PHYSICO-CHEMICAL PROPERTIES OF DIFFERENT VARIETIES OF SOIL

A
Thesis Submitted To
Odisha University of Agriculture and Technology, Bhubaneswar
In Partial Fulfilment of The Requirement of The Degree
of MASTER OF SCIENCE IN CHEMISTRY

By

SOUMYA RANJAN SWAIN

Admission No.: 15CHEM/19

DEPARTMENT OF CHEMISTRY

COLLEGE OF BASIC SCIENCE AND HUMANITIES
ODISHA UNIVERSITY OF AGRICULTURE & TECHNOLOGY
BHUBANESWAR- 751003
2021

A DISSERTATION SUBMITTED

TO

ODISHA UNIVERSITY OF AGRICLTURE & TECHNOLOGY,

BHUBANESWAR

IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE

OF

MASTER OF SCIENCE IN CHEMISTRY

By

SOUMYA RANJAN SWAIN

Admission No – 15CHEM/19

Under the guidance of

Dr. Sachidananda Muni

DEPARTMENT OF CHEMISTRY

COLLEGE OF BASIC SCIENCE AND HUMANITIES

ODISHA UNIVERSITY OF AGRICULTURE AND TECHNOLOGY

BHUBANESWAR-751003, ODISHA

Dr. Sachidananda Muni
M.Sc, M.Phil, CIC (IGNOU), Ph.D
Assistant Professor of Chemistry
College of Basic Science and Humanities
Odisha University of Agriculture and Technology
Bhubaneswar-751003

Residence:
Qtr. No. IV-31
OUAT Colony
Bhubaneswar-751003
Ph. : 0674-2561450
Mob. : 9437001133

Ref: ***Date:***

CERTIFICATE-I

This is to certify that the thesis entitled, **"PHYSICO-CHEMICAL PROPERTIES OF DIFFERENT VARIETIES OF SOIL"** submitted in **p**artial fulfillment of the requirements for award of degree of **MASTER OF SCIENCE IN CHEMISTRY** to the Orissa University of Agriculture and Technology, Bhubaneswar, Odisha is a faithful record of bonafide research work carried out by **SOUMYA RANJAN SWAIN** under my guidance and supervision and that no part of thesis has been submitted for any degree or diploma or published in any form.

PLACE: Bhubaneswar **CHAIRMAN**
DATE: **ADVISORY COMMITTEE**

CERTIFICATE II

This is to certify that the thesis entitled **"PHYSICOCHEMICAL PROPERTIES OF DIFFERENT VARIETIES OF SOIL"** submitted by **SOUMYA RANJAN SWAIN** to Odisha University of Agriculture and Technology, Bhubaneswar in partial fulfilment of the requirements for the award of the degree of MASTER OF SCIENCE IN CHEMISTRY has been approved by the students' Advisory Committee and the external examiner.

ADVISORY COMMITTEE

Chairman **Dr. Sachidananda Muni** _____
Assistant Professor
Department of Chemistry,
College of Basic Science and Humanities,
OUAT, Bhubaneswar.

Member **Dr. (Mrs.) Nandita Swain** _____
Professor and Head
Department of Chemistry,
College of Basic Science and Humanities,
OUAT, Bhubaneswar.

Examiner _____

ACKNOWLEDGEMENT

I convey my genuine commitment and heartfelt appreciation for the supervision, direction and encouragement to Dr. Sachidananda Muni, Department of Chemistry, College of Basic Sciences and Humanities, OUAT.

During the work I am most grateful for her inspiration, advice, support and encouragement to Dr. (Mrs.) Nandita Swain, Head of the Chemistry Department, College of Basic Science and Humanities, OUAT, Bhubaneswar.

I extend heartfelt appreciation for his assistance and advice to Professor C.S.K Mishra, Director, College of Science and Humanities, OUAT, Bhubaneswar.

I admit that I have been unwaveringly supportive, loving and affectionate to my mother, father and all of the family members, without whom I would have no opportunity to reach to that point. I warmly appreciate all seniors and friends during the working time for their advice and continuous support. I am really grateful for his assistance throughout my group's time, Sriman Subhakalyan Sahoo. I would like to thank Mr.P.S Sarangi & Ms.Bharati Patnaik, the Demonstrator, Department of chemistry, College of Basic Sciene and Humanities, OUAT, Bhubaneswar for his support and timely advice.

In the end, I bow my head before the Almighty who always guided and assisted me with all his omnipresence.

Date

Place: Bhubaneswar **SOUMYA RANJAN SWAIN**

CONTENTS

LIST OF FIGURES

ABBREVIATIONS

OC	Organic Carbon
GPS	Global Positioning System
GIS	Geographical Information System
EC	Electrical conductivity
SOC	Soil organic carbon
SAR	Sodium adsorption ratio
CEC	Cation exchange capacity
pH	Potential of Hydrogen

ABSTRACT

The soil is the most crucial component in meeting all of humanity's fundamental needs. Soil is a crucial part of our farming operations. Soil is a natural body of mineral and organic material divided into horizons that differ in their physical make-up and chemical composition from one another and from underlying materials. The importance of the physicochemical research of soil is that the data can be used to boost soil production. Various characteristics such as pH, electrical conductivity, texture, moisture, temperature, soil organic matter, accessible nitrogen, phosphorus, and potassium are used in this physicochemical examination of soil. This research will be beneficial to anyone who want to work in the agriculture area.

The physical and chemical qualities of soil samples from five distinct places are analysed in this study utilising standard methodology to assess the properties of soil, primarily pH, percentage of Organic Carbon, and Electrical Conductivity. The soil was slightly acidic in nature (pH ranges from 4.88 to 6.39), the EC ranges from 0.389 to 0.591 dSm-1, and the amount of organic carbon ranged from 0.352 to 0.673 percent, according to this study. As a result, it is concluded that maximum soil productivity can be linked to utilising approved fertiliser doses. The physical and chemical qualities of soil samples from five distinct places are analysed in this study utilising standard methodology to assess the properties of soil, primarily pH, percentage of Organic Carbon, and Electrical Conductivity. The soil was slightly acidic in nature (pH ranges from 4.88 to 6.39), the EC ranges from 0.389 to 0.591 dSm-1, and the amount of organic carbon ranged from 0.352 to 0.673 percent, according to this study. As a result, it is concluded that maximum soil productivity can be linked to utilising approved fertiliser doses.

INTRODUCTION

The term "soil" refers to one of the planet's most dynamic and complex natural processes. It is necessary for the existence of many types of life since it offers a medium for plant growth as well as meeting the majority of the nutritional needs of creatures. The plant's ability to extract water and nutrients is influenced by the physical and chemical qualities of the soil. High-quality soils help to develop natural ecosystems and improve air and water quality, in addition to producing healthier food and fibre. The amount, form, structure, size, pore space, organic matter, and mineral makeup of soil determine its physical qualities. The interactions of diverse chemical elements among soil particles and soil solution make up the chemical characteristics of the soil. Soil texture, bulk density, soil structure, soil colour, pH, electrical conductivity, water holding capacity, percent of organic carbon, organic matter, and soil nutrients are some of the physical and chemical qualities (Nitrogen, Phosphorous, Potassium, Calcium, Magnesium). All soils have unique features, and working with them necessitates a thorough understanding of these characteristics. Understanding the physical and chemical features of soil aids in resource management when working with a specific soil. They must be researched for agricultural purposes in order to raise productivity and improve the soil mass's workability. The assessment of current soil qualities is a critical instrument for increasing productivity on a long-term basis. As a result, the goal of the research was to determine the differences in the physical and chemical properties of soil under various land-use patterns. The majority of soil pollution issues are linked to huge amounts of heavy metal deposited on it by discarded wastes, particularly sewage sludge. When non-biodegradable metals are introduced into the environment, they accumulate in living species through the food chain. Soil naturally contributes to the environment, aside from anthropogenic sources and discharged pollutants.

Heavy metals are present in trace amounts. At trace levels, most of these heavy metals are required for plant and animal growth and normal activities, but significant amounts of any of them can cause acute or chronic toxicity. Excessive heavy metal deposition in soil is hazardous to humans, animals, and microbes. Nitrogen fixation, absorption, and decomposition of organic materials to release nutrients are all carried out by soil microorganisms. Heavy metals' toxic effects on microorganisms appear in a variety of ways, including reduced litter breakdown and nitrogen fixation, as well as less effective nutrient cycling. These consequences have an impact on the physicochemical qualities of the soil, as well as the plants that thrive there.

REVIEW OF LITERATURE

A. Anita Joshi Raj et al. [1] Concerning 51 surrounding soil sample and 51 subterranean water samples of 10 fluorotic regions, the fluoride content and several other relevant physicalchemical parametres, were studied in the Agastheeswaram Union, southern India. Fluorid levels were higher than subterranean water samples in all the fluorotic regions of the surface soil. Fluoride levels in the soil ranged from 2 to 3.5 ppm and ranged between 1.3 and 2.7 ppm in the water samples. Both values have exceeded the allowed limit. Additional components were examined, including pH, alkalinity, total hardness, calcium, magnesium, chloride, salinity and sodium. In all soil and water tests during different seasons, alkalinity and pH were found to be greater that the permitted level. Finally, the laxation of soil minerals was expected to be caused by the high amount of fluoride in samples of water and, in turn, to cause the incidence of fluorosis within the research region.

Saroj Mahajan et al. [2] Conduct a research on Nagchoon Pond Khandwa, MP, India on the physicochemical properties of the ground samples. The study was conducted between July 2008 and June 2009 on the basis of physico-chemical parameters such as pH, specific conductivity, chloride, calcium alkalinity, magnesium nitrate and sodium and potassum. Fluctuation in many parameters during the year of the research was noticed. During the whole duration of research, the pH in Nagchoon is alkaline (July 2008-June 2009). . The results indicated that the peak pH recorded in 2008-2009 in December was 8.92 and the greatest conductivity recorded in 7.15 in October was 760 µ mohs and in July, the minimum specific conductivity was 510 µ mohs, with calcium ranging from 76.80 to 43.00 mg/litre. During the trial. The magnesium was between 51.80 mg/litre, and 28.80 mg/litre. The chloride concentration varied between 40 mg/litre in the Nagchoon pond at the research locations. In Nagchoon pond, soil tests have revealed that during

the year of the research data show that the values of nitrate-nitrogen extended from 1,92mg/litr. to 0,90mg/litr. The sulphate value of Nagchoon Pond was between 13.56mg/litre, and 5.34 mg/litre. The soluble cation of Sodium is between 1.80 and 1.10mg/litre. Also a soluble cation is potassium. There were 2.50 mg/liter Potassium amounts to 1.10 mg/litre.

Kiran G. Chaudhari et al. [3] Studies rely on different factors such as total organic carbon, nitrogen, phosphorus, Potassium, pH and conductivity in the physicochemistry research soil. This study concludes the quantity of nutrient in Bhusawal soil, Jalgaon District (Maharashtra). The results indicate that Bhusawal has a medium to high mineral concentration in all eight sites selected. Phosphorus, and application of nitrogen to enhance the percentage yield of crops to examine the effect of phosphate fertiliser. This knowledge helps farmers handle soil nutrient problems, the quantity of which is utilised by fertilisers to improve crop yields.

Rajesh P. Ganorkar et al. [4] Conduced a research at Rajura Bazar, Amravati district of Maharastra, on physicochemical soil evaluation (India). Soil samples were obtained at Warud Tahsil in Amravati District (Maharashtra) India from six distinct sites covering Rajura Bazar. In february 2013, ground characteristics such as soil humidity, pH, EC, carbon, calcium carbonate, magnesium, calcium, nitrogen, cupric, potassium and phosphorous content have been analysedThe pH readings revealed that all the soil samples were alkaline, with modest amounts of accessible micronutrients present in all samples. Like values for electrical conductance ranging from 0.3 to 0.7 µS, the range of biological carbon levels was 1.25 to 1.69 percent.

Sanjoli Mobar et al. [5] carried out two locations, Sanganer and Durgapura, respectively, in the District of Jaipur with affected and non-impacted soil works. The soil quality has been analysed by estimating the physicochemical parameters of pH, electrical conductivity, capacity for water

holding, texture analyses, organic carbon, organic matter, total hardening, potassium sodium, sodium adsorption ratio, and standard protocol cation exchange capacity. The results indicated that the pH, EC, retain capacity, total hardness, SAR, CEC for both soil and soil have an important difference, thereby reducing the soil quality impact of industrial effluent. Thus, management of such an industrial pollution, which may be ensured by planned industrialisation, is more important to safeguard the degradation in soil quality.

Prakash L. et al. [6] Correlated agricultural soil chemical characteristics in the several villages in Western India in the Kutch area of Gujarat. They mainly studied mung bean crop using 30 medium-black soil samples randomly selected. Soil samples were gathered by licenced, local farms under the Government Soil Health Card Program of Gujarat, and were taken to the Soil Test Laboratory, Bhuj, in order to be tested. For soil quality analysis standard methods were utilised. This paper aims, through correlation analysis, to examine and assess the link between soil characteristics and macronutrients (P, K, C and S). This study finds that the correlation analysis' Statistical Method can be a scientific basis for controls and surveillance of soil fertility management in agriculture.

A.M. Shivanna et al. [7] Work is carried out on the soil fertility of three lakes - Eachanur, V. Mallenahalli and Halkurke in Tiptur Taluk - for the designated command areas. Tested variables were pH, EC, OC, N, P and K, respectively. The research found that, on a slow alkaline side but within a limit of 6.5-8.5, the pH in the soil samples ranged between 7.07 and 7.87. This was ideal for cultures. EC values varied between 0.26dSm-1 to 0.485dSm^{-1} and within the 0.8dSm^{-1} limit, suggesting minimal soil salinity. Organic carbon was between 0.5% to 0.67%, and all samples varied from medium. Nitrogen in the range 54,825kg/ha to 85,72kg/ha were available while nitrogen and phosphorus were available in the range from 5,33kg/ha to 10,79kg/ha. The samples

were medium in size, save one high-rating sample in terms of potassium, ranging from 156,18 kg/ha to 434,38 kg/ha.

V. Ramamurthy et al. [8] a physical chemical land analysis research on mangrove forest in Vedaranyam, Tamil Nadu, India. Tamil Nadu. All seasons the mangrove ground was clay. In the research periods, the typical pH values were 9.6 to 10.2, and the amount of organic matter was between 12.2 and 14.6 percent. The available potassium ranged from 3.8 mg/g to 6.7 mg/g and the available potassium was phosphorus, sodium, calcium; magnesium varied from 0.85 mg/g to 1.5 mg/g, 19 mg/g to 30 mg/g, and from 1 mg/g to 1.8 mg/g. The available values were 4.04ppm/g, 0.298ppm/g and 1.18ppm/g, 0.40ppm/g, 0.59pm/g, 2.02ppm/kg to 2.71ppm/g. The results were based on the available value for manganese, zinc, cupber, iron and iron. During monsoon and summer the pH and the amount of organic matter were extremely low. In particular in the nutritional and iron levels, the chemical characteristics of soils differed substantially amongst samples. N, P, K, Na, Ca and Mg were all in number Monsoon maximum and summer minimum. Maximum. Every season there are also modest levels of micronutrients such as zinc, copper, iron and manganese.

Borkar A.D. et al. [9] Studies were performed at Katol Taluka District of Nagpur (MS), India on physicochemical soil sample parameters. The soil was characterised by pH, conductivity, TDS, organic carbon, nitrate nitrogen availability, calcium and magnesium. Due to soil quality at different locations, variations in values were noticed in the various metrics. The findings show that the conductivity of all soil samples was much lower. In all soil samples, the level of magnesium and calcium is less so that magnesium and calcium-containing nutrients are applied in order to properly grow and develop crops.

Wagh G. S. et al. [10] Conducting a research on the physicochemical analysis, which is impacted by solid waste disposal as well as industrial effluent soils from the Manjari, Hadapsar, and Phursungi fields located in the South-Eastern portion of the town of Pune. Soil samples were first collected for examination from 12 typical locations. Physical components such as pH and electrical conductance have been examined, including the proportion of organic carbon, as well as chemical components such as phosphorus, potassium, copper, iron and manganese, zinc and boron. The pH varies from 7.32 to 8.52 meaning that soles range from 0.20 mS/cm to 3.02 mS/cm as alkaline as well as electric conductivity values. The proportion of organic carbon is between 0.38% and 1.5%. In current soil the phosphorous accessible varies between 10 Kg/hectare and 172,9 Kg/hectare; potassium available ranges between 112 Kg/hectare and 840 Kg/hectare; copper available from 2.02 to 36,51 ppm; Iron content ranging between 3,08 ppm and 23,04 ppm. Available soil content of manganese. The concentration varies from 12.36 ppm to 23.28 ppm and between 0.32 to 5.62 ppm and 0.08 to 0.54 ppm. This investigation indicated an excessive dosage in the soil of phosphorus and potassium, since excessive chemical fertilisers are in use by most farms. Cu, Fe, Mn and Z in the same way

Tupaki Lokya et al. [11] A research was conducted out utilising Global Positioning System (GPS) and Geographical Information System (GIS) technologies on KVK Farm, Nayagarh, North-Eastern Ghat Agro-Climatic Zone of Odisha, India. Surface samples were taken from the KVK (10 sample number), medium soil (10 sample number) and low soil (10 sample numberAverage of sand was 84.4, 81.5 and 77.94 in the upland, medium- and low-land surface area; the average of silt was 4.65, 5.58 and 6.04, and the average of clay was 10.68, 12.38 and 17.02, respectively; the average pH was 4.59, 5.55, 5.62 and the average of the soil OC values were found to be 4.07, 5.22 and 5.66g respectively. Average available N soil was determined to be 135.5, 167.2 and 200.7 kg/ha, respectively, of highland, medium soil and lowland. The mean soil availability for

P was 10.2, 10.4 and 15.3 kg/ha of highland, middle and low land. Average soil K of upland, medium soil availability. Soil accessible S in upland, medium-size and low-lying areas ranged from 2.56 to 4.86, from 3.22 to 5.16 and from 4.10 to 6.02 mg/kg respectively, with a median value of 3.46, 4.21 and 5.29 mg/kg. Soil accessible boron of upland, medium soil, and low soil varied between 0.45 and 0.75 mg/kg, between 0.55 and 0.90 and between 0.61 and 0.95 mg/kg with a mean of 0.58, 0.73 and 0.75 mg/kg. Results showed that the availability of N, P, K, S and B increased gradually to low-level surface soils, attributable to the rise in organic and clay content in low-level terrain.

Srikanta Kumar Sethy et al. [12] A research has been undertaken with a Global Positioning System and Geographical Information System instruments to assess land productivity status for Deogarh district of the Agroclimatic Plateau of Odisha, India. The findings showed that the soil pH of the Deogarh district was between 0,001 and 0,93dSm $^{-1}$ with an average value of 5.5, and that the solars' electrical conductivity was 0.2 dSm^{-1}. Organic soil carbon was between 0.2 and 18.0 gkg^{-1}, averaging 6.6 gkg^{-1}. These soils are safe in terms of soluble salt concentration for all forms of crop cultivation. Soil N content was available at a mean value of 87.5 to 237.5 kg/ha .

Nibedita Swain et al. [13] conducted a survey on the soil fertilities of some villages in Odisha, India in the North Eastern Ghat agroclimatic zone of Khordha and Bhubaneswar bloc. Khordha District. The results reveal that the pH for the soil ranging from 4.24 to 6.93 was less than 1 dSm^{-1} for the electrical conductance of the whole research region. Organic soil carbon varied from 1.1 to 11.6 g kg^{-1}. The nitrogen content available in these soils ranged from 50.0-225.0 kg ha^{-1}. The phosphorus content of Bray available was between 11.3 and 2326.5 kg ha^{-1}. The potassium soil content available ranged significantly from 37.6 to 458.3 kg ha^{-1}. In the highland areas, all the values in the lower range were seen. Sulfur and nitrogen levels in the inter-study region were

found inadequate. In several parts, too, there have been deficiencies in phosphate and sulphur. The main obstacles in both highland and lowland were soil erosion and water logging. The use of liming products and soil-based fertilisers will therefore assist increase crop output.

Pritipadma Priyadarshini et al. [14] The study was conducted on the state of soil fertility in several villages in Odisha's north-east coastal agroclimate area. In the villages of Salepur block in Cuttack district, the inventory of soil fertility was carried out. Results reveal that sandy loam, clay loam and soil colour vary in the villages under study in brown and yellow. In all soils, clay percentage varied between 8,8% and 28,8%. Soil pH varied from 5.13 to 6.63 and the electrical pathway was less than 0.14 dSm^{-1}, the soil content of soil organic carbon ranged from 2.8 to 10.6 kg and the accessible amount of nitrogen in these soils was low as the wagering range was low. The accessible phose content varied considerably between 32.3 and 376.3 $kgha^{-1}$ and extractable soil sulphur ranged between 0.95 and 10.9 mgkg-1 which produced soil deficiency in S. In addition, there was a significant increase in the volume of phosphorus available. Boron content was 0.06 to 2.28 $mgkg^{-1}$ for hot water solubility. The lower figures were all discovered on highlands whereas the higher values were found in lowlands for all criteria. SOC, N, P, K, S and B from the lowland upland to the ground were steadily on the increase, while basic cations, organic matter and plant nutrients were cleaned up and deposited in lowland areas thereafter. Positively content of clay was discovered.

Manoranjan Digal et al. [15] The research conducted out in the Phiringia block of Kandhamal in the North East Ghat agroclimatic zone in Odisha in India has examined the fertility condition of certain villages in the Soil. The results demonstrate that the soil texture of investigated villages ranged from loamy sand to clay loam. The amount of clay ranged between 9.2 and 28.4%. Soil pH varied from 4,33 to 6,6, and the whole field of investigation stayed below 1 dSm^{-1} electric conductivity. The soil concentration was from 2.3 to 9.7 g kg^{-1} organic carbon. In these soils a

nitrogen content between 88,0 and 263,0 kg ha^{-1} has been discovered to be available. The phosphorus concentration available was between 5.0 and 56.0 kg ha^{-1}. Power content variable width available. Contents of 0.60 to 0.97 mg kg^{-1} varied with hot water-soluble boron. All the figures in the lower range have been discovered in highlands whereas the values in the lower ground have been higher for all criteria. The main crop limitation on productivity in the research region has been determined to be soil acidity. The amount of accessible nitrogen, phosphorus and sulphur was found to be poor for most of our soils.

Rasmita Barik et al. [16] A soil fertility studies were carried out in some villages in the Puri area block of the eastern and southeastern coastal plain of the Odisha agroclimate zone in the Astaranga area. The results reveal that the texture of the soil of the soil under study ranged between loamy sand and clay loam, and that the clay percentage of all soils was between 8.8 and 2.8%. The value for soil pH varied from 5.12 to 6.57, with EC remaining <0.22 dSm^{-1}. The amount of organic soil carbon was from 2.5 to 10.9 g kg^{-1}. The nitrogen content available in these soils was found to be small, ranging from 87.5 to 187.5 kg ha^{-1}. The phosphorus concentration available was ranged between 3.38 and 259.2 kg ha^{-1}. Potash Containing Available. In highland soils, all the numbers in the lower range were discovered whereas the higher values of all the parameters in lowland were detected. The tendency towards the soil reactions has been growing, with SOC, N, P, K, S and B from the lowlands, resulting in a high value in lowly locations due to washing of cations and organic matter and the use of vegetable nutrients from the uplands. All factors except phosphorus were shown to link the clay content positively. Important positive association with soil response between OC, N, K, and B. The soils also have a favourable correlation between organic carbon and clay, macro and micronutrients.

Antaryami Mishra et al. [17] Realizing a 2012–13 research with Global Positioning System and

Geographical Information System tools on soil fertility maps of the Bhadrak district of Odisha, India. In each block of the district, geographically referenced soil samplings were gathered from the various settlements. Soil samples for pH, EC, organic carbon, accessible nitrogen, phosphorus, potassium, sulphur and boron have been treated and analysed in a laboratory. The results show that acidic soils (4.9 to 5.2), medium to high organic carbohydride levels (6.1 to 9.4 g kg^{-1}) of all blocks were found to be reactions. The soil nitrogen level accessible was low (148.9-190.7 kg N ha^{-1}), the phosphorus content in the soil available was low. In some blocks and in other blocks in the area, however, there was deficiency in the amount of sulphure available (8.04 to 32.86 mg S kg^{-1}). Critical limits (0,57 to1,03 mg kg^{-1}) in all the Blocks remained hot-water soluble concentration of boron.

Jayanthi P et al. [18] A research was conducted in order to identify potential reasons for its unproductive character in assessment of physiochemical parameters in soil samples in Tingroi hills in Lunghar district of Ukhrul, Manipur. Proofs gathered and submitted to the physicochemical parameter, macro and micro nutrient analysis from the research locations together with control soils. The pH of the soil samples ranged from 4.9 to 5.5, and acidity in nature was detected in all samples. The soil samples were electrically conductive from 0.01 to 0.03 dSm^{-1}. Soil samples varied from 10.1 to 23.7 mol kg^{-1} in cation exchange capacity. The current investigation indicated that the accessible nitrogen was more concentrated.

Marshal Soni et al. [19] The physicochemical characteristics of his soil samples from the city of Abohar were analysed. This soil physicochemical research is based on many factors such as pH, electrical conductivity, total organic carbon and accessible phosphorus. For their alkalinity, chloride, sulphate, pH, conductivity, sodium and potassium, five distinct solar samples were collected and analysed. pH value was identified in the range from 7.98 to 8.42 and a value of 20 to 64.0 meq/100 gm of alkaline, a chloride content of 1.23 to 1.98 g/100 g, a sulphate value of

0.063 to 0.742 g, conductivity of 0.4 t/742 g.

MATERIALS AND METHODS

Five soil samples were taken from five different areas of Jagatsinghpur districts of Odisha state. For each parameter three different readings were taken and the average of the readings were recorded. Different Physicochemical properties of the soil were analyzed by using standard methods e.g. Soil pH using glass electrode pH meter (Jackson), Organic Carbon by wet digestion method (Walkley & Black). Final data was analyzed to trace the correlation among the physicochemical properties of soil and to justify its significance.

SOIL pH

The Systronic pH metre as described by Jackson determined pH readings (1967). In this sample of 20 g dirt the 40 ml water distilled was combined in a ratio of 1:2. The suspension had been agitated for 30 minutes and left for one hour with a glass rod. In supernatant, the combined electrode was placed, and pH was measured. The pH value as a measure of the soil water system's hydrogen ion activity reflects soil acidity and alkalinity.

(Determination pH by Systronic pH meter)

ELECTRICAL CONDUCTIVITY

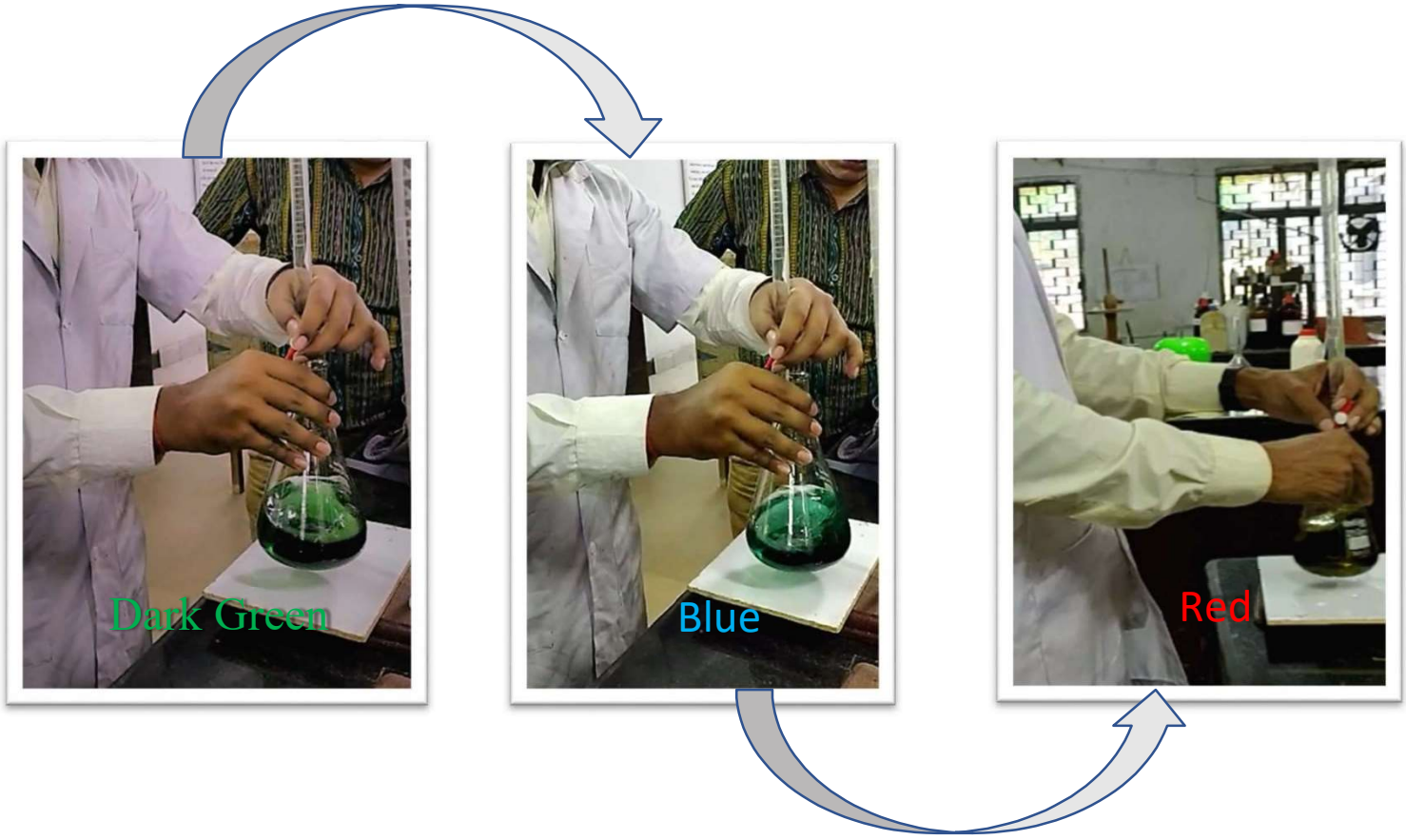
Electrical conductance (EC) provides a clear picture of the soluble salts in the soil that affect the current carrying capacity. On a Systronic digital electric conductivity bridge for which 20g grounds in 40ml of distilled water were added, the electrical conductivity of soil samples was measured. The suspension was occasionally agitated for half an hour and maintained for 30 minutes, while the solution of the soluble salts was not disturbed. The soil may be set and the conductance cell was then placed into a solution to record the EC values in reading.

(Determination of EC by Systronic conductivity meter)

ORGANIC CARBON CONTENT

Organic carbon of the soil was determined by Walkley and Black method as described, 2gm of finely ground soil passed through a 0.5 mm sieve was taken in a 500mL conical flask and 10 ml of 1N $K_2Cr_2O_7$ was added by a pipette followed by 20mL of concentrated H_2SO_4. The flask was shaken for a minute and allowed to stand for 30 minutes. 200mL of distilled water was added. Then 3-4 drops of ferroin indicator was added and the solution turned dark green. The

contents were titrated against 0.5N Ferrous ammonium sulphate solution till the colour of the solution changed from blue to red colour. A blank titration was carried out following all the above steps without taking soil.



(Determination of % of OC in Walkley and Black Method)

RESULT AND DISCUSSION

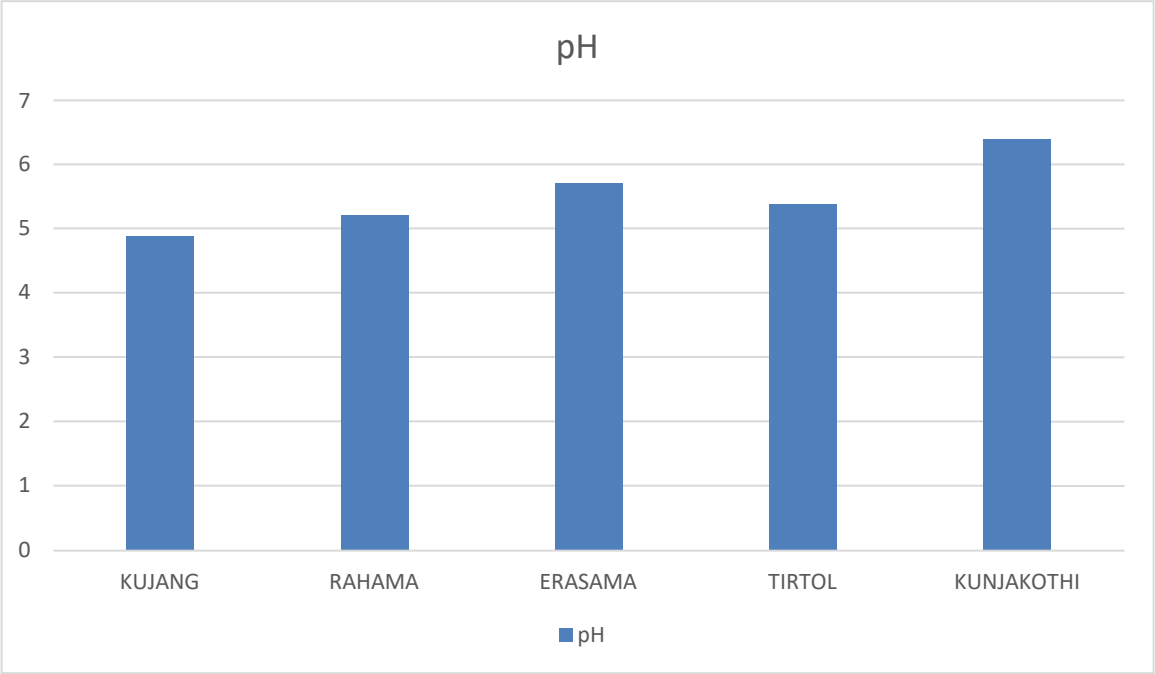
The pH, Electrical Conductivity, Organic Carbon content of different areas of Jagatsinghpur district are listed in table-1.

AREA NAME	pH	EC(in dSm^{-1})	O.C (in %)
KUJANGA	4.88	0.489	0.673
RAHAMA	5.22	0.412	0.438
ERASAMA	5.71	0.437	0.389
TIRTOL	5.39	0.389	0.593
KUNJAKOTHI	6.39	0.591	0.352

(TABLE-1)

SOIL pH

The pH value of different soil samples were varied in the range of 4.8 to 6.3. The pH value of Kujang was found to be lowest i.e. 4.88 and Kunjakothi to be highest i.e 6.39. The soil of Kujang is most acidic and the soil of Kunjakothi is least acidic among all the samples were collected.

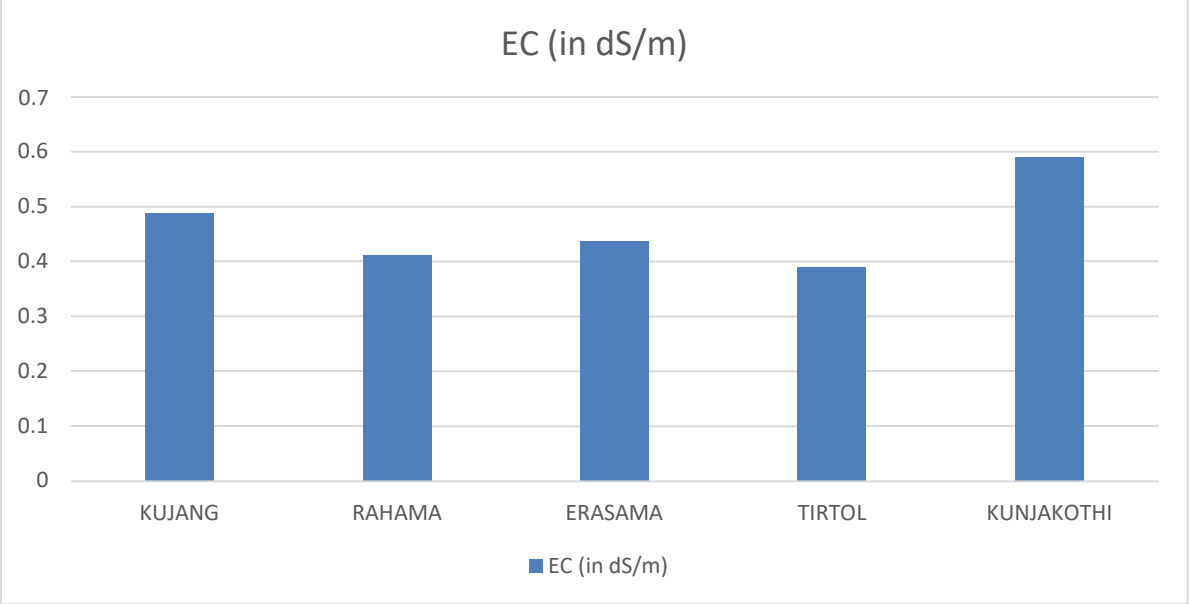


(Fig.1. pH values of different varieties of soil)

ELECTRICAL CONDUCTIVITY

The electrical conductivity of all the soil samples ranges between 0.389 dSm^{-1} to 0.591 dSm^{-1}.

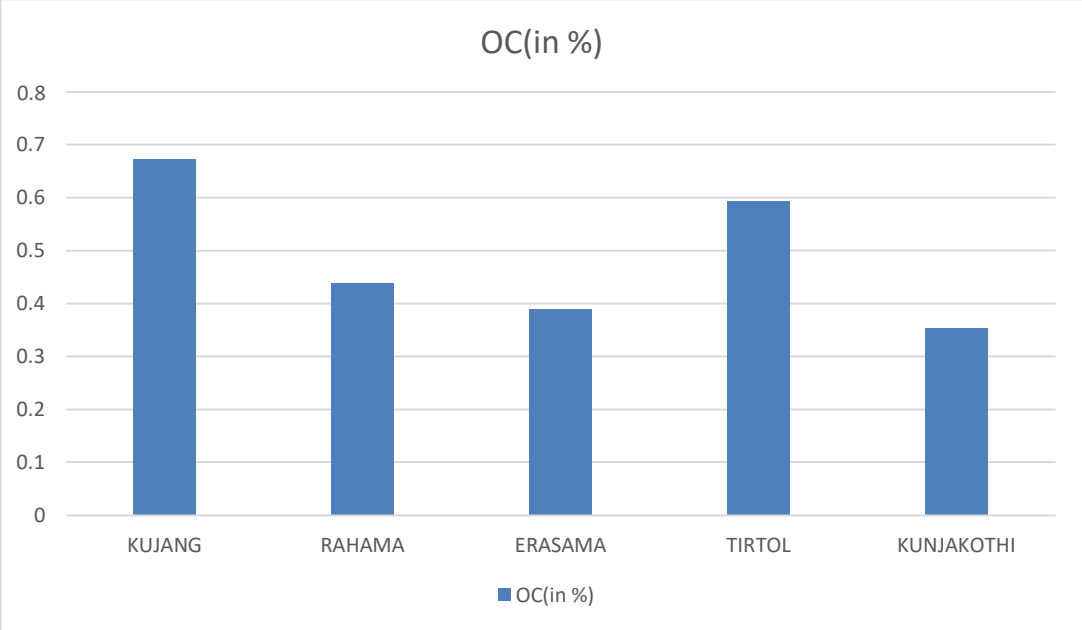
The electrical conductivity is highest in Kunjakothi and lowest in Tirtol area.



(Fig.2. EC values of different varieties of soil)

ORGANIC CARBON CONTENT

In all soil samples, the proportion of organic carbon ranges from 0.352% to 0.673%. In Kujang area 0.673 percent was found to be the greatest percentage of organic carbon, whereas in Kunjakothi region 0.352 percent was found to be the least proportion of organic carbon.



(Fig.3. O.C values of different varieties of soil)

SUMMARY AND CONCLUSION

Five different soil samples were collected from different areas of Jagatsinghpur district and analysed by using standard methods. From the study of physicochemical properties of soil, it can be concluded that most of the soils are slightly acidic in nature & the electrical conductivity is ranges in between 0.389 dSm^{-1} to 0.591 dSm^{-1} and the percentage of organic carbon is ranges between 0.352% to 0.673%. To increase the productivity in Jagatsinghpur district selected crop those are recommended by agricultural chemist should be cultivated in selected areas.

Study of examination papers concludes that the soil quality assessment may be performed using several factors. Most parameters exceed permissible limits or are much larger. It is thus vitally necessary that the human activities responsible for deteriorating soil quality are completely prohibited.

REFERENCES

1. A. Anita Joshi Raj, V Umayoru Bhagan. Comparative analysis of some important physicochemical parameters of surface soil and underground water samples of fluorotic ~ 32 ~ International Journal of Chemical Studies areas of Agastheeswaram Union, South India. American Journal of Engineering Research. 2013; 02(06):55-59.

2. Saroj Mahajan, Dilip Billore. Assessment of Physico-Chemical characteristics of the Soil of Nagchoon Pond Khandwa, MP, India. *Res.* J Chem Sci January. 2014; 4(1):26-30.

3. Kiran G. Chaudhari Studies of the physicochemical parameters of soil samples Advances in Applied Science Research 2013; 4(6):246-248.

4. Rajesh P Ganorkar, PG Chinchmalatpure. Physicochemical Assessment of Soil in Rajura Bazar in Amravati District of Maharashtra (India) International Journal of Chemical, Environmental and Pharmaceutical Research May-December. 2013; 4(2&3):46-49.

5. Sanjoli Mobar. Physicochemical comparison of textile effluent impacted and Unimpacted agricultural soil of Jaipur city, India, International Journal of Recent Scientific Research Research. 2015; 6(3)3090-3093.

6. Prakash L, Patel. Correlation Study of Soil Parameters of Kutch district Agriculture Land International Journal of Scientific and Research Publications. 2014; 4:5.

7. A.M.Shivanna and G.Nagendrappa. Chemical Analysis of Soil Samples to Evaluate the Soil Fertility Status of Selected Command Areas of Three Tanks in Tiptur Taluk of Karnataka, India. IOSR Journal of Applied Chemistry (IOSR-JAC) e-ISSN: 2278-5736.Volume 7, Issue 11 Ver. I. (Nov. 2014), PP 01-05. www.iosrjournals.org

8. V. Ramamurthy, K. Radhika, A. Kavitha Amirthanayagi and S. Raveendran. Physico- chemical analysis of soil and water of Vedaranyam mangrove forest, Tamil Nadu, India. IJALS, Vol.3. May - 2012.

9. Borkar A.D., Studies on Some Physicochemical Parameters of Soil Samples in Katol Taluka District Nagpur (MS), India. Research Journal of Agriculture and Forestry Sciences. Vol. 3(1), 16-18, January (2015).

10. Wagh G. S., Chavhan D. M., and Sayyed M. R. G. Physicochemical Analysis of Soils from Eastern Part of Pune City. Universal Journal of Environmental Research and Technology All Rights Reserved Euresian Publication © 2013eISSN 2249 0256 Available Online at: www.environmentaljournal.org Volume 3, Issue 1: 93-99.

11. Tupaki Lokya, Antaryami Mishra, Subhashis Saren and Prava Kiran Dash. GPS and GIS based soil fertility maps of KVK farm, Nayagarh located in the North-Eastern Ghat Agro- Climatic zone of Odisha, India. Journal of Pharmacognosy and Phytochemistry 2020; Sp 9(4): 599-605.

12. Srikanta Kumar Sethy, Antaryami Mishra, Prava Kiran Dash, Subhashis Saren and Pradip Dey. Geo-Information based Soil Fertility Status of Deogarh District of Odisha, India. Int.J.Curr.Microbiol.App.Sci (2019) 8(12): 255-262.

13. Nibedita Swain, Antaryami Mishra, Subhashis Saren, Prava Kiran Dash, Manoranjan Digal and Bbhuti Bhusan Mishra. Soil Fertility Status of Some Villages in Khordha and Bhubaneswar Block of Khordha District under North Eastern Ghat Agro Climatic Zone of Odisha, India. Int.J.Curr.Microbiol.App.Sci (2019) 8(1): xx-xx.

14. Pritipadma Priyadarshini, S. Saren, A. Mishra and B. P. Acharya. Soil Fertility Status of Some Villages under North-Eastern Coastal Plain Agroclimatic Zone of Odisha. J. Indian Soc. Coastal Agric. Res. 35(2): 42-47

(2017).

15. Rasmita Barik, Subhasis Saren, Antaryami Mishra and Baman Prasad Acharya. Soil fertility status of some villages in Astaranga block of Puri district of east and south-eastern coastal plain agroclimatic zone of Odisha. Annals of Plant and Soil Research 19(4): 408-412 (2017).

16. Antaryami Mishra, Dibyendu Das, Subhashis Saren and P. Dey. GPS and GIS based soil fertility maps of Bhadrak District of Odisha, India. Eco. Env. & Cons. 23 (1) : 2017; pp. (184-
190) .

17. Jayanthi P, Gaithuilung R and Pamshim Kazingmei. Physicochemical Analysis for Reclamation of Soils of Tingroi Hills in Lunghar, Ukhrul District, Manipur, India. Universal Journal of Environmental Research and Technology 2015 Volume 5, Issue 2: 101-111.

18. Marshal Soni. Analysis of soil samples for its physico-chemical parameters from Abohar city. The Pharma Innovation Journal 2016; 5(11): 37-39.

19. SS Kekane, RP Chavan, DN Shinde, CL Patil, SS Sagar. A review on physicochemical properties of soil. International Journal of Chemical Studies 2015; 3(4): 29-32.

20. Ku. Smita Tale and Dr. Sangita Ingole. A Review on Role of Physico-Chemical Properties in Soil Quality. *Chem Sci Rev Lett* 2015, 4(13), 57 – 66.