Biannual Open Access Journal
Peer-Reviewed/Refereed International Journal
JOURNAL OF GLOBAL RESOURCES
ISDESR, Jaipur, India

www.isdesr.org

ISSN: 2395-3160 (Print)
ISSN: 2455-2445 (Online)
January 2024, Volume 10 (01)
DOI Prefix: 10.46587/JGR

08

ANALYSING THE TOLERANCE LIMIT OF GUMBUSIA AFFINIS IN DIFFERENT COMPOSITIONS OF SEWAGE WATERINOCULATED IN FRESHWATER ECOSYSTEM

Sabiha Khan[1] and **Monika Jangir**[2]
[1]Professor [2]Research Scholar
Department of Zoology, S. P. C. Govt. College, Ajmer (Raj.) India
Email: jangirmj86@gmail.com

How to cite this paper:
Khan Sabiha and Jangir Monika (2024) Analysing the tolerance limit of Gumbusia affinis in different Compositions of Sewage Water Inoculated in Freshwater Ecosystem, Journal of Global Resources, Vol. 10 (01)

DOI:
10.46587/JGR.2024.v10i01.008

Received: 25 Oct. 2023
Reviewed: 27 Nov. 2023
Final Accepted: 15 Dec. 2023

Abstract: *In the current article, research has been developed for analysing the tolerance level of gambusia affinis in different compositions of sewage water inoculated in a freshwater ecosystem. To understand the different water composition impact three water sources has been selected. A lab test has been performed and the chemical and microbiological result is extracted. Used water resources sample of the research include central sewage water. peripheral sewage water and raw water. Data analysis has been developed for extracted results of different composition values of water resources. The probability of growth of microorganisms has been evaluated here. Findings have been developed by comparing three sources for knowing the impact of gambusia affinis.*

Key words: Sewage Water, Chemical Test, Gambusia affinis, Microbiological Result

Introduction

The current article has been developed for analysing the effect of different compositionsof sewage water in the freshwater ecosystemson gambusia affinis in Jhunjhunu, Rajasthan. For the understanding of the impact, three types of water sources have been used as an analysis area. Chemical analysis and microbial analysis have been performed for each selected water source in the current research.

Problem Statement

The presence of the endocrine disrupting chemicals in wastewater affects aquatic life. Direct discharging practices make the growing concern for the efficiency of gambusia affinis life cycle (Sanjaya et al.2021). Different containing composition according to standard parameter makes the growing concern for the destructive impact on the aquatic environment.

Research Aim and Objective

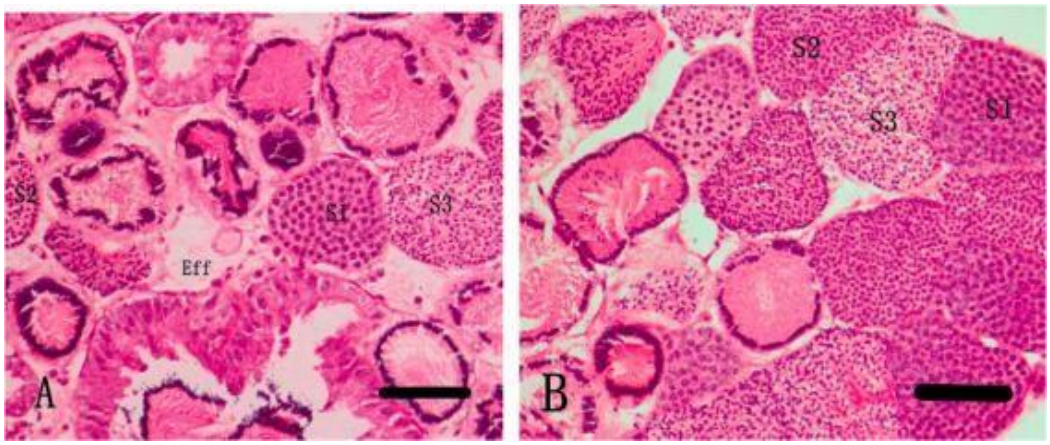
Aim: Current research is aimed at analyzing the tolerance limit of gambusia affinis in different compositions of sewage waterinoculated in freshwater ecosystems.

Objectives:

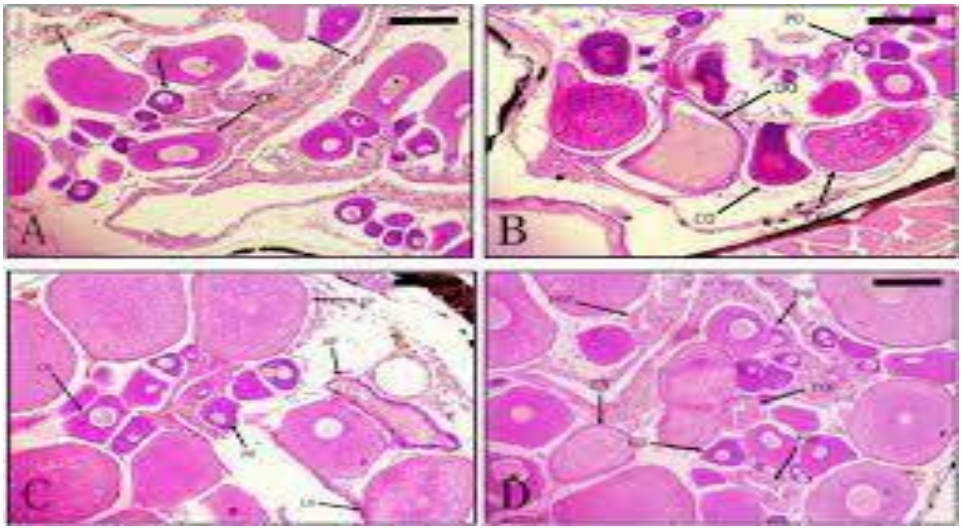
- To analyze the tolerance limits of gambusia affiis for different compositions of water.
- To analyze the existing different sources parameters and probability of growth of microbial population.
- To analyze the impact of chemical parameterincreasing impact for the life cycle o aquaticlives.

Methodology

For the current research, observation has been made for fresh and sewage water composition. Chemical and microbiological analysis has been developed for the understanding of the different existing compositions and impacts over the life of gambusia affinis. Three sources have been selected for composition observation that includes raw water, peripheral sewage and central sewage water. As per Ashraf et al. (2020) composition observation makes the understanding scope for the parameter difference from which the life cycle of microorganism growth is affected. The presence of microbial analysis for E. coli andcoliform makes the impact clearer for thethree types of water sources selected for the current research.



Microscopic image of Gumbusia affinis



Culture Media of Gumbusia affinis

Data Analysis

For the analysis of the different water sources' impact on gambusia affinis differentsources have been selected. The first selectedfor the analysis are the center sewage water, raw water and peripheral sewage water. Selected three samples have been tested in the Omega test house. Behera et al. (2018) stated that from the chemical analysis of center sewage water, it has been noticed thatthe odour of this water source is objectionable whereas the source of raw water odour is agreeable and objectionable odour is noticed for peripheral sewage water. Analyzed turbidity for peripheral sewage water is 178 NTU which for raw water is 0.24 NTU and 153 NTU for central sewage water.Comparison value has been dejected for the selected three water sources for the current research. The pH value of central sewage water is detected as 6.88 which for peripheralsewage water is 7.41 and becomes 7.57 for raw water.

Table 01: Comparison of Three Used Water Sample

Water Quality Parameter	Raw Water	Periphery Sewage Water	Central Sewage Water
Turbidity	0.24 NTU	178 NTU	153 NTU
pH	7.57	7.41	6.88
Total Dissolved Solid	1650 mg/L	585 mg/L	650 mg/L
Total hardness $CaCO_3$	583.52	148.53	201.58 mg/L
Mg (mg/L)	108.18	12.87	20.60
Cl (mg/L)	507.28	119.64	138.78

Source: Calculated by Author

Analyse the total dissolved solid value of rawwater is 1650 mg/l, which for peripheral sewage water is 585 mg/Land 650 mg/L for peripheral sewage water is 38.22 mg/L whichis higher for central sewage water at 46.72mg/L (Zhou et al. 2018). Mg presence ofcentral sewage water is noticed is 20.60 mg/L which is higher in raw water at 108.18 mg/L and 12.87 mg/L for peripheral sewage water. Cl value noticed for peripheral sewage wateris 119.64 mg/L and for raw water, the value ishigher 507.28 mg/L and lower for central sewage water which is 138.78. Identified alkalinity ($CaCO_2$) for central sewage water is nil and the same for peripheral sewage water. Raw water is also the same as nil. Alkalinity ($CaCO_3$) value is different for three used sources. 483mg/L for raw water and for central sewage the detected alkalinity value is 345 and for peripheral sewage water, it is 333.50mg/L. As per Benaventeparedes (2021) the detected nitratevalue for peripheral sewage water is 13mg/L which is higher for the raw water sources. The detected higher value of raw water is 239.43

mg/L and for peripheral sewage water central sewage water. 201.58 mg/L total hardness of $CaCO_3$ is noticed for central sewage water. 583.52 mg/L is the value of total solid of $CaCO_3$ for raw water which remains at the standard value of 200-600max.148.53mg/L is the hardness of $CaCO_3$ noticed for peripheral sewage water. Ca as calcium hardness value is identified for it is 13 mg/L.

The sulphate value detected for peripheral sewage water is 46.39 mg/L, which for raw water is 245.83 mg/L and for central sewage, it is 48.84 mg/l. Identified Ferrous value for central sewage water is <0.01 which is the same for raw water and also for peripheral sewage water. The sodium value for peripheral sewage water is 203.40 mg/L which for raw water is 53.22. 90mg/L is the sodium value for central sewage water. The staining method used for analyzing the tolerance limit of Gumbusia affinis indifferent compositions of sewage water inoculated in freshwater ecosystem is called the Fluorescence in Situ Hybridization (FISH) method. This method is used to detectand quantify the presence of specific microbial targets in complex microbial communities, such as in sewage watersamples. The FISH method involves the use of fluorescently labelled oligonucleotide probes that hybridize specifically to the targetorganism. The hybridized probes can then bedetected and quantified using a fluorescence microscope. This method allows for rapid and sensitive detection of the target organism, even in the presence of other non-target organisms. The Staining Method is a method used in the analysis of tolerance limits of aquatic organisms. This method is used to measure the amount of dissolvedoxygen in water samples. The Staining Method requires the use of a stain, such as methylene blue, which is added to the water sample. The stain binds to the oxygen molecules in the water, and the staining intensity is then measured to determine the amount of oxygen present in the sample. This method is often used to measure the amount of oxygen present in sewage water, and to determine how tolerant aquatic organisms, such as Gumbusia affinis, are to different compositions of sewage water.

The Staining Method is a technique used to analyze the tolerance limit of micro-organisms like Gumbusia affinis in different compositions ofsewage water inoculated in freshwater ecosystem. The Staining Method is based ona differential staining technique, which isused to identify the different functional groups of microorganisms present in the sample. The Staining Method involves the use of two stains that are used separately and consecutively to identify and count the different microbial species present in the sample. The first stain is called the primary stain and it is used to identify and count the different functional groups ofmicroorganisms present in the sample. The second stain is called the secondary stain andit is used to further differentiate the differentfunctional groups of microorganisms present in the sample. The Staining Method is used to determine the tolerance limit of Gumbusia affinis in different compositions of sewage water inoculated in freshwater ecosystem.

Findings

For the current research chemical and microbial analysis has been developed for theselected three water sources. From theobservation, it has been detected that alkalinity ($CaCO_2$) is the same for three sources. IS: 3025 (P-23) has been used for this analysis. Biochemical oxygen demand isnoticed at 90 mg/L for central sewage water (Fierascu et al. 2021). E.coli is present in central sewage water and peripheral sewage water but is absent in raw water. Coliform bacteria are present in three of the selectedwater sources. Total dissolved solid has been noticed high for the raw water sources. Identified calcium hardness seems high in raw water compared to the other two sources.

Conclusion

From the above research scope of understanding the tolerance levels of Gambusia affinis for different water, compositions have been developed. For this understanding of tolerance level differences,three water sources have been selected that include raw water, peripheral sewage water and central sewage water. Chemical and microbiological analysis has been developed for evaluating the different water compositions that affect the life of the aquaticenvironment. Observing parameters have been analyzed for three sources so that impactcan be better understood.

References

1. Ashraf, S., Naveed, M., Afzal, M., Ashraf, S.,Ahmad, S.R., Rehman, K., Zahir, Z.A. andNúñez-Delgado, A., 2020. Evaluation oftoxicity on Ctenopharyngodonidella due totannery effluent remediated by constructedwetland technology. *Processes*, *8*(5), p.612. Behera,B.K., Das, A., Sarkar,D.J.,
2. Benavente Paredes, J.N., 2021. *The role of contemporary evolution shaping the response to warming of a globally important freshwater consumer* (Doctoral dissertation, Research Space@ Auckland).
3. Fierascu, I., Fierascu, R.C., Ungureanu, C., Draghiceanu, O.A. and Soare, L.C., 2021.Application of Polypodiopsida Class in Nanotechnology–Potential towards Development of More Effective BioactiveSolutions. *Antioxidants*, *10*(5), p.748.
4. Sanjaya, W.T.A., Khoirunhisa, N.S., Ismiani,S., Hazra, F. and Santosa, D.A., 2021. Isolation and characterization of mercury-resistant microbes from gold mine area in Mount Pongkor, Bogor District,
5. Weerathunge, P., Parida, P.K., Das, B.K., Thavamani, P., Ramanathan, R. and Bansal, V., 2018. Polycyclic Aromatic Hydrocarbons (PAHs) in inland aquatic ecosystems: Perils and remedies through biosensors and bioremediation. *Environmental pollution*, *241*, pp.212-233.