*Quest Journals*
*Journal of Research in Environmental and Earth Sciences*
*Volume 7 ~ Issue 1 (2021) pp: 86-89*
*ISSN(Online) :2348-2532*
www.questjournals.org

**Research Paper**

# Comparative Soil Analysis of Riverside Soil and Artificial Wetland Soil of Agra City

Dr. G. C. Yadav
*Associate Professor, Chemistry Department, C. L. Jain College, Firozabad*

***Abstract:***
*The city of Agra, located in the northern Indian state of Uttar Pradesh, is known for its famous UNESCO World Heritage Site, the Taj Mahal. However, like many other urban areas in India, Agra is also plagued by air pollution, including soil pollution. Soil pollution in Agra is primarily caused by industrial activities, including chemical industries and tanneries. These industries release various toxic chemicals into the soil, which can lead to soil contamination and damage to the ecosystem. The pollution can also seep into groundwater, posing a threat to human health.*
*In addition to industrial activities, agricultural practices and waste disposal also contribute to soil pollution in Agra. The use of pesticides and fertilizers in farming can contaminate the soil, while improper disposal of waste, including plastic, can lead to soil degradation. The Indian government has implemented various measures to address soil pollution in Agra, including the establishment of the Agra Environment Management Society (AEMS) to monitor and control pollution levels. The government has also implemented policies to encourage the use of cleaner technologies in industries and promote sustainable agriculture practices. Despite these efforts, soil pollution in Agra remains a significant environmental challenge, and continued efforts are needed to mitigate its effects on the health and wellbeing of the local population and the environment. The rapid development in recent decades has an adverse impact on the quality of groundwater. Keeping in view the frequent degradation of water quality, the present study has been done to decipher the chemical variations in soil profile by various natural and anthropogenic factors to assess the suitability of soil.*
***Keywords:*** *Soil moisture, nutrients, industry, profile.*

## I. Introduction

Agra is located in the northern Indian state of Uttar Pradesh and is situated on the banks of the Yamuna River. The soils in Agra can be classified into several types based on their physical and chemical properties. Here is a general soil profile of Agra city:

- Alluvial soils: The soils in the riverine areas of Agra are predominantly alluvial soils. These soils are formed by the deposition of sediments carried by rivers, and they have a high content of silt and clay. Alluvial soils are generally rich in nutrients and have good water-holding capacity.
- Red soils: The upland areas in Agra are characterized by red soils. These soils are formed by the weathering of crystalline rocks and have a high content of iron oxide, which gives them a red color. Red soils are typically low in nutrients and organic matter, but they can be improved with appropriate soil management practices.
- Sandy soils: Sandy soils are found in some areas of Agra, particularly in the outskirts of the city. These soils have a high proportion of sand particles, which makes them well-drained but less fertile than alluvial soils.
- Black soils: Black soils, also known as regular or black cotton soils, are found in some areas of Agra. These soils are characterized by their high clay content and dark color. They are typically low in nutrients but have good water-holding capacity.
- Alkaline soils: Some areas in Agra have alkaline soils, which have a high pH and a high content of soluble salts. These soils are not suitable for most crops but can be used for growing salt-tolerant crops.

It's important to note that the specific soil types and properties in Agra can vary depending on the location and management practices. Therefore, it's recommended to conduct a site-specific soil analysis to understand the characteristics and properties of soils in a particular area of Agra[1-5].

Agra being the taj city gradually subjected to rapid industrialization and unorganized out flux of industrial discharge in holy Yamuna will create the subsequent pollution in the river water, which with the age of city and rapid increase in population will create more industrial and domestic water pollution in the city[6-9]. The current work is based on the soil analysis of riverside soil and artificial wetland soil created in agra city.

A comparative soil analysis of riverside soil and artificial wetland soil can provide insights into the differences in their physical and chemical properties, which can have implications for their potential uses and management[10]. Here are some general steps that can be followed to conduct such an analysis:

- Site selection: Choose two locations, one along the riverside and the other in an artificial wetland area, that are representative of the soil types in each area.
- Sampling: Collect soil samples from both locations using a soil corer or auger. Take samples from multiple locations within each site to account for potential variability in soil properties.
- Analysis: Analyze the soil samples for physical and chemical properties, such as soil texture, pH, organic matter content, nutrient content, and compaction. There are various laboratory and field methods available for analyzing these properties.
- Comparison: Compare the results of the soil analysis for the two sites. Look for any significant differences in soil properties that could explain the observed differences in plant growth or other ecological indicators.
- Interpretation: Interpret the results of the soil analysis in the context of the site characteristics and management practices. Consider how the differences in soil properties between the two sites might affect their potential uses or management.
- Recommendations: Based on the findings of the soil analysis, make recommendations for any necessary soil amendments or management practices to improve the soil quality and achieve desired ecological outcomes.

It's important to note that the specific methods and parameters used for soil analysis can vary depending on the objectives of the study and the characteristics of the soils being analyzed. Therefore, it's recommended to consult with a soil scientist or other qualified professional for guidance on how to conduct a comparative soil analysis of riverside soil and artificial wetland soil in The Taj City.

**Study area:**

The study area falls in the sub tropical region and the climate is classified as tropical to sub tropical type. The climate is characterized by a hot summer and bracing cold winter associated with general dryness, except during the south west monsoon when humidity is high. The rainy season extends from end of June to September or part of October. About 86 % of rainfall takes place from June to September. During monsoon surplus water is available for deep percolation to groundwater. The average annual rainfall is 967 mm.(4-6) The study area forms a part of Central Ganga Plain and is underlain by alluvial deposits of Quaternary age. This alluvium is a pile of unconsolidated sediments made up of sequence of clay, silt, calcareous nodules, locally known as Kankar and different grades of sand and occurrence of gravel at depth is also occasionally reported. Calcareous nodules, indicative of sedimentation gaps, occur as thin beds and lenses.(7,8)

## II. Material And Methods:

For the determination of soil profile along the wetland formed in Agra due to Yamuna river which were basically heart of the industrial city. We chose one spot as A as wetland of Yamuna region B as wetland of Yamuna river and C as an artificial wetland (Taal) created.

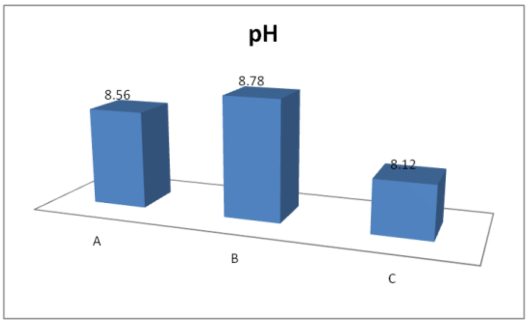
Ten to twenty sample plots were taken in each category of wetland. Three replicate soil profile samples were collected randomly in each plot. Soil samples of 0–50 cm soil depth were collected using a stainless-steel slide hammer with an inner diameter of 3.5 cm on September 7th, 2012. Each collected sample in the soil profile was sectioned at 10 cm intervals in the field, and then stored in polyethylene plastic bags after air dried. Soil samples were ground using a mortar and pestle, and then sieved before laboratory analysis

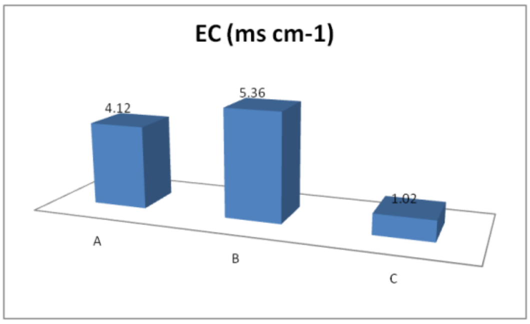
Total carbon (TC) and total nitrogen (TN) contents were measured with an elemental analyzer of vario MACRO cube (Germany, 2009). The methods which were developed by Murphy and Riley (1962) were used for the colorimetric determination of orthophosphate concentration in solutions. The perchloric acid ($HClO_4$) digestion method(Olsen and Sommers, 1982) was used to determine the total phosphorus (TP) in soil. The soil total C, N and P concentrations (mg $kg^{-1}$ ) were transformed to a unit of mmol $kg^{-1}$ , and C:N, C:P and N:P ratios for each type of soil were calculated as molar ratios (atomic ratio), rather than mass ratios.(9)

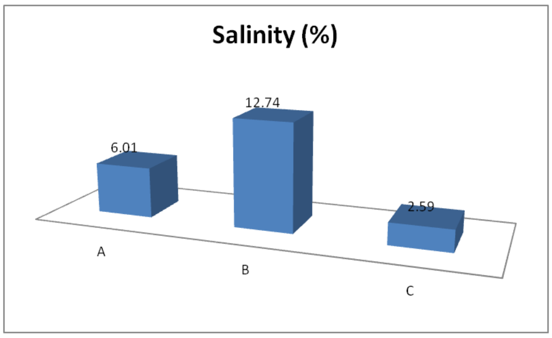
## III. Observation And Result:

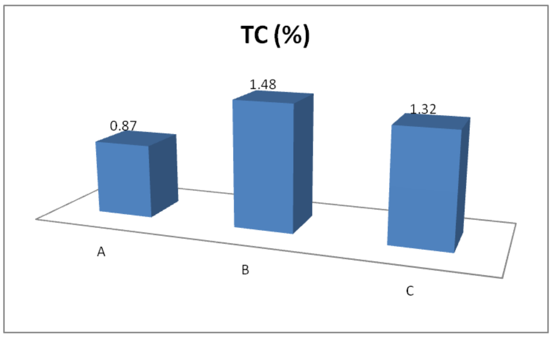
**Table 1:** basic soil characteristics

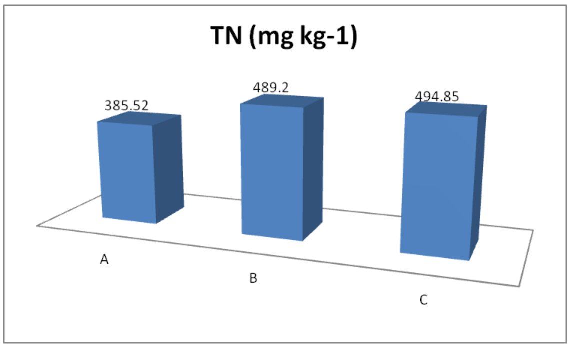
| Sample area | pH | EC (ms $cm^{-1}$) | Salinity (%) | TC (%) | TN (mg $kg^{-1}$) | TP (mg $kg^{-1}$) |
|---|---|---|---|---|---|---|
| A | 8.56 | 4.12 | 6.01 | 0.87 | 385.52 | 523.9 |
| B | 8.78 | 5.36 | 12.74 | 1.48 | 489.20 | 531.4 |
| C | 8.12 | 1.02 | 2.59 | 1.32 | 494.85 | 558.6 |

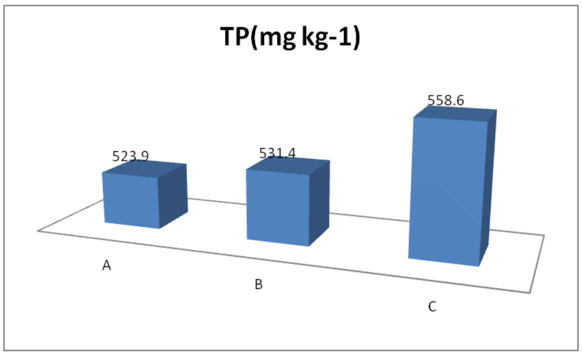



## IV. Conclusion:

The high pH values of ~8.5 (classification: pH N 8.5 — strongly alkaline) were observed in the three categories of wetland soil profiles in the study (Table 1). Generally, the soil pH in natural wetlands generally ranged from around 6.5 to 7.5 (with a few exceptions). Our results indicated that the unusually high pH values compared to those of wetlands could be caused by the regional geological, geochemical, and hydrologic conditions, as well as the land–river interaction in this region. The mean content of salinity was ranked as Spot B (mean, 12.74%) N Spot A (mean, 6.10%) N Spot C (mean, 2.52%), primarily due to the influence of cultivation which reduced soil salt content. The soil TC, TN and TP in B and C soils averaged 14.7 g $kg^{-1}$ , 485.8 mg $kg^{-1}$ , 531.5 mg $kg^{-1}$ and 13.7 g $kg^{-1}$ , 495.4 mg $kg^{-1}$ , 559.4 mg $kg^{-1}$ , respectively (Table 1), with no significant differences in each other. Though the mean content of TP was ranked as Spot C (mean, 559.4 mg $kg^{-1}$ ) N Spot B (mean, 531.5 mg $kg^{-1}$ ) N Spot A (mean, 523.9 mg $kg^{-1}$ ), the differences of TP among Spot A, Spot B and Spot C were not significant, which provided a platform to do C:N:P stoichiometry.

## References:

[1]. McLaughlin, M.J., Parker, D.R., Clarke, J.M., 1999. Metals and micronutrients: food safety issues. Field Crops Res. 60, 143–163.
[2]. Rastogi, G.K., Sinha, D.K., 2008. Metal toxicity in underground drinking water at Moradabad, Uttar Pradesh, India. Int. J. Chem. Sci. 6 (2),1074–1080.
[3]. APHA, 2012. Standard method for examination of water and wastewater, 22nd ed. Washington,
[4]. Hossain, D., Islam, M.S., Sultana, N., Tusher, T.R., 2013. Assessment of iron contamination in groundwater at Tangail municipality, Bangladesh.J. Environ. Sci. Nat. Resour. 6 (1), 117–121.
[5]. Indian Standard, 2003. Method of Sampling and Test (Physical and Chemical) for Water and Waste Water. IS: 3025 (Part 1).
[6]. Rawat, N.S., Arora, R.K., 1986. Mines. Met. Fuels, 112.Sinha, D.K., Kumar, N., 2006. Monitoring of trace metals in Gagan river water at Moradabad. Indian J. Environ. Prot. 26.
[7]. DC.Behera, B., Das, M., Rana, G.S., 2012. Studies on ground water pollution due to iron content and water quality in and around, Jagdalpur, Bastardistrict, Chattisgarh, India. J. Chem. Pharm. Res. 4 (8), 3803–3807.

[8]. Bichi, M.H., Bello, U.F., 2013. Heavy metal pollution in surface and ground waters used for irrigation along river Tatsawarki in the Kano, Nigeria.IOSR J. Eng. 3 (8), 1–9.
[9]. Colter, A., Mahler, R.L., 2006. Iron in Drinking Water, A Pacific Northwest Extension Publication. University of Idaho, Oregon StateUniversity and Washington State University in cooperation with University of Alaska, Fairbanks, Accessed 9.3.16,
[10]. Gangwar, R.K., Khare, P. , Singh, J., Singh, A.P., 2012. Assessment of physico-chemical properties of water: River Ramganga at Bareilly, U.P. J.Chem. Pharm. Res. 4 (9), 4231–4234.