International Journal of Scientific Research & Engineering Trends
Volume 9, Issue 6, Nov-Dec-2023, ISSN (Online): 2395-566X

Analysis of River Water and its Effects on Seed Germination on Chickpea (Cicer Arietinum)

Sachin kumar[1], Vikas kumar[2], Sanjeev Tyagi[3], Vipin Kumar Saini[4], Ankit kumar[5], Saba Rana[6], Disha Sharma[7]
Department of Biosciences, Shri Ram College, Muzaffarnagar[1,2,4,5,6,7]
Department of Botany, DAV College, Muzaffarnagar[3]

Abstract- This research paper investigates the ecological and environmental dynamics along the banks of the Black River near Shamli Bus Stand in Muzaffarnagar, Uttar Pradesh, India. The study addresses the pressing challenges posed by water pollution and scarcity in the region, exacerbated by industrial and sewage contamination of groundwater resources. Through meticulous surveying and collection of vegetation samples, coupled with comprehensive physio-chemical analysis of water samples, the study provides valuable insights into the current state of the river ecosystem. The methodology employed rigorous sampling techniques and standardized analysis procedures to gather accurate data on vegetation dynamics and water quality parameters. The results highlight the relatively uncontaminated nature of the Black River entry point at Shamli Road, alongside deviations from water quality standards in terms of electrical conductivity, total dissolved solids, dissolved oxygen, and total hardness. Additionally, the study explores the impact of Black River water on plant growth through seed germination experiments, revealing varying responses to water concentration levels. Overall, the findings underscore the need for sustainable water management practices and remediation efforts to mitigate pollution and safeguard ecosystem health in the Black River watershed and similar environments.

Index Terms-River water analysis, BOD, Cicer arietinum, Hardness, TDS

I. INTRODUCTION

The district of Muzaffarnagar in western Uttar Pradesh, India, is a vital agricultural zone characterized by intensive cultivation practices, particularly focusing on sugarcane, wheat, and paddy crops (Choudhary S.K., et. al., 1987). However, the sustainability of agricultural production in the region is threatened by the deteriorating quality of groundwater resources, exacerbated by industrial and sewage pollution in the Yamuna-Krishna sub-basin (Ghanbari A., et. al., 2007). As surface water availability diminishes, there is a growing reliance on groundwater for irrigation, leading to concerns about the potential contamination of water sources. Anthropogenic activities such as population growth, urbanization, industrialization, and modern agricultural practices contribute to water pollution, gradually degrading its quality (Gupta, R.K., et. al., 1961). Consequently, there is a pressing need to explore alternative water resources for irrigation, with wastewater emerging as a significant source rich in organic and inorganic nutrients. The Black River, traversing through Saharanpur, Muzaffarnagar, and Baghpat districts, exemplifies this issue, with sewage and industrial effluents rendering water unsuitable for drinking and irrigation purposes (Jena V, et. al., 2013). Past studies have investigated the impact of wastewater on soil characteristics and crop growth, highlighting both its potential benefits and drawbacks. However, careful assessment of wastewater quality and its compatibility with different plant species is imperative to ensure sustainable crop production in the face of water scarcity and pollution challenges (Keeling, K.A., et .al., 1997).

The challenges posed by water pollution and scarcity in Muzaffarnagar underscore the pressing need for sustainable water management practices. As the region grapples with the complex interplay between agricultural needs, industrial growth, and environmental conservation, concerted efforts are required to safeguard water resources for future generations while ensuring the continued prosperity of the agricultural sector.

II. MATERIALS & METHODS

The materials and methods utilized in this research endeavour were meticulously crafted to facilitate a comprehensive investigation into both the vegetation dynamics and water quality along the banks of the Black River near Shamli Bus Stand in Muzaffarnagar. The methodology encompassed several key steps, each designed to gather accurate data and

insights into the ecological and environmental aspects of the study area.

1. Survey and Collection of Vegetation
The research commenced with an extensive survey of the study area to identify and document the various crops and vegetation growing in the vicinity of the Black River. This survey involved traversing different locations along the riverbank, ensuring comprehensive coverage of the vegetation present. Samples of the collected vegetation were carefully catalogued, and herbarium file was prepared to facilitate further analysis and identification.

2. Physio-Chemical Analysis of Water Samples
A crucial aspect of the study involved assessing the physio-chemical parameters of the water samples collected from the Black River. This assessment was essential for understanding the quality and ecological health of the river. The analysis encompassed various parameters, including colour, odour, temperature, electrical conductivity (EC), total dissolved solids (TDS), pH, total hardness, and dissolved oxygen (DO).
Data Collection: Data collection was conducted using both primary and secondary methods. Primary data, collected directly during the investigation, provided real-time insights into the current state of the water body. Secondary data, sourced from existing datasets and literature, offered valuable historical context and comparative analysis, enriching the overall findings of the study.

3. Sampling Methods
Sampling points for water collection were strategically chosen to ensure representativeness and coverage of different aspects of the river. Points included shallow and deep areas, inflow and outflow points, and areas impacted by human activities such as agriculture and urbanization. Sample collection was performed using wide-mouthed polyethylene bottles and glass containers, employing appropriate preservation techniques to maintain sample integrity during transportation and storage.

4. Physio-Chemical Analysis Procedures
Each physio-chemical parameter was analysed using standardized procedures and equipment. Colour and odour assessments were conducted visually and olfactorily, respectively. Temperature measurements were taken using calibrated thermometers, while EC and TDS levels were quantified using specialized meters. pH levels were determined using portable pH meters, and total hardness was assessed through titration methods.

5. Dissolved Oxygen Analysis
Dissolved oxygen levels, crucial indicators of aquatic ecosystem health, were determined through titration methods. This involved the titration of water samples with standardized solutions to quantify the concentration of dissolved oxygen present, providing valuable insights into the oxygen saturation levels of the river water.

Overall, the materials and methods employed in this research were characterized by their systematic approach and adherence to standardized protocols, ensuring the collection of accurate and reliable data for assessing both vegetation dynamics and water quality along the Black River. These findings are instrumental in informing environmental conservation and management efforts in the region, facilitating evidence-based decision-making for sustainable resource utilization and ecosystem preservation.

III. RESULTS & OBSERVATION

1. Collection and Identification of Crops and Vegetations Grown at the Bank of Black River at (Shamli Bus Stand) Muzaffarnagar
Area of black river Muzaffarnagar was selected for collecting and identification of crops vegetables and vegetation during this research work. This area is generally used for growing sugarcane, okra and wheat crops by farmers throughout the year. Generally, some vegetables are also grown in this area.


Figure 1: Spinach (Spinacea oleracea)


Figure 2: Giant reed (Arundo donax)

Figure 3: Eichornia crassipes

2. Physico-Chemical Analysis of Water Sample Collected From Black River at Muzaffarnagar

Results show the value of different parameters such as pH, Temperature, EC, TDS, DO & Hardness (table 1).

Table-1 Physico-chemical parameters of Black river water

S. No.	Parameters	Results of river water	Standard value ISO:10500-1991
1.	Colour	Turbid	Transparent
2.	Odour	Odurless	Unobjectionable
3.	pH	7.7	6.5 - 8.5
4.	Temperature	26℃	Not > 40℃
5.	Electric Conductivity (EC) (ms/cm)	855	250 - 270
6.	Total dissolved solids (TDS) (mg/L)-	1156	30 - 380
7.	Dissolved Oxygen (DO) (mg/L)	4.3	6.5 – 8.0
8.	Total hardness (mg/L)	472	185-350
9.	Permanent hardness (mg/L)	168	-
10.	Temporary hardness (mg/L)	304	-

Figure 4: Calotropis procera

Table-2: Description of Chickpea seed germination using different concentration of Black River.

S. No.	Sample	No. of seeds used	No. of seeds germination	Germination percentage (%)
1.	Control (Tap water)	35	33	94.28%
2.	10%	35	27	77.14%
3.	25%	35	30	85.71%
4.	50%	35	31	88.57%
5.	75%	35	31	88.57%
6.	100%	35	27	77.14%

Figure 5: Control (Tap water)

Figure 6: 10% river water

Figure 7: 25% river water

Figure 8: 50% river water

Figure 9: 75% river water

Figure 10: 100% river water

IV. CONCLUSION

In this study it was concluded that the Black River near Shamli Bus Stand in Muzaffarnagar has yielded valuable insights into both the water quality and its impact on vegetation in the surrounding area. Firstly, we determined that the entry point of the Black River at Shamli Road, near the bus stand, is relatively uncontaminated compared to other areas, making it suitable for treatment and potential use in irrigation after appropriate processing. Secondly, our analysis of the physio-chemical parameters of the Black River water revealed that while some parameters such as temperature, odour, and pH were within acceptable ranges, others including electrical conductivity, total dissolved solids, dissolved oxygen, and total hardness exceeded permissible limits outlined in Indian standards (ISO:10500:1991). This indicates a potential threat to aquatic ecosystems and highlights the need for remediation measures to improve water quality. Furthermore, our investigation into the impact of Black River water on plant growth revealed mixed results. While some vegetation showed similar growth patterns regardless of proximity to the river, others exhibited variations in growth rates. Additionally, seed germination experiments demonstrated that the concentration of Black River water had a significant effect on seed viability, with optimal germination observed at lower concentrations. After the study it was shown that the maximum germination of chick pea was occurs accept control in between 50 – 75% of river water. More than 75% concentrations of river water decreasing germination of chickpea.

REFERENCES

1. Rajor, A., & Bhalla, G. (2016). Impact of Sewage on Seed Germination and Growth of Kharif and Rabi Crops. Journal of Chemistry, Environmental Sciences and Its Applications, 3(1), 1-18.
2. Bhargava, A., Shukla, S., & Ohri, D. (2006). Karyotypic studies on some cultivated and wild species of Chenopodium (Chenopodiaceae). Genetic Resources and Crop Evolution, 53, 1309-1320.
3. Choudhary S.K., A.N.Jha and D.K. Srivastava. 1987. Effect of paper mill effluent on seed germination and seedling growth mustard. Environment, Ecol,5(2):285-287.
4. Rajput, J., Mishra, A., Dwivedi, N., Sharma, D., Singh, Y., Kumar, S., & Mani, I. (2021). Potential Irrigation Command Of Pulp And Paper Mill Treated Effluent Under Conventional And Pressurized Irrigation Techniques - A Case Study. International Journal of Tropical Agriculture, 39(4), 329-333.
5. Darvishi, H. H., Manshouri, M., & Farahani, H. A. (2010). The effect of irrigation by domestic wastewater on soil properties. J. Soil Sci. Environ. Manag, 1(2), 030-033.
6. Girishal and Raju (2017) CecicP.Hartwell G, Bellinzi R. The multiple root canal system in the maxillary first molar: A case report J Endod 1982:8:113.
7. Gupta, R. K. (1961). Flora of district Muzaffarnagar in the Doab of the rivers Ganga and Yamuna. J Bombay Nat Hist Soc, 58(3), 749-775.

8. Heidarpour, M., Mostafazadeh-Fard, B., Koupai, J. A., & Malekian, R. (2007). The effects of treated wastewater on soil chemical properties using subsurface and surface irrigation methods. Agricultural water management, 90(1-2), 87-94.
9. Hicks, R. W., & Hird, C. (2000). Soils and urban land use. Soils: Their Properties and Management,, 378-399.
10. Kumawat, D. M., Tuli, K., Singh, P., & Gupta, V. (2001). Effect of dye industry effluent on germination and growth performance of two rabi crops.
11. Ibrahim, A. K., Kelly, S. J., Adams, C. E., & Glazebrook, C. (2013). A systematic review of studies of depression prevalence in university students. Journal of psychiatric research, 47(3), 391-400.
12. Vinod, J., Sapana, G., & Matic, N. (2013). Assessment of Kharoon River water quality at Raipur by physico-chemical parameters analysis. Asian Journal of Experimental Biological Sciences, 4(1), 79-83.
13. Jothimani, P., Prabakaran, J., & Bhaskaran, A. (2002). Characterization and impact of dyeing factory effluent on germination and growth of maize [CO 11 and Cowpea [CO 4]. Madras Agricultural Journal, 89(10/12), 568-571.
14. Kamal, D., Khan, A. N., Rahman, M. A., & Ahamed, F. (2007). Study on the physico chemical properties of water of Mouri River, Khulna, Bangladesh. Pakistan journal of biological sciences: PJBS, 10(5), 710-717.
15. Kanan, J. W., & Pruitt, M. V. (2002). Modeling fear of crime and perceived victimization risk: The (in) significance of neighborhood integration. Sociological inquiry, 72(4), 527-548.
16. Karunaichamy, K. S. T. K., Paliwal, K., & Swamy, P. S. (1990). Effect of sewage water irrigation on dry matter yield and heavy metal concentration in three forage grasses. International Journal of Ecology and Environmental Sciences, 16(2-3), 151-160.
17. Kelling, K. A., Peterson, A. E., Walsh, L. M., Ryan, J. A., & Keeney, D. R. (1977). A field study of the agricultural use of sewage sludge: I. Effect on crop yield and uptake of N and P (Vol. 6, No. 4, pp. 339-345). American Society of Agronomy, Crop Science Society of America, and Soil Science Society of America.
18. Khan, N. A., Gupta, L., Javid, S., Singh, S., Khan, M., Inam, A., & Samiullah, S. (2003). Effects of sewage waste water on morphophysiology and yield of Spinacia and Trigonella.
19. Mur Kumar, C. V., & Chauan, P. D. (1987). Influence of water pollution on germination of gram (Cicer arietinum L.) In: Current pollution Research in India. Triveni pk,. Goel PK.