + | + | - | + | + | + | + | + | + | + |
| 22 | Ptychoptera larvae Family-Ptychopteridae | + | + | + | - | - | + | + | + | + | + | + | + |
| 23 | Tabanus larvae Family-Tabanidae | + | + | + | - | - | + | + | + | + | + | + | + |
| 24 | Hydroporus larvae Family-Dytiscidae | + | + | + | - | - | + | + | + | + | + | + | + |
| | Total Zooplankton | 21 | 15 | 14 | 10 | 06 | 16 | 18 | 24 | 20 | 19 | 18 | 20 |

Note : + = Present
- = Absent

Table 2: Heterogeneity index of Zooplankton in different months at Sagra talab of district Gonda (U.P.), India (Data of October 2019 to September 2020)

| Months | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
|--------|------|------|------|------|------|------|------|------|------|------|------|------|
| 'H' | 0.28 | 0.22 | 0.19 | 0.17 | 0.14 | 0.45 | 0.64 | 0.94 | 0.90 | 0.77 | 0.80 | 0.70 |

During the presence of zooplankton was maximum in the summer month (May) and minimum in the spring month (February). This is not conformity to the finding of Eggleton (1931) and Devey (1945) who observed the maximum zooplankton in the month of April and minimum in the month of September in an American lake, while Srivastava (1956) and Tripathi (2006,b) observed maximum in the month of May and minimum in the month of February from lake of Lucknow (U.P) and Seetadwar lake of district Shravasti, Uttar Pradesh state, India, Michael (1969) concluded the peak period in the month of January and April but Mandal and Moitra (1975), Jana and Manna (1975) and Bose & Lakara (1994) found maximum peak during summer months which is quite in conformity to the findings of this investigation. The differences in the occurrence of peak in zooplankton might be due to different nature of the water bodies, difference in the composition of abiotic factors of water, soil and variation in productivity of water bodies. Some workers such as Bhati and Rana(1987), Chaurasia (1996) and Singh (2000) correlated bottom community with the fish productivity and accordingly this water body is most suitable for the pisciculture.

Conclusion

The present contribution is the result of the extensive and intensive studies on diversity in zooplankton at Sagra talab carried out during October 2019 to September 2020. During

present investigation in Sagra talab, meroplanktonic organisms have been found to be dominant among zooplankton and generally Anopheles larvae, Culex larvae, Eristalis larvae and Ptychoptera larvae present in Sagra talab which indicate the polluted nature of talab. Thus keeping in view the importance of study, steps should be taken for conservation and maintenance of Sagra talab. It is the necessarily step which have to be followed for the safety of Sagra talab.

References

- 1: Ahmad , U. Parveen, S. Mola, HRA, Kabir, H. A. and Ganai, A.H. (2012): Zooplankton population in relation to physico-chemical parameters of Laldiggi pond in Aligarh, India. J. Environ. Biol. 33:1015-1019.
- 2: Bhati, D.P.S. and Rana, K.S. (1987): Zooplankton in relation to abiotic components in the Fortmoat of Bharatpur. Proc. Nat. Acad. Sci., India, 57(B) III: 237-242.
- 3: Bose, S.K., Lakra, M.P. (1994): Studies on macro zoobenthos of two freshwater ponds of Ranchi, Bihar. J. Freshwater Biol., 6(2): 135-142
- 4: Chaturvedi, R.K.(1999): Plankton community of polluted water around Sanganer, Jaipur. J. Env. Poll.Tech, 6(1): 77-84.
- 5: Chaurasia,S.(1996): Seasonal fluctuation of zoo plankton in Burha tank water, Raipur, India. J. Environ. Prot., 16(2): 140-142.

- 6: Devey, E (1945): Limnological studies Connecticut, VI. The quantity and composition of bottom fauna of 36 Connecticut and New York lakes. *Ecol.Mongr.*, 21: 7-92.
- 7: Eggleton, F.E. (1931): A limnological study of profound bottom fauna of certain fresh water lakes. *Col. Mon.* 1: 231-232.
- 8: Jana, B.B. and Manna, A.K. (1975): Seasonal changes of benthic invertebrates in two tropical fish ponds. *J. Freshwater Biol.*, 7: 129-136.
- 9: Jha, U.N. (1968): Productivity of pond ecosystem, Ph.D.Thesis of B.H.U. Varanasi (U.P.), India.
- 10: Lalita Sukhija (2007): Seasonal variation in zooplankton population in relation to physico-chemical characteristics of water of Kayad lake near Ajmer (Rajasthan). *Nat. Env. Poll. Tech.*,6 (2): 299-302.
- 11: Mandal, B.K.and Moitra, S.K. (1975): Studies on bottom fauna of a freshwater pond at Burdwan .J. *Inland. Fish.Soc.*, 8: 34-38.
- 12: Michael, R.G. (1969): Studies on bottom fauna in atropical freshwater pond. *Hydrobiologia*, 31(1): 203-229.
- 13: Mishra, R. (1968): Ecology work book, Oxford and IBH Publ.Co. Calcutta.
- 14: Sahai, A.B.(1969): Investigation on the ecology of Ramgarh lake, Gorakhpur. Ph.D. Thesis of Gorakhpur University, Gorakhpur (U.P.), India.
- 15: Sharma, U.P. and Hussain, M.D. (2001): Abundance, ecology and zooplankton in a tropical flood plain lake, Assam, India. *Evil. Env. Conser.*, 7(4): 397-403.
- 16: Singh, D.N.(2000): Seasonal variation of zooplankton in tropical lake. *Geobios*, 27: 97-100.
- 17: Singh, K, Tripathi, R.B. and Singh, I. (2019): Study of zooplankton population in Baghel talab of district Bahraich (U.P.), India. *Int. J. Recent Sci.Res.*, 10(07): 33847-33849.
- 18: Srivastava ,V.K. (1956): Bottom organisms of a freshwater fish tank. *Curr. Sci.*, 23: 158-159.
- 19: Tripathi, R.B., Singh, I. and Tewari, D.D.(2006,a): Qualitative and quantitative study of zooplankton in Seetadwar lake of Shravasti (U.P.), India. *J. Flora and Fauna*, 12(1): 37-40
- 20: Tripathi, R.B., Singh,I., Tewari,D.D. and Pathak, M. (2006,b): Composition, abundance and distribution of zooplankton in Seetadwar lake of Shravasti (U.P.), India. *J.Bioved*, 17(1,2): 135-137.
- 21: Tripathi, R.B., Shukla, A.and Singh,I. (2016): Water quality of Seetadwar lake of Shravasti U.P.in relation to physico-Chemical characteristics of zooplankton. *J.Flora and Fauna*, 22 (2): 257-262.
- 22: Tripathi, R.B., Shukla, A and Singh,I. (2019): Study of zooplankton diversity in Chittaura Jheel of district Bahraich (U.P.), India. *Int. J. Recent. Sci. Res.*10(7): 33497-33499.
- 23: Ward, H.B. and Whipple, G.C. (1959): *Freshwater Biology*, 2nd Edn.John Wiley &Sons, New York, 1248.

| Access this Article in Online | |
|--|--|
|  | Website: www.ijarbs.com |
| Quick Response Code | Subject: Biodiversity |
| DOI: 10.22192/ijarbs.2021.08.01.002 | |

How to cite this article:

R.B.Tripathi and Anjani Shukla. (2021). Diversity in Zooplankton at SagraTalab of District Gonda, Uttar Pradesh, India. *Int. J. Adv. Res. Biol. Sci.* 8(1): 7-13.
 DOI: <http://dx.doi.org/10.22192/ijarbs.2021.08.01.002>