



Manoharbai Shikshan Prasarak Mandal Armori's

**MAHATMA GANDHI ARTS, SCIENCE &  
LATE NASARUDDINBHAI PANJWANI COMMERCE  
COLLEGE, ARMORI**

**Dist. Gadchiroli (Maharashtra) 441 208**

**Affiliated to Gondwana University, Gadchiroli.**

**Re-accredited by NAAC 'A' with 3.02 CGPA**

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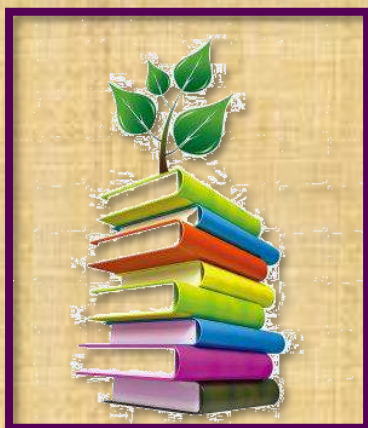
**AQAR : 2020-2021**

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**CRITERION – I**  
**CURRICULAR ASPECTS**

**METRIC NO: ~ 1.3.2.**

**METRIC NAME: ~Number of courses that include experiential learning through project work/ field work/ internship during the year.**



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**PROJECT WORK/ FIELD VISIT REPORTS OF  
M.Sc. (ZOOLOGY, GEOLOGY, CHEMISTRY)**

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**M.Sc.**  
**Zoology**  
**Project Work**

# ***“Ecological Benefits of an Aquatic Insects”***

**A Project Report**

Submitted to the

**Gondwana University Gadchiroli**

For the degree of

**Master of Science (Zoology)**

By

**Miss. Ankita C. Pendam**

M.Sc. Zoology. Sem. - IV

Under the **Supervision** of

**Prof. S. Kumare**

(Supervisor)

**Dr. J.N. Papadkar**

(HOD Zoology Dept.)

**P.G. Department of Zoology**

**M.G. Arts, Science & Late. N.P. Commerce**

**College Armori**

**2020-21**





**Mahatma Gandhi Arts, Science & Late. N.P.  
Commerce  
College Armori, Dist- Gadchiroli  
2020-21**

**CERTIFICATE**

This is to certify that **Miss. Ankita C. Pendam** has carried out his project work on the topic entitled "Ecological Benefits of an Aquatic Insects " during the academic session **2020-21** under my supervision in the Post Graduate Department of Zoology, **M.G. Arts Science and Late. N.P. Commerce College Armori** This research work presented in this project is own work of the candidate.

Armori

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**Dr. L. H. Khalsa**

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## 1. Introduction

The advancement of our knowledge on the ecology and biology of aquatic insects is essential to improving our understanding of their roles in water quality, disease ecology, as indicators of climate change, biodiversity, as well as community structure and ecosystem functioning. Over the past 100 years, large strides in research have been made in the ecology and biology of aquatic insects that have expanded our knowledge on their diversity, life histories, potential as surrogates for ecosystem attributes, as well as ecosystem energetics .

Aquatic insects are found within the interfaces of terrestrial and mainly freshwater ecosystems such as lentic systems, e.g., lakes, ponds, wetlands, bogs, as well as lotic systems, e.g., springs, streams, and rivers, while only a few occur in truly marine habitats. Aquatic insect communities can vary greatly within and among habitats but also according to how humans have altered adjacent lands, and these communities play significant roles within the freshwater ecosystems they inhabit whether through the cycling of nutrients or via their overall contribution to secondary production. Aquatic insects contribute to the trophic structure of the ecosystems by filling functional roles ranging from detritivores up to predators, along with being food sources for vertebrate and invertebrate predators. As many aquatic insects have both aquatic (larval and adult) and terrestrial (adult) life stages, their impact is not limited to the aquatic environment alone and stretches into the terrestrial riparian environment. This -Ecology and Biology of Aquatic Insects|| Special Issue will address current basic and applied areas of research focused on aquatic insect evolution, habitat partitioning, community response to land use/land change relative to disease ecology, their application as surrogates for ecosystem attributes, such as with human-mediated drivers of pollution, as well as their use in the court of law. A major process that has presented an



essential problem for insects to be evolutionarily successful in their adoption of aquatic habitats is respiration .

Insects have resolved this issue in many different ways, a few of which include cutaneous and gill respiration and through the extraction of air from plants. Field ecological studies and molecular techniques can be used to not only better understand how these types of physiological mechanisms have allowed unique ways for aquatic insects to respire, but also understand how they have adapted to flowing waters as well as developed control strategies for pest species.

This issue will address how transcriptomic analyses can be used to control a pest species of aquatic beetle. Currently, aquatic insects are comprised of more than 88,500 described species from approximately 13 orders . Although this significant relationship between taxonomy and basic biological and ecological studies has been widely recognized, major groups of aquatic insects remain poorly understood, e.g., Plecoptera, Trichoptera, and even less so with minor groups such as Neuroptera. Many of these species are understudied, leaving gaps in ecological knowledge regarding habitat use or partitioning about either the larval, adult, or both life stages, e.g., the aquatic Neuropteran family, Sisyridae (Spongillafly).

A lack of species-level information may hamper our understanding of aquatic insect life histories and their role in production and bioenergetics. This issue will include studies that address habitat use and partitioning by two of these orders in an attempt to augment our ecological knowledge of different life stage and life history attributes.

Aquatic insect communities can be found on a gradient—from very biologically heterogeneous to very homogeneous, in diversity and abundance—that is influenced by



environmental factors. These organisms require specific hydraulic, substrate and oxygen requirements that can cause spatially distinct communities [4]. Aquatic insect community diversity and integrity are important due to the functional ecosystem roles they perform; therefore, landscape, biotic, abiotic, and anthropogenic factors can all influence the community composition. This issue will address how certain insect community composition responds to stream flow and anthropogenic impacts as drivers of community composition in disease ecology. Changes in aquatic ecosystems, whether naturally or anthropogenically caused, can result in changes in relative proportions of specific aquatic insect groups. Aquatic insects are often used as surrogates to assess water quality and pollution impacts in freshwater environments. For example, the EPT (Ephemeroptera, Trichoptera, and Plecoptera) richness index is one example of surrogacy that is widely used in many aquatic studies. The richness of these three pollution intolerant orders is used as a metric for overall environment health, water quality, and response to pollution in many research studies. This issue will address how surrogates for ecosystem attributes are being used in the emerging human-mediated pollution of microplastics.

The application of aquatic insect ecology and their biology has been intertwined in various aspects of human society, such as in art, music, a source for food and for recreational sports such as fly-fishing. An emerging application to the use of aquatic insects in human society is how they can be utilized in the court of law, specifically with death scene investigations. This issue will evaluate the use of aquatic Chironomidae in death investigations and how this group of aquatic insects may provide valuable details in estimating a postmortem submersion interval (PMSI). This Special Issue on the Ecology and Biology of Aquatic Insects brings new empirical results and aids in unraveling aquatic insects' complex roles in the aquatic community and to ecosystem function.

## Conclusion

Ecological insects play an important role for transmission of human and animal diseases. These insects also are important for biological control. Therefore ecological study on aquatic insects can provide information about ecology of insects in an area for any decision making. Conservation of natural resources and biodiversity has become urgent issues in recent years for attaining an environmentally sustainable future. While a lack of data has historically excluded the use of many taxa as possible indicators. Growing number of studies on the habitats and distributional pattern of certain insects is making their use increasingly suitable. The improvement and development of existing and new biomonitoring tools using aquatic insects are a major effort among aquatic entomologists.

standard physico-chemical water quality methods. Standard physico-chemical water quality measures provide information on water quality at a particular spatial unit during the time of sampling. It cannot provide historical information on water quality. On the other hand, by knowing the ecology of aquatic insect community, biomonitoring tools provide some historic insights into the water quality. Standard physico-chemical water quality methods need to be carried out in conjunction with biomonitoring tools to comprehensively evaluate the health of freshwater ecosystems. This is particularly important when heavy metal or pesticide contamination is suspected (Subramanian & Sivaramakrishnan 2005).



**M.Sc.**  
**Zoology**  
**Project Work**

# **“ Study of Terrestrial Insects Biodiversity in College Campus ”**

**A Project Report**

Submitted to the

**Gondwana University Gadchiroli**

For the degree of

Master of Science (**Zoology**)

By

**Miss. Ankita D. Rokade**

M.Sc. Zoology. Sem. - IV

Under the **Supervision** of

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**2020-21**

**CERTIFICATE**

This is to certify that **Miss. Ankita D. Rokade** has carried out his project work on the topic entitled “**Study of Terrestrial Insects Biodiversity in College Campus**” during the academic session **2020-21** under my supervision in the Post Graduate Department of Zoology, **M.G. Arts Science and Late. N.P. Commerce College Armori** This research work presented in this project is own work of the candidate.

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**ENDORSEMENT BY THE HOD/ PRINCIPAL/CO-  
ORDINATOR OF THE INSTITUTION**

This is to certify that dissertation entitled " Study of Terrestrial Insects  
Biodiversity in College Campus" is a bonafide research work done by Miss.  
Ankita D. Rokade under the guidance of Professor Prof. S. Kumare Mam

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## Introduction

Mahatma Gandhi Arts and Science College was established way back in 1981. In 1995, the name of the college was re-christened as Mahatma Gandhi Arts, Science and Nasaruddinbhai Panjawani Commerce College keeping in view the great contribution made by late Shri Panjawani for the growth and development of Commerce faculty. It is a prominent college in Gadchiroli district. This college is run by Manoharbai Shikshan Prasarak Mandal, Armori. The Society has a lofty aim of providing higher education to the tribal youth so that they could join the mainstream of the nation and thereby contribute to the development of the nation. The geographical situation of the district had been exceedingly bad. It was known as Andaman and Nicobar of the State of Maharashtra. The mighty Vainganga four Kms towards west and the deep Gadhavi river two Kms. to the east of it had cut it off from the world outside till the new bridges did not span across them. The college started with 45 students and 11 lecturers in 1981. However, today there are 866 students studying in the faculties of Arts, Science, Commerce and Computer courses with 32 lecturers.

The aim of this college is to provide education to the down-trodden tribal students of this backward and poor area so that this tribal area could grow and flourish. The college is affiliated to Gondwan University Gadchiroli. It is also recognized by the University Grants Commission under sections 2(f) and 12B..

The study of biodiversity of insects was conducted in the college campus which covers around half square kilometre area. One boundary of college campus is along Wadsa Road. The major vegetation of college campus is neem, banyan, Asoka and amaltas trees and some ornamental and medicinal plants. The main objective of the study was to determine the insect diversity and the relative abundance of the insect species in the campus. The collection of insects was carried out by using sweep nets, hand picking and beating tray in the month of



sq. km. The state of Sikkim with 0.21% of the geographical area of whole India, represents 9.63% of all known insect species diversity of the country, which reveals that the Sikkim possess very high species biodiversity in comparison to any other state in India. Despite the fact, that the study of insects in Sikkim is still not very exhaustive (ZSI, 2012).

### Threats to biodiversity

Changes in habitats all across the country, particularly in fragile ecosystems, freshwater ecosystems and forests areas has impacted the insect diversity of India. Pollution of streams, particularly through drainage and siltation, has resulted in profound changes in aquatic insect communities. The introduction of exotic insects for the control of pests or weeds directly or indirectly affects the population of native insects. However, the major factor responsible for the loss of insect populations during the last few decades is the widespread use of organic pesticides (ZSI, 2011).



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A green handwritten signature, consisting of several loops and a long tail, positioned above the principal's name.


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## Conclusion

This study was an attempt to analyse some aspects of biodiversity of insects from Mahatma Gandhi College campus. Since it is a preliminary study, a lot of research is necessary in this regard and further collections are essential for getting a detailed record of the faunal diversity of insects and development of standard monitoring procedures for assessing the environmental stability in this area.

Insects are important because of their diversity, ecological role, and influence on agriculture, human health, and natural resources. This chapter documents the dominance of insects in the living world and shows how they have been central to many advances in science. Insects create the biological foundation for all terrestrial ecosystems. They cycle nutrients, pollinate plants, disperse seeds, maintain soil structure and fertility, control populations of other organisms, and provide a major food source for other taxa. Most major insect pests in agriculture are non-native species that have been introduced into a new ecosystem, usually without their natural biological control agents. Insects have evolved unique features in the animal world that are a surprise to experts in biomechanics and bioengineering because many are recent inventions of humans. Insects have been in competition with humans for the products of our labor ever since cultivation of soil began.

  
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**M.Sc.**  
**Zoology**  
**Project Work**

# **“ STUDY OF ZOOPLANKTON DIVERSITY OF GADHAVI RIVER”**

**A Project Report**

Submitted to the

**Gondwana University Gadchiroli**

For the degree of

Master of Science (Zoology)


By

**Miss. ARATI R. SHENDE**

M.Sc. Zoology. Sem. - IV

  
**Prof. S. Kumare**

Under the **Supervision** of

  
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This is to certify that Miss. Arati R. Shende has carried out his project work on the topic entitled "A Study of Zooplankton Diversity in Gadhavi River" during the academic session 2020-21 under my supervision in the Post Graduate Department of Zoology, M.G. Arts Science and Late. N.P. Commerce College Armori This research work presented in this project is own work of the candidate.

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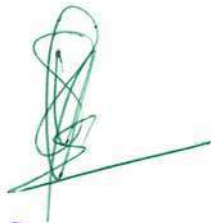
## INTRODUCTION

Zooplanktons are free floating minute aquatic organism found both in fresh water as well as in marine water ecosystem. These are one of the important biotic components that influence the food chain, food web and energy transfer in aquatic ecosystem. Zooplankton acts as main sources of nutrient rich food for many planktivorous fishes (Balayla and Moss, 2004, Tijare and Shastrakar, 2012). The freshwater zooplankton comprises protozoa, rotifers, microscopic crustaceans and microinvertebrates suspended in water. The density and diversity of zooplankton correlates with the physico-chemical characteristics of water (Jafari *et al.*, 2011). Zooplankton play important role in



biomonitoring of water pollution (Tyor *et al.*, 2014). They are also considered as indicators of water quality (Pinto-Coelho *et al.*, 2005; Rajashekhar *et al.*, 2009; Joshi, 2011). Several other investigators also worked on composition and seasonal dynamics of zooplankton from various fresh waterbodies (Dhembare; 2005, Kamble and Meshram; 2005, Pawar and Pulle;2005, Kiran; 2007, Tijare and Thosar; 2008, Rajashekar *et al.* 2009 and Rajagopal *et al.*, 2010). Crustaceans are one of the group of zooplankton of fresh water aquatic ecosystem plays important role in aquatic food web and also affect primary productivity as their chief food is phytoplankton (Gonzalez, 2000). Cladocerans generally contribute largely to zooplankton biomass and act as a key element in the freshwater food webs

(Hessen et al., 2003). Present study conducted to analyze the species diversity of crustacean zooplankton of K.K. reservoir.

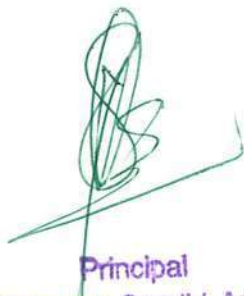


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## CONCLUSION:

From the present study it is concluded that crustacean diversity is within the permissible range that reveals the healthy trophic status of reservoir.



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**M.Sc.**  
**Zoology**  
**Project Work**

# ***“Morphology and Histology of Available Fish”***

**A Project Report**

Submitted to the

**Gondwana University Gadchiroli**

For the degree of

Master of Science (**Zoology**)

By

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This is to certify that **Miss. Diksha P. Bansod** has carried out his project work on the topic entitled “**Morphology and Histology of Available Fish**” during the academic session **2020-21** under my supervision in the Post Graduate Department of Zoology, **M.G. Arts Science and Late. N.P. Commerce College Armori** This research work presented in this project is own work of the candidate.

Place :- Armori

Date: / /2021

  
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## CERTIFICATE

This is to certify that Project entitle "*Morphology and Histology of Available Fish*" submitted By **Miss. Diksha P. Bansod** as partial fulfilment of the requirement pertaining to the Nature and standard of work for the M.Sc. Degree (Zoology) to Gondwana University, Gadchiroli. It is a bonafide research work carried out by his under my supervision and guidance.

This project fulfils the requirement pertaining to the nature and standard of work for the M.Sc. Degree (Zoology) in the faculty of science. Gondwana University. The work embodies in this project has not been submitted for any degree or diploma.



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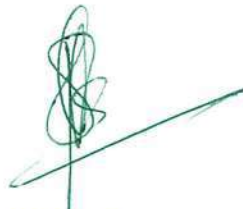
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Date:- / /2021



Miss. Sunanda Kumare

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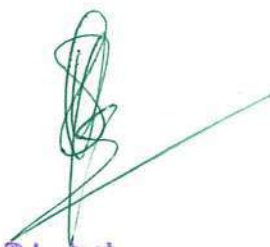


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## INTRODUCTION

Fish have great significance in the life of mankind, being an important natural source of protein and providing certain other useful products as well as economic sustenance to many nations. The gradual erosion of commercial fish stocks due to over-exploitation and alteration of the habitat is one reason why the science fish biology came into existence (Royce, 1972).

It is a well known fact that the knowledge on fish biology particularly on morphometry, length-weight relationship, condition factor, reproduction, food and feeding habit, etc. is of utmost important not only to fill up the lacuna of our present day academic knowledge but also in the utility of the knowledge in increasing the technological efficiencies of the fishery entrepreneurs for evolving judicious pisciculture management. For developing fishery, it is necessary to understand their population dynamic show fast they grow and reproduce, the size and age at which they spawn; their mortality rates and its causes, on what they prey upon along with other biological processes.

There are many isolated disciplines in fish biology, of which the study of morphology is inseparably related to study of the mode of life of the organism. In fact, the size and shape are fundamental to the analysis of variation in living organisms ( Grant and Spain, 1977) and morphological variations even in the same species most often related to the varied environmental factors.

### 1.1. General characters of a fish

Fishes are the first vertebrates with Jaws. They are cold-blooded animals that breath by means of gills, live in water and move with the help of fins. There are about 36,000 species, which represent 40% of the total vertebrates present. Fishes have evolved during


Ordovician period and widely distributed during Devonian period, which is known as „Golden age of fishes“.

The study of fishes is known as Ichthyology. Fishes differ from each other in size, shape, habits and habitats. The smallest fish is the Phifippine goby, *Mistichthys lozerensis* which measures about 1.2 cm. and the largest fish is the whale shark, *Rhinodon* which grows up to 20 meters. They live in all the seas, rivers, lakes, reservoirs, canals, tanks etc. They are economically a very important group of animals. They are used as food throughout the world

and the fish liver is the main source of liver oil containing vitamin A and D. Body oils of fishes are externally used in soap industry and tanneries. Beautiful coloured fishes are the present craze to have them in Aquariums. The general

#### **Characters of fishes are:**

1. Fishes are aquatic. found in all types of waters. They are found in freshwater (*Labeo*), marine (*Stromateus*), brackishwaters (*Chanos*) and cold waters (*Salmo*).
2. Symmetry: These are bilaterally symmetrical
3. Coelome: Fishes are eucoelomates and enterocoelomates
4. These are triploblastic animals
5. Segmentation : Fishes are segmented and segmentation is internal
6. Shape : Most of the fishes are spindle shaped some are dorso-ventrally depressed (*Narcine*), some are laterally compressed (*Notopterus*), some are snake like (*Mastacembelus*) some are globe like (*Tetraodon*)

  
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## Conclusion

Histomorphological observations and stomach content analysis performed in this study suggest that *A. baremoze* has morphological adaptations for omnivory. The molariform dentation observed in the adult fish also helps them to feed on hard bodied organisms. Further investigations to assess the ability of *A. baremoze* to digest formulated diets will be useful.

Morphological observations indicated that the liver in *A. baremoze* is three-lobed and lies adjacent to the oesophagus, stomach, and the anterior section of the intestine. Histologically, the liver parenchyma contained tubular acinar glands which constituted the exocrine pancreas forming the hepatopancreas. This arrangement is similar to what was observed in several fish and freshwater bivalves. However, the hepatopancreas is not observed in higher vertebrates .

Similarly, observations made in this study reveal that *A. baremoze* has a nine-fingered caeca and a long tubular intestine lying alongside the gonads. Multifingered caeca have been reported in several other fishes and have been proposed to be important in chemical digestion, absorption , homeoregulation, food storage, lipid absorption, and optimising pH for digestion . Histologically, the organisation of the intestine did not significantly differ from that of the caeca. The arrangement of this structure is in agreement with findings by and is suitable for absorbing digested food.



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**M.Sc.**  
**Zoology**  
**Project Work**

# ***“Pesticide pollution in vegetable Crop in Armori”***

**A Project Report**

Submitted to the

**Gondwana University Gadchiroli**

For the degree of

Master of Science (**Zoology**)

By

**Miss. Disha B. Dhawale**

M.Sc. Zoology. Sem. - IV

Under the **Supervision** of

**Prof. S. Kumare**

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**P.G. Department of Zoology**

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**College Armori**

**2020-21**



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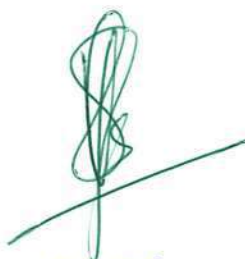


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## Introduction

The term "pesticide" is a composite term that includes all chemicals that are used to kill or control pests. Pesticides are used to protect crops against insects, weeds, fungi, and other pests. They also play a significant role in food production. They protect or increase yields, and the number of times per year a crop can be grown on the same land. In agriculture, this includes herbicides (weeds), insecticides (insects), fungicides (fungi), nematocides (nematodes), and rodenticides (vertebrate poisons)


### PESTICIDE FACTS

Pesticides are potentially toxic to humans and can have both acute and chronic health effects, depending on the quantity and the ways in which a person is exposed.

Some of the older, cheaper pesticides can remain in the soil and water for years. They have been banned in developed countries for agricultural use but are still used in many developing countries.

There are more than 1,000 pesticides used around the world to ensure food is not damaged or destroyed by pests. Each pesticide has different properties and toxicological effects (and the toxicological effects of multiple pesticides can be greater than the sum of their parts).

There are many ways in which pesticide contamination can be prevented such as selecting the appropriate pesticides, proper pesticide mixing, and loading procedures. Preparation of seedbeds and planting allows crops to emerge quickly, potentially reducing early season disease and insect damage that reduces the amount of pesticides needed. It is also important to dispose of pesticide containers properly and these containers should be triple rinsed. Contaminated containers exposed to rain can leak pesticides into the environment.

  
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Pesticides and herbicides contain toxic materials that pose both environmental and human health risks. Humans, animals, aquatic organisms, and plants can be severely threatened by these chemicals. However, with an aggressive march toward the protection of source waters from pesticide and chemical mixtures, as well as improving technology to treat polluted water, there is hope that the flow of pesticides into humans via drinking water can be brought to a tiny trickle for future generations.

The aim of this chapter is to describe the presence of pesticide residues in fruits and vegetables, mainly how they are introduced, dissipated, degraded, affected by food processing techniques and their risk assessment. Fruits and vegetables are important components of the human diet since they provide essential nutrients that are required for most of the reactions occurring in the body. A high intake of fruits and vegetables (five or more servings per day) has been encouraged not only to prevent consequences due to vitamin deficiency but also to reduce the incidence of major diseases such as cancer, cardiovascular diseases and obesity. Like other crops, fruits and vegetables are attacked by pests and diseases during production and storage leading to damages that reduce the quality and the yield. In order to reduce the loss and maintain the quality of fruits and vegetables harvest, pesticides are used together with other pest management techniques during cropping to destroy pests and prevent diseases.




## CONCLUSION

Vegetables like chillies, cauliflower, brinjal and bhendi are infested with a number of insect pests and if left uncontrolled may cause heavy damage. The study has revealed that chemical control is the principal pest control method followed by the farmers in the study area. Biopesticides and botanical pesticides are applied by a limited number of growers, while application of weedicide has been observed absent. On an average, cauliflower and brinjal crops are each given 15 sprayings, chilli is given 13 and bhendi is given 12 applications of pesticides


Pesticide Act 2048 has not mentioned residue part of pesticides and it is urgent to revise and incorporate in the Act. A sound system of monitoring for pesticide residues at the local level and residue analysis at market place can control fruit and vegetables growers, who are competing with chemical imports. This will encourage consumers to trust local produce. Establishment of regional centre is necessary for the prevention and management of pesticide poisoning, enhanced surveillance, training, and community action.

Dissemination of information about insights, experience and lessons learnt from research and interventions is necessary as recommendations to interlink global policy and local action for prevention and management of pesticide hazards. Therefore, information, education and communication sectors need strengthening to raise awareness about proper use of pesticides and its safety measures. Residues analysis of 12 insecticides from 75 samples of 13 vegetables indicated that over half of the vegetable samples contained no detectable level (NDL) of the monitored pesticides, 38% samples resulted in trace level of the pesticides residue or below the minimum residue level (MRL), while 4% samples showed above MRL (EU Standard). Pesticide Act 2048 has not mentioned residue part of pesticides and a sound

  
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system of monitoring for pesticide residues at the local level and residue analysis at market place is lacking.



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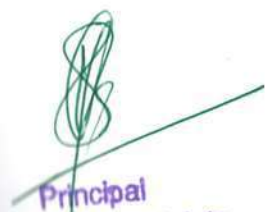
Date: 27-08-2021



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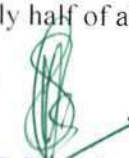
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## Introduction

Inland waters cover less than 1% of the Earth's surface yet harbor 10% of all known animal species, of which 60% is composed of aquatic insects. This diversity today numbers close to 100,000 described species (11) (Table 1). This is probably an underestimate, and with the taxonomic deficit skewed toward the insects, we estimate that aquatic insects may well number more than 200,000 species and thereby make up 80% of aquatic animal diversity. Aquatic insects spend one or more stages of their life cycles in the water, with the majority living in water as eggs and larvae and moving to terrestrial habitats as adults. They play important ecological roles in both aquatic and terrestrial realms as primary consumers, detritivores, predators, and pollinators. The ecology of many groups is well studied, owing to their roles as bioindicators or disease vectors, but freshwaters have been largely overlooked as a hotbed of diversification, despite their disproportionate contribution to global biodiversity. A review by Mayhew (74) explored why there are so many insect species but included very few aquatic examples. The investigation of aquatic insects is therefore timely, with freshwater habitats widely recognized as the most threatened on Earth. The fossil record suggests that all aquatic insect groups are the result of the invasion of freshwaters by terrestrial groups (143). Although belonging to 12 orders, aquatic insects may represent more than 30 separate invasions (Table 1). Ephemeroptera, Odonata, Plecoptera, Trichoptera, and Megaloptera are almost exclusively restricted to freshwater by an aquatic larval stage and make up over 27,000 known species, of which over half belong to Trichoptera. The remaining diversity includes over 10% of the hemipteran suborder Heteroptera, approximately 30% of Diptera, approximately 3% of Coleoptera, and very small proportions of Hymenoptera, Lepidoptera, Neuroptera, and Orthoptera. The order Diptera is by far the largest group, containing nearly half of all aquatic insects. All major orders are cosmopolitan.

  
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with the notable exception of the Megaloptera, and have 50–75% of known species in the tropics, except Plecoptera, of which 65% are Holarctic species (11).

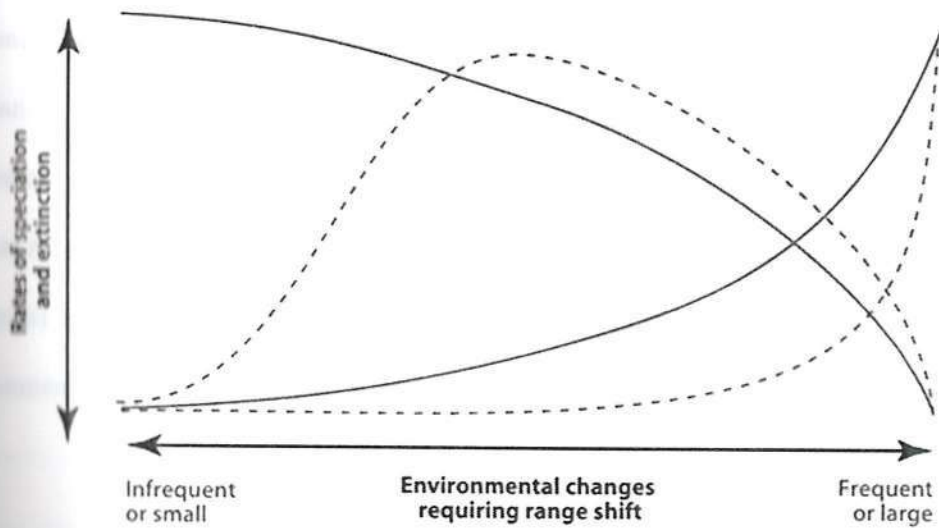
Freshwaters are highly diverse and include ponds, lakes, springs, streams, rivers, wetlands, reservoirs, and ditches (139). The transition to freshwaters demanded adaptation in mechanisms of thermo- and osmoregulation, respiration, feeding, and locomotion. Among the most notable characteristics of freshwaters are their daily and seasonal temperatures, which are more stable than air and soil temperatures. Freshwaters occupy a low position on the landscape where they accumulate nutrients and detritus. Aquatic autotrophs are smaller (often unicellular), grow faster, and have a higher nutritional quality than land plants. Aquatic habitats also exhibit marked spatiotemporal gradients of connectivity and permanence, ranging from stable to dynamic and from insular to connected: For example, seasonal precipitation makes some habitats temporarily dry, turns small streams into large rivers, or reconnects previously separated wetlands. This heterogeneity is important to freshwater biodiversity because of the variety of life histories and ecological roles it enables. Because of their shape and size, freshwater habitats have a large interface with adjacent terrestrial habitats. We estimate that over 70% of aquatic animal species, including most insects, have complex life cycles, providing great adaptability and the potential to disperse outside water. This potential to adjust and disperse, and to access opportunity and evade extinction, sets insects apart from less diverse life forms (74) and separates the freshwater majority from better studied minorities such as fish.

Here we review the important contributions to our understanding of aquatic insect diversification. We emphasize phylogenetic studies that infer processes that led to species

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diversification. Where these are lacking, we refer to studies of population divergence within species that suggest relevant mechanisms. Our arrangement of these mechanisms into discrete sections oversimplifies the diversification process, because mechanisms are not mutually exclusive and many studies address multiple factors. Our synthesis suggests that a good knowledge of general patterns of diversity exists, but that few studies explicitly investigate the processes responsible.



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## Conclusions

The major objective of this communication is to disseminate information on importance of ponds for their conservation and management planning, especially in Indian perspectives. The available studies show that the ponds in India are under threat due to increase in pollution rates and encroachment. There is a need to formulate policy development plan and then endeavour to deliver the plan on the ground. Instead of treating ponds as individual sites, they should rather be treated as part of the pond network or pondscape (more important in terms of climate change problem). The urgently required is a Pond Water Framework Policy and the Indian Pond Conservation Network for the sustainable development and management of ponds. In Indian scenario the exact number of ponds and the volumes of water they store are unknown. Information is lacking on existing storage and large scale benefits the ponds provide. The basic scientific insights needed for planning and management of ponds is inadequate. There is a need to promote frontier research and development in these areas. Based on the lines of the IUCN Red Data List a water red data list (WARD) should be developed which can be a useful tool in pond conservation, planning and management. The preparation of list, however, needs extensive survey and development of inventories. It is essential to do systematic analysis of ponds as alternative storage options in relation to their roles in poverty reduction, and adaptation to climate change in India. It is noteworthy that ponds provide practical water conservation solutions.

**M.Sc.**  
**Zoology**  
**Project Work**

# **“Study of Aquatic Insects Biodiversity of Wainganga River”**

**A Project Report**

Submitted to the

**Gondwana University Gadchiroli**

For the degree of

**Master of Science (Zoology)**

By

**Miss. Manisha D. Chilbule**

M.Sc. Zoology. Sem. - IV

Under the **Supervision** of

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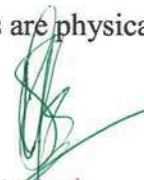
## Introduction

The inland freshwaters encompass a diverse array of ecosystems as varied as lakes and rivers, ponds and streams, temporary puddles, thermal springs and even pools of water that collect in the leaf axils of certain plants. This is a small fraction of world's water resource. Despite this, inland aquatic habitats show far more variety in their physical and chemical characteristics than marine habitats and contain a disproportionately high fraction of the world's biodiversity.

Inland water habitats can be classified into stagnant (lentic) and flowing (lotic). They may also be classified into perennial or transient. Each of these has its own set of distinctive ecology and biological community. Lentic systems comprise lakes and ponds. Majority of large lakes are formed either by glacial or tectonic activity. Most of the glacial lakes are geologically young and were formed during Holocene, 11,500 years before present. Manmade lentic habitats such as irrigation tanks, ponds and reservoirs are historically recent and predominant landscape features in India. Lotic system encompasses rivers and streams. A river system is essentially a linear body of water draining under the influence of gravity. Most of the river systems discharge into the sea and some into lakes.

Few water courses in arid regions enter inland basin where no permanent lakes exist and disappear into the dry plains. Large rivers such as Ganges and Brahmaputra cross over many zones of latitude and traverse a wide range of climatic conditions.

Changes in water flow and underlying geology also create a wide range of habitats, often within short distance. Because of this change in habitats, different organisms are typically present in different parts of any given river system. Even though rivers are physically very

  
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dynamic, large rivers rarely disappear, and there are indications that some of the large rivers are in existence for tens of millions of years. This is reflected in the fact that, all the taxonomic groups are found in running waters and some invertebrate taxa are exclusive or attain greatest diversity here. Biodiversity at higher taxonomic levels such as Phylum, Class or Order in freshwater systems are much narrower than those in the terrestrial or marine systems. The overall number of species (species richness) is also low compared to marine and terrestrial groups. However, species richness in relation to habitat extent may be very high. For example, about 10,000 (40%) of the 25,000 known fish species are freshwater forms. This high diversity of freshwater fishes relative to habitat extent is promoted by isolation between freshwater systems. The species richness in the freshwater systems increases towards the equator as in the case with terrestrial habitats.

There are many more species in the tropical freshwater systems than in temperate regions, but in some specific groups such as freshwater crayfishes this trend appears to be reversed. Animal species are far more diverse and numerous in inland waters than plants. Apart from fishes, invertebrates form an important group. The important groups include sponges, flatworms, annelids, polychaete worms, oligochaete worms, crustaceans, insects and numerous parasitic species in various groups. As on land, insects are the most diverse group of organisms in inland waters. Unlike terrestrial faunas, where beetles (Order Coleoptera) are the most diverse, flies (Order Diptera) appear to be by far, the most abundant group in inland waters.

Insects are the most diverse group of organisms in freshwater. Estimates on the global

number of aquatic insect species derive from the fauna of North America, Australia and Europe is about 45,000, of this about 5,000 species are estimated to inhabit inland

wetlands of India. Aquatic insects of inland wetlands comprise some well-known groups like mayflies (Ephemeroptera), dragonflies (Odonata) and caddisflies (Trichoptera). Aquatic insects such as dragonflies and damselflies (Odonata) are very colourful and prominent insects of the wetlands. Different functional feeding groups of aquatic insects such as shredders, scrapers, filter feeders and predators are important links in nutrient recycling. Aquatic insects primarily process food and leaf litter reaching the wetland from the surrounding landscape.

Nutrients processed by aquatic insects are further degraded into absorbable form by fungal and bacterial action. Plants in the riparian zone absorb this nutrient soup transported through the wetlands. In addition to this significant ecosystem function, aquatic insects are also a primary source of food for fishes and amphibians. Evolution of aquatic insects: The origin of aquatic insects has been controversial and doubts still exist as to whether or not insects are primarily or secondarily adapted to aquatic environments.

The widely accepted view is that the ancestor of myriapod-insect group (millipedes, centipedes, and insects) lived in leaf litter areas along margins of pond like environment. Primitive insects of this moist environment were ancestors of aquatic insects. Their fossil record extends to Devonian in the Palaeozoic era.


  
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## Conclusion

This study was an attempt to analyse some aspects of biodiversity of insects from Mahatma Gandhi College campus. Since it is a preliminary study, a lot of research is necessary in this regard and further collections are essential for getting a detailed record of the faunal diversity of insects and development of standard monitoring procedures for assessing the environmental stability in this area.

Insects are important because of their diversity, ecological role, and influence on agriculture, human health, and natural resources. This chapter documents the dominance of insects in the living world and shows how they have been central to many advances in science. Insects create the biological foundation for all terrestrial ecosystems. They cycle nutrients, pollinate plants, disperse seeds, maintain soil structure and fertility, control populations of other organisms, and provide a major food source for other taxa. Most major insect pests in agriculture are non-native species that have been introduced into a new ecosystem, usually without their natural biological control agents. Insects have evolved unique features in the animal world that are a surprise to experts in biomechanics and bioengineering because many are recent inventions of humans. Insects have been in competition with humans for the products of our labor ever since cultivation of soil began.

  
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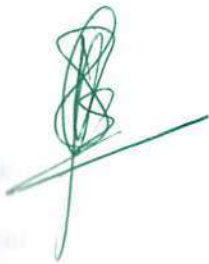
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## INTRODUCTION

### What is Climate Change?

Climate change refers to the long-term changes in the climate that occur over decades, centuries or longer. It is caused by rapidly increasing greenhouse gases in the Earth's atmosphere due primarily to burning fossil fuels (e.g., coal, oil, and natural gas).

The processes affecting climate can exhibit considerable natural variability. Even in the absence of external forcing, periodic and chaotic

variations on a vast range of spatial and temporal scales are observed. Much of this variability can be represented by simple (e.g., unimodal or power law) distributions, but many components of the climate system also exhibit multiple states—for instance, the glacial-interglacial cycles and certain modes of internal variability such as El Niño-Southern Oscillation (ENSO) (see Box 2.5 for details on patterns and indices of climate variability). Movement between states can occur as a result of natural variability, or in response to external forcing. The relationship between variability, forcing and response reveals the complexity of the dynamics of the climate system: the relationship between forcing and response for some parts of the system seems reasonably linear; in other cases this relationship is much more complex, characterised by hysteresis (the dependence on past states) and a non-additive combination of feedbacks.

Related to multiple climate states, and hysteresis, is the concept of irreversibility in the climate system. In some cases where multiple states and irreversibility combine, bifurcations or 'tipping points' can be reached (see Section 12.5). In these situations, it is difficult if not

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impossible for the climate system to revert to its previous state, and the change is termed irreversible over some timescale and forcing range.

A small number of studies using simplified models find evidence for global-scale 'tipping points' (e.g., Lenton et al., 2008); however, there

is no evidence for global-scale tipping points in any of the most comprehensive models evaluated to date in studies of climate evolution in the 21st century. There is evidence for threshold behaviour in certain aspects of the climate system, such as ocean circulation (see section 12.5) and ice sheets (see Box 5.1), on multi-centennial-to-millennial timescales.

There are also arguments for the existence of regional tipping points, most notably in the Arctic (e.g., Lenton et al., 2008; Duarte et al., 2012; Wadhams, 2012), although aspects of this are contested (Armour et al., 2011; Tietsche et al., 2011)

These heat-trapping gases are warming the Earth and the Oceans resulting in rising sea levels, changes in storm patterns, altered ocean currents, changes in rainfall, melting snow and ice, more extreme heat events, fires, and drought. These impacts are projected to continue and in some cases, intensify, affecting human health, infrastructure, forests, agriculture, freshwater supplies, coastlines, and marine systems.

Climate is changing, forced out of the range of the past million years by levels of carbon dioxide and other greenhouse gases not seen in the Earth's atmosphere for a very, very long time. Lacking action by the world's nations, it is clear that the planet will be warmer, sea level will rise, and patterns of rainfall will change. But the future is also partly uncertain -- there is considerable uncertainty about how we will arrive at that different climate. Will the changes be gradual, allowing natural systems and societal infrastructure to adjust in a timely

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fashion? Or will some of the changes be more abrupt, crossing some threshold or "tipping point" to change so fast that the time between when a problem is recognized and when action is required shrinks to the point where orderly adaptation is not possible?

*Executive Summary*

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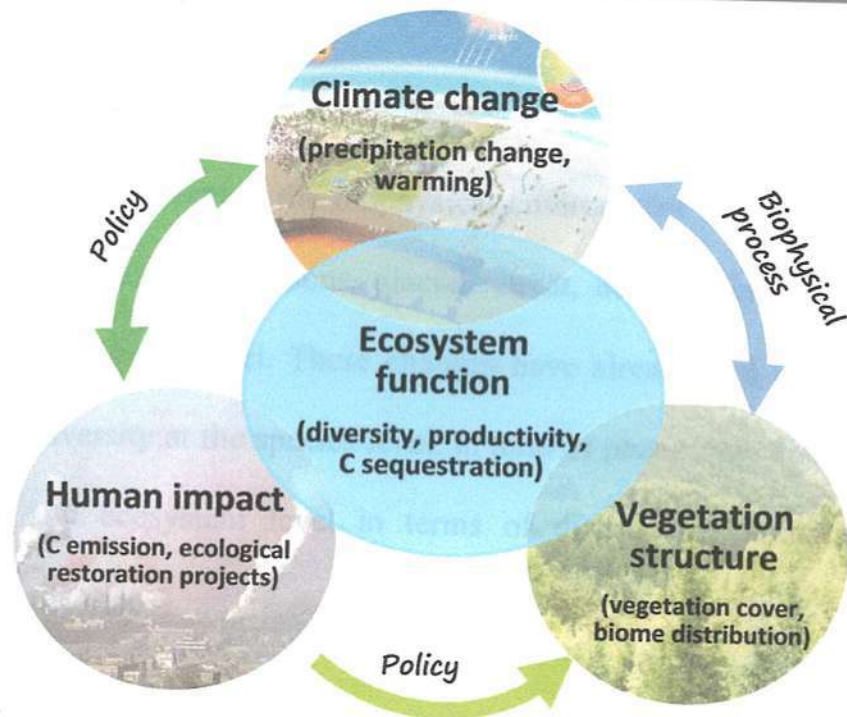
**Abrupt Impacts of Climate Change** is an updated look at the issue of abrupt climate change and its potential impacts. This study differs from previous treatments of abrupt changes by focusing on abrupt climate changes and also abrupt climate impacts that have the potential to severely affect the physical climate system, natural systems, or human systems, often affecting multiple interconnected areas of concern. The primary timescale of concern is years to decades. A key characteristic of these changes is that they can come faster than expected, planned, or budgeted for, forcing more reactive, rather than proactive, modes of behavior.

*Executive Summary*

**Abrupt Impacts of Climate Change** summarizes the state of our knowledge about potential abrupt changes and abrupt climate impacts and categorizes changes that are already occurring, have a high probability of occurrence, or are unlikely to occur. Because of the substantial risks to society and nature posed by abrupt changes, this report recommends the development of an Abrupt Change Early Warning System that would allow for the prediction and possible mitigation of such changes before their societal impacts are severe. Identifying key vulnerabilities can help guide efforts to increase resiliency and avoid large damages from abrupt change in the climate system, or in abrupt impacts of gradual changes in the climate system, and facilitate more informed decisions on the proper balance between mitigation and adaptation. Although there is still much to learn about abrupt climate change and abrupt climate impacts, to willfully ignore the threat of abrupt change could lead to more costs, loss of life, suffering, and environmental degradation. **Abrupt Impacts of Climate Change** makes the case that the time is here to be serious about the threat of tipping points so as to better anticipate and prepare ourselves for the inevitable surprises.

*Executive Summary*

  
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Conceptual diagram showing how vegetation structures, climate changes, and human activities influence ecosystem functioning (e.g., productivity, carbon sequestration, and biodiversity), which are the foci of this special feature. The biophysical processes and governmental policies act on ecosystem functioning by affecting vegetation structure, climate change, and human activities.

In the last 100 years average global temperature has increased by  $0.74^{\circ}\text{C}$ , rainfall patterns have changed and the frequency of extreme events increased. Change has not been uniform on either a spatial or temporal scale and the range of change, in terms of climate and weather, has also been variable. Change in



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## CONCLUSION

It is evident that the loss in biodiversity is due the change in climate. All these changes in environment, adversely affecting the biodiversity, are mainly due to the human activities. The increase in the greenhouse gases is leading to global warming at a faster rate and impacts on biodiversity, ecological balance and humans. The ecological balance is an indispensable need for human survival (Verma 2018b). Every change in the ecosystem process or in ecological balance works on the principle of Newton's law of motion (Every action has an equal and opposite reaction) which may be damaging or complimentary. Even a small change in the climate can lead to the extinction of some vulnerable and sensitive species. Climate change results in the impact on the biodiversity like change in their distribution pattern, migration of species, invasion of invasive species, change in the phonological behaviour like breeding period, migration time etc., increase in the forest fires and pest attacks (Rathore and Jasrai, 2013). To maintain the balance of ecosystem, interaction between the plants, animals and biodiversity needs to be understood, hence promoting its conservation and protection by designating the hotspots as biosphere reserves, increasing aforestation, reforestation and agro-forestry practices. Biodiversity-based adaption and mitigation strategies will enhance the resilience of ecosystems and prevent damage to human and natural ecosystems.

Increasing our understanding of the affects of climate change on biodiversity, developing ways of mitigating such effects and reduced anthropogenic activities are critical to limit such damage. Without conserving the biodiversity and minimizing the anthropogenic activities, it is almost impossible to get the inclusive and sustainable development (Verma, 2019). Thus, there is a growing realization among decision-makers that biodiversity is not an optional bonus in human affairs, but the very foundation of our existence. Moreover, biodiversity

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conservation tailored to changing climatic conditions is not only necessary to help species and habitats to adapt to change, but such action is also likely to mitigate climate change (FAO, 2012). In terms of agriculture, there is a need for climate resilient farming systems. Climate literacy should be spread and a cadre of Community Climate Risk Managers should be formed in villages. The calamity of climate change should be converted into an opportunity for developing and spreading climate resilient farming techniques and systems (Swaminathan and Keshvan, 2012).



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**M.Sc.**  
**Zoology**  
**Project Work**

# ***“Study of Store grain pests”***

**A Project Report**

Submitted to the

**Gondwana University Gadchiroli**

For the degree of

Master of Science (**Zoology**)

By

**Miss. Pallavi M. Nakhate**

M.Sc. Zoology. Sem. - IV

Under the **Supervision** of

**Prof. S. Kumare**

**Dr. J.N. Papadkar**

(HOD Zoology Dept.)

**P.G. Department of Zoology**

**M.G. Arts, Science & Late. N.P. Commerce**

**College Armori**

**2020-21**





## CERTIFICATE

This is to certify that. **Miss. Pallavi M. Nakhate** has carried out his project work on the topic entitled "**Study of Store grain pests**" during the academic session **2020-21** under my supervision in the Post Graduate Department of Zoology, **M.G. Arts Science and Late. N.P. Commerce College Armori** This research work presented in this project is own work of the candidate.

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This is to certify that Miss. Pallavi M. Nakhate has carried out his project work on the topic entitled " Study of Store grain pests" during the academic session 2020-21 under my supervision in the Post Graduate Department of Zoology, M.G. Arts Science and Late. N.P. Commerce College Armori This research work presented in this project is own work of the candidate.

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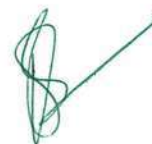


## INTRODUCTION

In India, post-harvest losses caused by unscientific storage, insects, rodents, microorganisms etc., account for about 10 per cent of total food grains. The major economic loss caused by grain infesting insects is not always the actual material they consume, but also the amount contaminated by them and their excreta which make food unfit for human consumption. About 500 species of insects have been associated with stored grain products. Nearly 100 species of insect pests of stored products cause economic losses. Losses of grain in storage due to insects are the final components of the struggle to limit insect losses in agricultural production. These losses can exceed those incurred while growing the crop. Losses caused by insects include not only the direct consumption of kernels, but also include accumulations of frass, exuviae, webbing, and insect cadavers. High levels of this insect detritus may result in grain that is unfit for human consumption



A storage pest is an insect or other animal that damages or destroys stored food or other stored valuable organic matter. Insects are a large proportion of storage pests with each type of crop having specific insects that gravitate towards them such as the genus *Tribolium* that



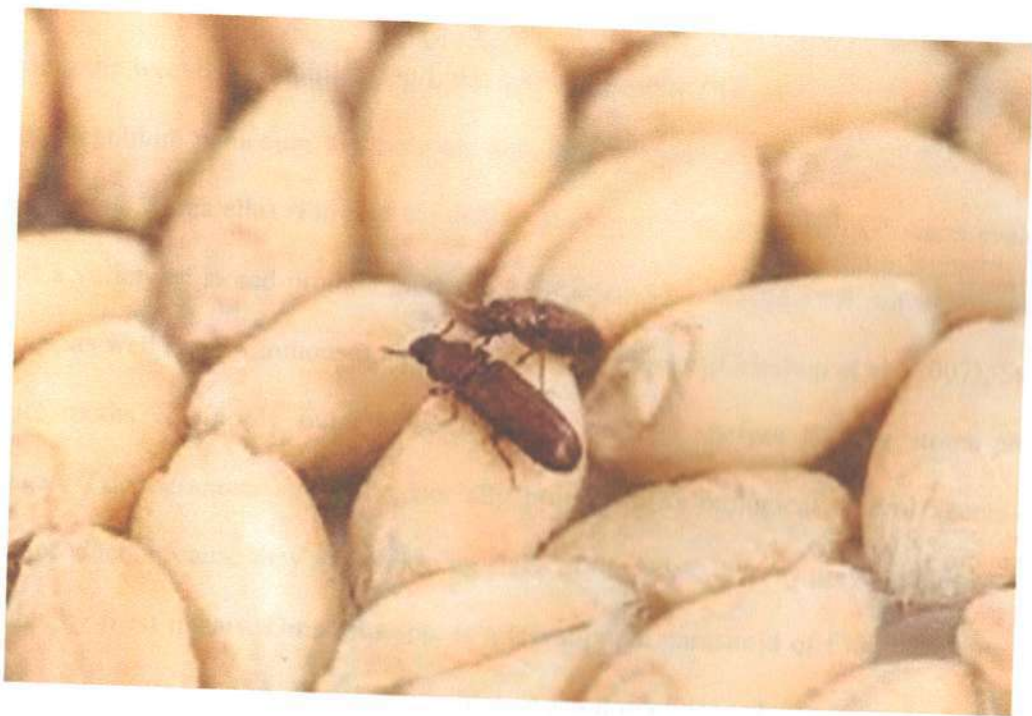
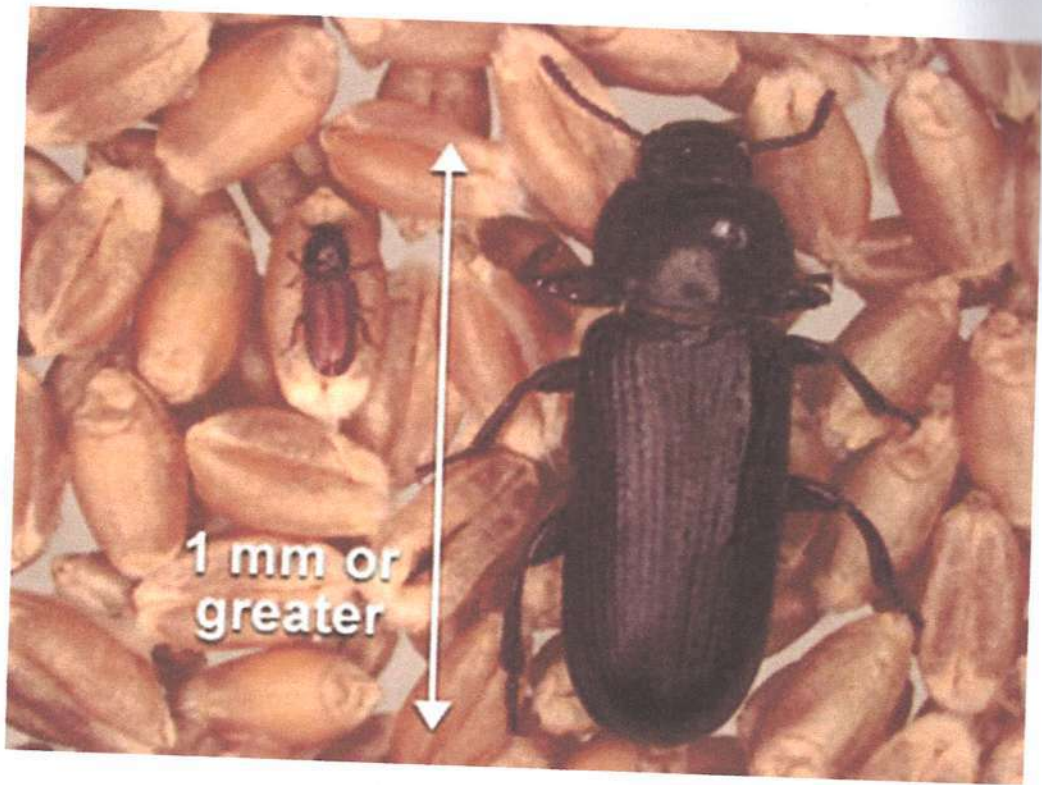
consists of insects such as *Tribolium castaneum* (red flour beetle) or *Tribolium confusum* (confused flour beetle) which damage flour crops primarily.

Advancement of technologies in agriculture has led to increased food production every year. In many countries, major portion of the food grains produced, were storing for contingency and regular supply. These stored grains were infested by insects directly or indirectly and causing severe damages, apart from other storage losses. Most of the storage part is mainly concentrating on grain storage either in domestic or commercial scale. Several structures were used for grains storage ranging from a small metal bin to tall grain elevators. Such stored commodities for long time were

prone to contamination and damage by biotic and abiotic factors. Among the biotic agents, insects, mites, rodents, birds and microorganisms cause immense loss in storage. Major damage was mainly caused by insects, which account for an average of 10-20 per cent of storage losses (Phillips and Throne 2010). In general, stored products of agricultural and animal origin are attacked by more than 600 species of coleopterans, 70 species of lepidopterans and about 355 species of mites. They are causing both quantitative and qualitative losses (Rajendran and Sriranjini 2008). The insects damaging the stored grains, many times got access from the field and established at the storage site due to microclimate and retained during the course of processing and storage (Hagstrum and Phillips 2017). Reports have shown that some insect pests initiate damage during ripening stage of crops and continue to storage. However, major sources of infestations are old bags, storage structure, old containers and cross over infestation (Perez-Mendoza et al. 2004), harvesters and other machineries (Sinclair and White 1980). The initial infestation can be minimized during the post-harvest handling to the storage structures by proper harvesting and drying of grains. However, between the lots the movement of stored product insects are facilitated by grains supply from one region to another either through the commodity. Sometimes they also spread

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## Conclusions

It is high time to think about the severity of the problem of storage losses, as it is estimated that different countries throughout the world suffer major losses as a result of attacks by stored-product insects as well as from improper storage conditions.

A systems approach rather than a piecemeal one needs to be adopted. The existing postharvest system has to be improved to cut postharvest losses at the farm level where about 70% of grains are stored and consumed as food and feed and for seed purposes.

**M.Sc.**  
**Zoology**  
**Project Work**

# ***“Wasps’ diversity in and around Armori”***

**A Project Report**

Submitted to the

**Gondwana University Gadchiroli**

For the degree of

Master of Science (**Zoology**)

By

**Miss. Payal B. Jaunjalkar**

M.Sc. Zoology. Sem. - IV

Under the **Supervision** of

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**Mahatma Gandhi College Armori.**

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## INTRODUCTION

A wasp is any insect of the narrow-waisted suborder Apocrita of the order Hymenoptera which is neither a bee nor an ant; this excludes the broad-waisted sawflies (Symphyta), which look somewhat like wasps but are in a separate suborder. The wasps do not constitute a clade, a complete natural group with a single ancestor, as their common ancestor is shared by bees and ants. Many wasps, those in the clade Aculeata, can sting their insect prey.

The most commonly known wasps, such as yellowjackets and hornets, are in the family Vespidae and are eusocial, living together in a nest with an egg-laying queen and non-reproducing workers. Eusociality is favoured by the unusual haplodiploid system of sex determination in Hymenoptera, as it makes sisters exceptionally closely related to each other. However, the majority of wasp species are solitary, with each adult female living and breeding independently. Females typically have an ovipositor for laying eggs in or near a food source for the larvae, though in the Aculeata the ovipositor is often modified instead into a sting used for defense or prey capture. Wasps play many ecological roles. Some are predators or pollinators, whether to feed themselves or to provision their nests. Many, notably the cuckoo wasps, are kleptoparasites, laying eggs in the nests of other wasps. Many of the solitary wasps are parasitoidal, meaning they lay eggs on or in other insects (any life stage from egg to adult) and often provision their own nests with such hosts. Unlike true parasites, the wasp larvae eventually kill their hosts. Solitary wasps parasitize almost every pest insect, making wasps valuable in horticulture for biological pest control of species such as whitefly in tomatoes and other crops.

  
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## Conclusion

Wasps are a diverse group, estimated at well over a hundred thousand described species around the world, and a great many more as yet undescribed. For example, almost every one of some 1000 species of tropical fig trees has its own specific fig wasp (Chalcidoidea) that has co-evolved with it and pollinates it.


Many wasp species are parasitoids; the females deposit eggs on or in a host arthropod on which the larvae then feed. Some larvae start off as parasitoids, but convert at a later stage to consuming the plant tissues that their host is feeding on. In other species, the eggs are laid directly into plant tissues and form galls, which protect the developing larvae from predators but not necessarily from other parasitic wasps. In some species, the larvae are predatory themselves; the wasp eggs are deposited in clusters of eggs laid by other insects, and these are then consumed by the developing wasp larvae.

The largest social wasp is the Asian giant hornet, at up to 5 centimetres (2.0 in) in length. The various tarantula hawk wasps are of a similar size and can overpower a spider many times its own weight, and move it to its burrow, with a sting that is excruciatingly painful to humans. The solitary giant scoliid, *Megascolia procer*, with a wingspan of 11.5 cm, has subspecies in Sumatra and Java; it is a parasitoid of the Atlas beetle *Chalcosoma atlas*. The female giant

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ichneumon wasp *Megarhyssa macrurus* is 12.5 centimetres (5 in) long including its very long but slender ovipositor which is used for boring into wood and inserting eggs. The smallest wasps are solitary chalcid wasps in the family Mymaridae, including the world's smallest known insect, *Dicopomorpha echmepterygis* (139 micrometres long) and *Kikiki huna* with a body length of only 158 micrometres, the smallest known flying insect.

  
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**M.Sc.**  
**Zoology**  
**Project Work**

***“Study on diversity of an ants from armori  
area”***

**A Project Report**

Submitted to the

**Gondwana University Gadchiroli**

For the degree of Master  
of Science (Zoology)

By

**Miss.Pooja S. bawane**

M.Sc. Zoology. Sem. - IV

Under the Supervision of

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2020-2021**

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## Chapter No.1

### Introduction:

Within landscapes, natural habitats play a major role in the recycling of nutrients, breaking down of wastes, and maintaining clean air, water, and soil. Recovery time from disturbances on natural habitats depends directly on communities of plants and animals (Tilman and Downing 1994, Turner et al. 1998, Pfeiffer et al. 2003).

Land-use change has drastically affected the environment but much is still to be learned about the effects of degradation and fragmentation of land on plant and animal populations. Fragmentation of a habitat into smaller units due to urbanization or agriculture can result in species richness decline (Tilman et al. 1994, Stone 1995). In a study of carrion and dung-feeding beetle communities, Klein (1989) showed that one- and ten-hectare rain forest fragments, isolated from contiguous forests by at least 350 meters for two to six years, had fewer species, sparser populations and smaller individuals than beetle communities in undisturbed rain forests. Suarez et al. (1998) studying the effects of fragmentation on native ant communities in coastal southern California found that increased fragmentation promoted the spread of the invasive Argentine ant (*L. humble*) and displaced native ant species. Grassland birds are experiencing extensive population decline because of fragmentation (Herbert 1994, Vickery et al. 1994). Helper and Helsinki (1999) tested different sizes of patch-area and perimeter-area on grassland breeding birds and found that although large patch size is important, patch shape had more influence on the presence and richness of bird species.



In extreme cases, some animals become extinct, partly due to fragmentation of land, such as the Carolina Parakeet, *Conuropsis carolinensis* Linnaeus (Dickson 1991), and the Excess Blue butterfly, *Glaucopsyche xerces* (Boisduval); the first butterfly known to become extinct in North America (Emmel & Emmel 1993).

Many conservation programs exist in Missouri to help conserve Missouri's natural resources, one of which is the Conservation Reserve Program (CRP). The CRP's primary objectives are to remove erodible or eroding lands from agricultural production by establishing perennial grassland vegetation, and to enhance habitat for fish and wildlife populations (Johnson 2005). It is hoped that a reduction in soil erosion will also reduce sedimentation of streams, and improve water quality.

CRP land is typically fragmented into various sizes and surrounded by farmland. Studies have shown that CRP patch size influences which animal species can colonize the land. Specifically, Johnson and Igl (2001) found that the northern harrier, sedge wren, clay-colored sparrow, grasshopper sparrow, Baird's sparrow, Le Conte's sparrow, and bobolink favor larger grassland patches, whereas two edge species, mourning dove and brown-headed cowbird, tended to favor smaller grassland patches. However, little is known of the effects of fragmentation on prairie ant communities.

Ants form an essential component of grasslands by participating in most levels of the trophic system (Carroll and Janzen 1973, Trager 1998). Ants disperse seeds for many plant species (Berg 1975, Beattie 1985, Willson et al. 1990), are the chief predators of insects and other arthropods (Mirenda et al. 1980, Youngs 1983, Porter and Savignano 1990), and both invertebrates (Whitcomb et al. 1973, Jackson et. 1998) and vertebrates prey on them for food (Milne and Milne 1950, Taigen and Pough 1983, Reiss 2001).

Ants are a useful group to be used in diversity studies because they show high

diversity and have numerical and biomass dominance in almost every habitat (Hölldobler and Wilson 1990, Agosti et al. 2000). There is also a good taxonomic knowledge base (Creighton 1950, Bolton 2003), ants are easily collected (Romero and Jaffe 1989, Olson 1991, Wang et al. 2001), they have stationary nesting habits that allow them to be resampled over time (Brian et al. 1966, Bristow et al. 1992), and they are sensitive to environmental change (Andersen 1990, 1995, Peck et al. 1998, Agosti et al. 2000).

Although ants have a great impact on their surrounding environment, few studies have examined the ant communities of restored and recreated grasslands (Trager 1990, Whiles and Charlton 2006). Previous studies (Trager 1990, Petersen et al. 1998) have shown that native prairie ants naturally colonize restored prairies once appropriate vegetation has been reestablished. A typical prairie remnant is able to support 25-35 ant species (Trager 1998). Trager (1990) found that in two artificial prairies, isolated from other prairie remnants, and planted where no prairie occurred for at least 50 years prior to their establishment; each had approximately 20 ant species. In a study of a reconstructed tallgrass prairie plot, (Petersen et al. 1998) found that the dominant grass species were Big bluestem (*A. gerardii*), Indian grass (*S. nutans*) and prairie dropseed (*Sporobolus heterolepis* Gray), and 11 species of ants were collected. Of these, nine were in native tallgrass prairie and the remaining two were in open fields.

## Chapter No. 5

### Conclusion:

With the decline in our natural resources, people are increasingly concerned with preserving and restoring natural habitats. This study is a baseline study examining how ants colonize restored grassland in the Conservation Reserve Program in an effort to establish information for comparative studies. In general, ant abundance increased the longer land had been in the CRP program. Thus, as age increased, ant abundance increased. This may be due to ant colonies becoming more established in older fields and more colonies being present. Species richness was constant among the four ages, except for a peak in richness in 7-8 yr fields. The intermediate disturbance hypothesis may explain this (Wilson 1994; Collins et al. 1995), indicating that 7-8-yrs, is an intermediate time since disturbance on CRP fields. Future studies could include follow-up on earlier-succession fields, to determine if they have similar species richness and abundance when reaching the ages examined in this study. Another study could compare this study to ant communities on undisturbed prairie remnants. Other taxa collected from this study should be examined to determine if any similarities in total abundance and species richness exist with ants. Majer (1983) has shown a correlation of ant richness with the richness of other invertebrate groups.

The relationship between ants and beetles are not well understood, although both are used

as bioindicators in studies (Majer 1983, Oliver and Beattie 1996).

Functional studies should also be examined, to build a knowledge base of ant's response to disturbance in prairie habitats and other ecosystems.

**M.Sc.**  
**Zoology**  
**Project Work**

**“STUDY OF BIODIVERSITY OF MOLLUSCAN OF  
WAINGANGA RIVER AT ARMORI, DIST.  
GADCHIROLI, (M.S.) INDIA”**

**To Gondwana University, Gadchiroli in partial fulfillment of the  
Requirements for Degree of  
Master of Science (Zoology)**

**Submitted By**

**Ku. Rashmi Sanjay Kapkar**

**M.Sc. II (Zoology) Semester –IV**

**Under the Guidance of**

**PROF. MISS. KUMARE MADM**

**H.O.D**

**Dr. J. N. PAPADKAR SIR**



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College Armori Dist. Gadchiroli (M.S.)**

**2020-21**

**CERTIFICATE**

The is to certify that the project entitled "STUDY OF MOLLUSCAN BIODIVERSITY OF WAINGANGA RIVER AT ARMORI, DIST. GADCHIROLI, (M.S.) INDIA" submitted by KU. RASHMI SANJAY KAPKAR as partial fulfillment of the reuirement pertaining to the nature and standard of work for the M.Sc. Degree (Zoology) to Gondwana university, Gadchiroli. It is a bonafide research work carried out by him under my supervision and guidance.

The work embodied in this project has not been submitted for any degree or diploma.

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2020-21

## CERTIFICATE

The is to certify that the project entitled “**STUDY OF MOLLUSCAN BIODIVERSITY OF WAINGANGA RIVER AT ARMORI, DIST. GADCHIROLI, (M.S.) INDIA**” submitted by KU, RASHMI SANJAY KAPKAR as partial fulfillment of the reuirement pertaining to the nature and standard of work for the M.Sc. Degree (Zoology) to Gondwana university, Gadchiroli. It is a bonafide research work carried out by him under my supervision and guidance.

The work embodied in this project has not been submitted for any degree or diploma.

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## INTRODUCTION

Freshwater molluscs fall into two main groups, the Bivalves and the Gastropods, and are found in a wide range of freshwater habitats, and have varied life-history strategies, with life-spans that vary from three months (peaclam) to over 120 years (pearl mussels). They find their highest levels of endemism and diversity in ancient lakes, large river basins and artesian basins (Seddon 2000) and all of these habitats can be found within the Eastern Mediterranean region.

The geographic range of this study covers all of Turkey, the southern Caucasus. The Levant and Mesopotamia. It includes 14 freshwater ecoregion, (Abell et al 2008, WWF and TNC 2013); from Thrace in the West of Anatolia, east to the Kura-South Caspian ecoregion, and south to the Jordan River and Levant ecoregions in the west, and Tigris and Euphrates ecoregions in the east. This study completes the assessment of the Circum-Mediterranean region, covering large geographic gap between Europe, which has been assessed by Cuttelod, Seddon and Neubert (2011), North Africa (Van Damme et al. 2010), and the Arabian Peninsula (Neubert, Zuhair, and Van Damme in prep).

Over 90,000 species of gastropods have been recorded worldwide, both in the water and on land, although mollusks are common components of the benthic communities, their role in the dynamic of the aquatic ecosystem and their contribution to biomass production is not well known. Freshwater gastropods are either herbivores or detritivores, or they may passively consume small invertebrates associated with periphyton (Coker, B.E).

Many species spend their entire lives in a few square meters of habitat, making them extremely vulnerable to localized environmental habitat degradation. Although most species prefer clean, stable and river bottoms, some prefer the soft substrated, more common to ponds and lakes. Besides this, a few wide-ranging small species can easily survive in polluted habitats.

Mollusca are highly successful invertebrates in terms of ecology and adaptation and are found nearly in all habitats ranging from deepest ocean trenches to the intertidal zones, and freshwater to land occupying a wide range collected from Deria tank while minimum species were collected from Godavari river.

Water is indispensable and one of the precious natural resource of our planet. Water is vital to the existence of all living organisms, but this valued resource is increasingly being threatened as human population grows and demand more water of high quality for domestic use, agricultural production, industrial production, power generation, mining, and forestry practices can lead to deterioration in water quality and quantity that impact not only the aquatic

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ecosystem but also the availability of safe water for human consumption. However, a systematic study on biodiversity of molluscs at Wainganga river of Wadsa (Desaiganj) was not done, that is why, the topic was chosen for research.

**Freshwater molluscs** are those members of the Phylum Mollusca which live in freshwater habitats, both lotic (flowing water) such as rivers, streams, canals, springs, and cave streams (stygobite species) and lentic (still water) such as lakes, ponds (including temporary or vernal ponds), and ditches.

This article is about freshwater Mollusca in general; for information on one particular family of freshwater molluscs, please follow the appropriate links in the lists below.

The two major classes of molluscs have representatives in freshwater: the gastropods (snails) and the bivalves (freshwater mussels and clams.) It appears that the other classes within the Phylum Mollusca - the cephalopods, scaphopods, polyplacophorans, etc. - never made the transition from a fully marine environment to a freshwater environment.

A few species of freshwater molluscs are among the most notorious invasive species. In contrast, numerous others have become threatened or have become extinct in the face of anthropogenic change.

Typical freshwater species (such as many river mussel species in the family Unionidae) have a range which may consist of a series of adjacent river systems, a series of adjacent tributaries, or part of a single large river system. Large rivers and small tributary creeks typically share few species, and distribution patterns suggest large lowland rivers represent substantial barriers to the dispersal of species adapted to small upland streams. Endemism is common in some families, and species may be endemic to a single creek or spring. In contrast, some of the tiny pill clams have a nearly worldwide distribution (Burch, 1972)

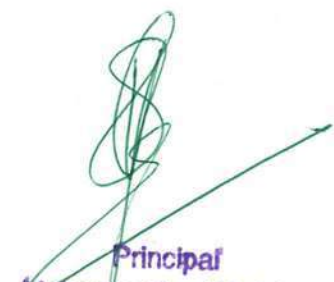
Challenges in the natural environment faced by freshwater Mollusca include floods, droughts, siltation, extreme temperature variations, predation, and the constant unidirectional flow characteristic of river habitats. Osmoregulation, or the maintenance of constant salinity within body tissue and fluids, is another challenge faced by freshwater Mollusca. Dillon (2000)<sup>[2]</sup> indicates that they have characteristically low tissue salinities relative to other freshwater animals, and unionid mussels have some of the lowest tissue salinities of any animal.

  
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## CONCLUSION

The bivalves and gastropods are abundantly seen in the Wainganga river coastal waters at the selected sample station. The molluscs especially gastropods mentioned here in act as important supplementary food for birds. Many water bird species feed on both bivalve and gastropod species. Increasing anthropogenic activity pressures especially by fishing, discharge of polluted water in river, use of water for agriculture and grazing cattle is affecting population ecology of molluscs. Molluscs act as natural recyclers of organic debris converting it into biomass that can be further utilized by fishes. The rate of pumping of water from Wainganga is increasing. The mollusk fauna is however rich but in near future it could get affected and threatened by the anthropogenic pressures on river. Therefore Wainganga river should be properly managed in terms of water quality and quantity so that this diversity of organisms is preserved to the future generations.

  
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**M.Sc.**  
**Zoology**  
**Project Work**

# ***“Reproductive biology of fishes a available fish”***

**A Project Report**

Submitted to the

**Gondwana University Gadchiroli**

For the degree of

Master of Science (**Zoology**)

By

**Mr. Prakash Arvind Thute**

M.Sc. Zoology. Sem. - IV

Under the **Supervision** of

**Prof. S. Kumare**

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**College Armori**

**2020-21**





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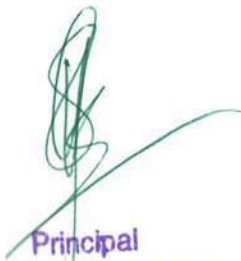
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## Introduction

Fish reproductive organs include testes and ovaries. In most species, gonads are paired organs of similar size, which can be partially or totally fused. There may also be a range of secondary organs that increase reproductive fitness. The genital papilla is a small, fleshy tube behind the anus in some fishes, from which the sperm or eggs are released; the sex of a fish often can be determined by the shape of its papilla.

Fish reproductive biology plays an important role for fishery management, especially in developing countries. The aim of this study was to compile all available information and analyze reproduction patterns of marine fishes in three Large Marine Ecosystems (LMEs): North, East, and South Brazil Shelves. We tested the hypothesis that the onset and duration of spawning season differ among these three LMEs; compared the ratio between length at first maturity and asymptotic length with the global trend observed; analyzed sex ratios; and tested whether females allocate more energy into reproduction than males. The following data were compiled from published sources and "gray" literature: sex ratio, spawning season, gonadosomatic indices (GSI), and length at first maturity ( $L_m$ ). The reproductive load was estimated as  $L_m/L_\infty$ . The median extension of the spawning season in the North, East, and South Brazil Shelves were 6.5, 6.0, and 5.0 months, respectively, with higher frequency during austral summer in South Brazil. Marine fishes from these three LMEs can be grouped in summer and non-summer spawners. About 96% of the cases the reproductive load was between 0.3 and 0.8, which is slightly shifted toward smaller values, compared with the global range of 0.4–0.9. Gonadosomatic indices for females were higher. Contrary to some expectations, there is seasonality in the reproduction of tropical fishes. However, seasonality

  
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is stronger in southern populations. Size at first maturity is not efficiently used as a tool for fisheries management in the ecosystems analyzed.

Key

Key

Fish reproductive biology is crucial for fishery management (Jakobsen et al., 2009), especially in developing countries such as Brazil, where managers rely on size at first maturity and the onset and duration of spawning season for managing fisheries (Dias Neto, 2010a). Despite the importance of fish biology, the lack or scarcity of fishery data in some countries leads to overexploitation of the stocks and management failure in some cases (Kinas, 1996; Alves and Minte-Vera, 2012). Furthermore, subsidies drive the limits of exploitation beyond sustainability (Abdallah and Sumaila, 2007; Castello, 2007; Dias Neto, 2010b). Spawning season has a temporal scale, with most fishes exhibiting one or two spawning seasons a year (Bye, 1984; Cushing, 1990). The success of reproductive activities depends on the match between spawning season and the best conditions for larval survival (Cushing, 1973; Lowerre-Barbieri et al., 2011). Hence, it is fundamental to have basic biological data in order to conduct a reliable management system.

Keywords


Keywords

Large Marine Ecosystems (LMEs) are defined as ecosystems with similar bathymetry, hydrography, productivity and dependent populations at trophic level (Ekau and Knoppers, 2003). The vast extension of the Brazilian coast comprises 17 coastal states and encompasses three LMEs: North Brazil Shelf, East Brazil Shelf, and South Brazil Shelf. Thus, maintaining a continuous system of data collection of fishery statistics and basic biological information has been a continuous challenge. Besides, Brazil has the highest richness of freshwater fishes in the world (about 3139 species) and one of the highest richness of marine fish species (1107) (Froese and Pauly, 2015). FishBase, an electronic encyclopedia with biological

information about fishes, indicates, e.g., that local information related to reproduction (size at first maturity) is available for only 5.4% of Brazilian fish species (Froese and Pauly, 2015). In principle, this information could be derived from meta-analysis (Borenstein et al., 2009). However, before this is undertaken, many of the empirical values that have been obtained so far should be made available.

Currently, some results of important studies and/or surveys are not published, remaining in the format of theses, technical reports, and/or proceedings of local congresses or conferences, often in language not widely read by the international scientific community. A study by Stergiou and Tsikliras (2006) showed that hypotheses can be more straightforwardly tested after gray literature has been accessed. Godinho and Lamas (2010) recently reviewed all information available on the reproduction of Brazilian freshwater fishes. However, for Brazilian marine fishes the only review found was by Ferraz-Dias (1989).

Thus, this study was proposed with the main objective of compiling and analyzing all available information (published or not) on reproduction for marine fishes of the three Brazilian LMEs. We analyzed information available on length at first maturity and spawning season for Brazilian marine fishes and how it has been used for fisheries management. We tested the hypothesis that the onset and duration of spawning season differ among the three LMEs that comprise Brazil; compared the ratio between length at first maturity and asymptotic length with the global trend observed; analyzed sex ratios; and tested whether females allocate more energy into reproduction than males.


  
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## Conclusions

Based on the biological findings in this study, the observed size distribution structure, whereby all small size individuals are female and the majority of large individuals are males, confirms that *Epinephelus malabaricus* is a monandric protogynous hermaphrodite species. The minimum landing weight of 2 kg proposed for the trial policy on groupers exports corresponds to immature *Epinephelus malabaricus* of less than 60 cm which are not yet capable of reproducing; therefore, in order to ensure the survival and continued reproduction of the species, the stated minimum size limit needs to be reconsidered. The spawning season is from September to February, which coincides with the grouper fishing season, but this particular species is not known to have spawning aggregations. The *Epinephelus malabaricus* fished in Mafia Island waters include a range of immature specimens, ripe females and few large males; this seems to be a non-selective fishing pattern achieved by using gear of different types and sizes, which may contribute to ensuring the viability of *Epinephelus malabaricus* populations.

The deep reefs where large specimens of *Epinephelus malabaricus* are fished are found mainly outside the Mafia Island Marine Park area. Furthermore, there are no national fishing regulations stipulating the minimum or maximum size of grouper species that can be caught, the size of hooks and basket traps that may be used or the best time of year to catch groupers so as to avoid affecting their spawning activities. The natural seasonal closure of fishing due to strong southeast monsoon winds, coupled with the small size of fishing vessels and gear used by resident fishers, hinders access to deep reefs. These factors are currently acting as natural limitations to the fishing of large *Epinephelus malabaricus*. Another factor limiting the pressure on large fish is the consumer preference for smaller fish, at both local and international levels.

  
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**M.Sc.**  
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**Project Work**



***“ Pesticide use and possible effects on  
the environment in Armori”***

**A Project Report**

Submitted to the

**Gondwana University Gadchiroli**

For the degree of

Master of Science (Zoology)

By

**Miss. Pranjali D. Ganvir**

M.Sc. Zoology. Sem. - IV

Under the **Supervision** of

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Armori

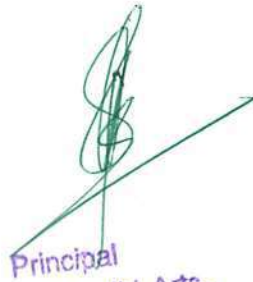
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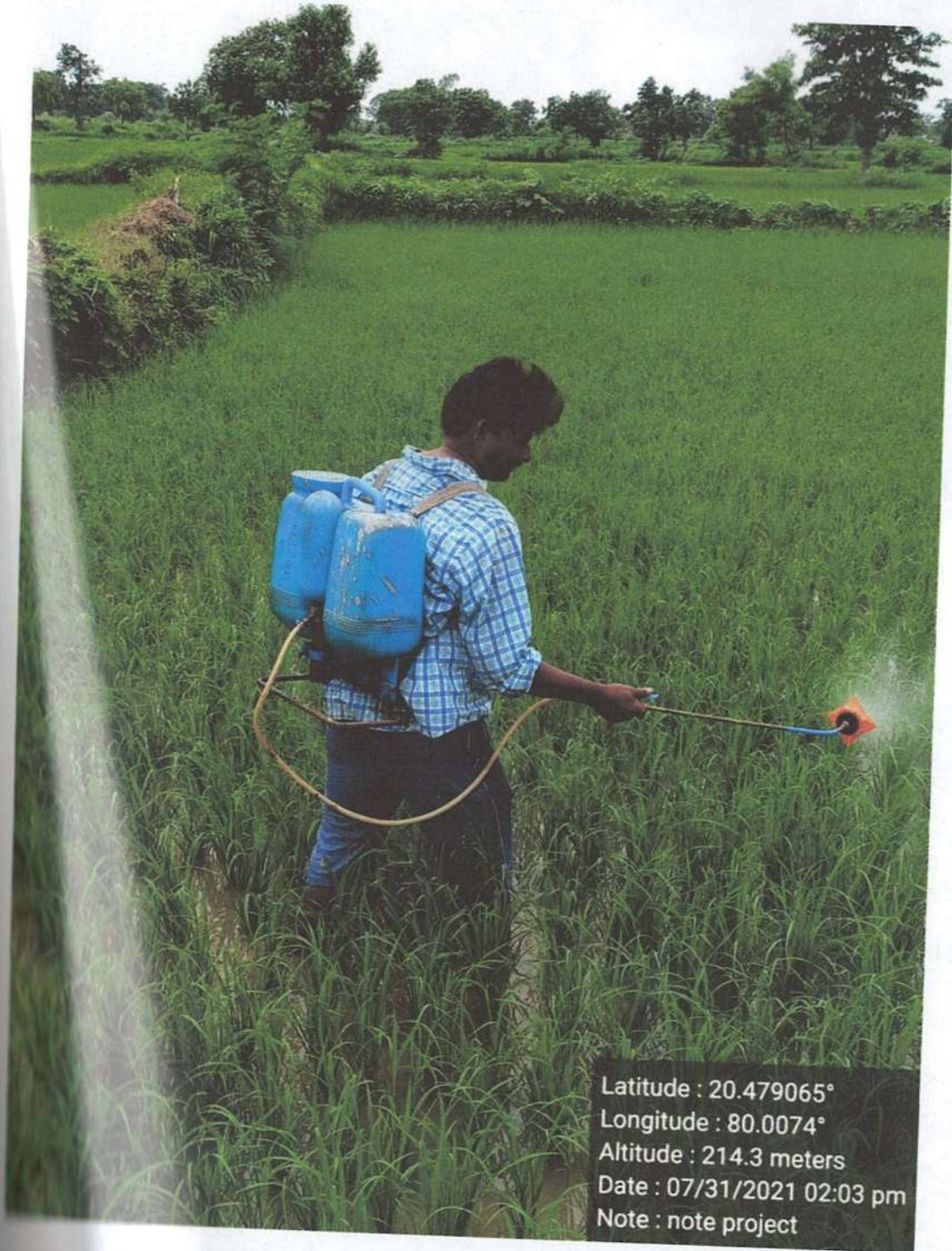
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**Photographs of Armori area**



  
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## Conclusion

In summary, the widespread use of insecticides is ineffective and economically wasteful in the long run. Many insecticides do in fact accomplish the intended task of controlling pest populations. However, their detrimental health and environmental effects make them an inadequate long term solution.

On the basis of the foregoing, we conclude that there is a number of existing alternative methods for preventing and controlling pests. They could be taken into use today. However, many of these methods have economic limitations and, in many cases, additional economic costs are involved in their use, in comparison to the costs of chemical methods. It would, however, be necessary to reinforce R&D efforts on these methods.

## Recommendations

The Committee recommends a reinforced research effort on the development and improvement of alternative methods, so that they become economically competitive. It also recommends that, to the extent possible, marketing mechanisms be used to create crop-rotation regimes that require the lowest possible treatment frequency.

  
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This is to certify that **Ku. Puja Vilas Tupat** is bonafide student of P. G. Department of Zoology, Mahatma Gandhi College Armori. She has submitted the project work for the partial fulfillment of the Master Degree in Zoology of Gondwana University, Gadchiroli.

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## INTRODUCTION

### WAINGANGA RIVER

Wainganga River, river, tributary of the Godavari River, western India. Its name, which means "Arrow of Water," was probably derived from the names of the goddess Ganga and of Venu, or Benu, a king who ruled in Damoh during Puranic times.

The Wainganga rises in the Mahadeo Hills in south-central Madhya Pradesh state and flows 360 miles (580 km) south to join the Wardha River (a headwater of the Godavari), northeast of Kagaznagar in Maharashtra state. Along the final 142 miles (229 km) of its course, the river forms the boundary between Maharashtra and Telangana states and is known as the Pranhita. The river receives water from numerous tributaries, notably the Bagh, Bawanthadi, Kanhan, Chulband, Garhvi, and Thanwar rivers. The river drains into the eastern Nagpur plain and the areas around Seoni and Chhindwara. During the rainy season the river is navigable for only a short distance upstream from the confluence with the Bagh River. Timber is floated down the river, and grain and vegetables are carried short distances by boat.

The Wainganga River valley is forested and relatively sparsely populated, except in the northern industrial area around Maharashtra state. Most of the population is concentrated along the river, where rice is extensively irrigated. Major river towns in Maharashtra include Bhandara, Tumsar, Balaghat, and Pauni. Gadchiroli, Chandrapur

The valley of Wainganga River has served as a backdrop for Rudyard Kipling's Jungle book. East Vidarbha region of Maharashtra hosts major part of this lush green landscape which is ecologically one of the most significant regions of India. More than 50% of forest of Maharashtra State falls in this region. Government of Maharashtra (GoM) however is doing little on its part to protect these. Perceiving them as 'hurdles' GoM is pushing more and more

### Waingangā River Armori- Bramhpuri Road




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## CONCLUSIONS

Water quality index (WQI) takes information from a number of sources and combines them into single number that represents an overall picture of the quality of the water at a meticulous time and site. The samples have values of contaminants exceeding the permissible limits as prescribed by Indian standards. However, the WQI values in the present investigation were found to be 8741.1 and 30246.51 for samples at different sites indicating that the untreated water is unsafe for human consumption. Higher concentration of Iron is found in the River Wainganga at study area may be due to surface leaching of slag or waste water discharge from Steel industry. Hence, it's highly recommended that before discharging waste water into surface, waste water should be treated before discharging into natural stream. Water Quality Index may be used as a tool to convey the information regarding the quality of water in an easy and understandable way to the public and policy makers. However, necessary preventive measures to maintain high water quality of the Wainganga River must be taken up to ensure the safety of the Wainganga River water and to preserve this valuable resource to the future generations.

In the present investigation total 15 species have been recorded belonging to 6 orders: belongs to the order Heteroptera, Ephemeroptera, Trichoptera, Plecoptera, Amphipoda, and Coleoptera. Order Hemiptera represents the highest number of species (6 species) followed by Coleoptera (5 species), and other orders such as Ephemeroptera, Trichoptera, Plecoptera, and Amphipoda comprised one specie each. Presence or absence of littoral vegetation and depth found to be important factors and that is affecting in the distribution of aquatic insects in the present studied water bodies.

  
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**M.Sc.**  
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**Project Work**

***“A Study on some bivoltine silkworm breeds and hybrids of Tasar”***

**A Project Report**

Submitted to the

**Gondwana University Gadchiroli**

For the degree of

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## Introduction

Increasing demand for production of import substitute raw silk necessitated the importance of bivoltine silkworm breed or hybrids in sericulture. Unfortunately, bivoltine silk production in India could not reach to the most of the farmers despite best possible efforts made by sericultural functionaries of the country. The major constraints for production and popularization of bivoltine silkworm hybrids in India are their instability in cocoon yield and non suitability for varied climatic conditions. Presently much emphasis is being given for promotion of bivoltine sericulture to cater the need of quality silk matching international standards. Systematic research efforts on silkworm breeding programmes in different countries have resulted development of several robust and productive bivoltine hybrids (Mano et al., 1991) [10] (Hong et al., 1992) Thiagarajan et al., 1993) [24] (Datta et al., 2001) [4] (Basavraja et al., 2013) [3]. Unfortunately, many of the breeds continues to suffer badly under adverse environmental conditions coupled with poor rearing management practices of small and marginal farmers; causing wide gap between realized cocoon yield in laboratory and field. Therefore situation demands assessment, evaluation and identification of season/region specific silkworm breeds/hybrids to mitigate variation in adaptability and quantitative characters of the breeds under diverse environmental conditions.

Sericulture practicing areas of Odisha state experiences wide variation in temperature, humidity and rainfall. But continuous efforts are in place to promote bivoltine sericulture in the state, unfortunately none of the bivoltine breed or hybrid could become popular due to fluctuating climatic conditions and fear of crop loss. Silkworm breeding programme in India for last few decades have resulted in the development of many productive silkworm breeds which have contributed significantly in increasing the silk production of the country.

  
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## CONCLUSION

Higher survival (>90%) coupled with higher cocoon weight recorded in the newly identified improved crossbreeds viz., NDV6 x CSR51 and L14 x CSR50 confirms their superiority over the popular commercial crossbreed (PM x CSR2) with regard to consistency in the expression of productivity traits than that of. The larvae of each breed were reared in three replications and each replication comprised of 250 larvae. During the rearing period, larvae and cocoons were assessed for different parameters viz; fecundity, hatching percentage, larval weight, larval duration, cocoon yield, cocoon weight, shell weight, pupal weight, shell ratio and filament length. The data pertaining to the following parameters was recorded replication-wise for all the treatments and subjected to statistical analysis. The characters studied and observational procedures adopted are given under the following headings.

Silkworm moth, (*Bombyx mori*), lepidopteran whose caterpillar has been used in silk production (sericulture) for thousands of years. Although native to China, the silkworm has been introduced throughout the world and has undergone complete domestication, with the species no longer being found in the wild.

An adult silkworm has a wingspan of 40 to 50 mm (about 2 inches) and has a thick bristly body (the adult female is larger than the adult male). It typically is blond to light brown in colour, with thin dark bands running across the body. The wings are cream-coloured and have dark veins extending out to the margins. Mouthparts in adults are reduced or absent, so in their brief adulthood of two or three days, they do not eat. They cannot fly, either. Males, however, perform a flutter dance, a mating ritual induced by females' secretion of a pheromone known as bombykol. Females lay about 300 to 500 eggs, which hatch within roughly 7 to 14 days when kept at temperatures of 24 to 29 °C (about 75 to 85 °F).



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**“STUDY OF BIODIVERSITY OF MOLLUSCAN OF  
WAINGANGA RIVER AT ARMORI, DIST.  
GADCHIROLI, (M.S.) INDIA”**

**To Gondwana University, Gadchiroli in partial fulfillment of the  
Requirements for Degree of  
Master of Science (Zoology)**

**Submitted By**

**Ku. Rashmi Sanjay Kapkar**

**M.Sc. II (Zoology) Semester –IV**

**Under the Guidance of**

**PROF. MISS. KUMARE MADM**

**H.O.D**

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**2020-21**

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The is to certify that the project entitled “**STUDY OF MOLLUSCAN BIODIVERSITY OF WAINGANGA RIVER AT ARMORI, DIST. GADCHIROLI, (M.S.) INDIA**” submitted by **KU. RASHMI SANJAY KAPKAR** as partial fulfillment of the reuirement pertaining to the nature and standard of work for the M.Sc. Degree (Zoology) to Gondwana university, Gadchiroli. It is a bonafide research work carried out by him under my supervision and guidance.

The work embodied in this project has not been submitted for any degree or diploma.

Place : Armori

Date : 21/8/2021



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M. G. Art, Sci., Late N. P.

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**2020-21**

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Date :



**DR. L. H. KHALSA**

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## INTRODUCTION

Freshwater molluscs fall into two main groups, the Bivalves and the Gastropods, and are found in a wide range of freshwater habitats, and have varied life-history strategies, with life-spans that vary from three months (peaclam) to over 120 years (pearl mussels). They find their highest levels of endemism and diversity in ancient lakes, large river basins and artesian basins (Seddon 2000) and all of these habitats can be found within the Eastern Mediterranean region.

The geographic range of this study covers all of Turkey, the southern Caucasus. The Levant and Mesopotamia. It includes 14 freshwater ecoregion, (Abell et al 2008, WWF and TNC 2013); from Thrace in the West of Anatolia, east to the Kura-South Caspian ecoregion, and south to the Jordan River and Levant ecoregions in the west, and Tigris and Euphrates ecoregions in the east. This study completes the assessment of the Circum-Mediterranean region, covering large geographic gap between Europe, which has been assessed by Cuttelod, Seddon and Neubert (2011), North Africa (Van Damme et al. 2010), and the Arabian Peninsula (Neubert, Zuhair, and Van Damme in prep).

Over 90,000 species of gastropods have been recorded worldwide, both in the water and on land, although mollusks are common components of the benthic communities, their role in the dynamic of the aquatic ecosystem and their contribution to biomass production is not well known. Freshwater gastropods are either herbivores or detritivores, or they may passively consume small invertebrates associated with periphyton (Coker, B.E).

Many species spend their entire lives in a few square meters of habitat, making them extremely vulnerable to localized environmental habitat degradation. Although most species prefer clean, stable and river bottoms, some prefer the soft substrated, more common to ponds and lakes. Besides this, a few wide-ranging small species can easily survive in polluted habitats.

Mollusca are highly successful invertebrates in terms of ecology and adaptation and are found nearly in all habitats ranging from deepest ocean trenches to the intertidal zones, and freshwater to land occupying a wide range collected from Deria tank while minimum species were collected from Godavari river.

Water is indispensable and one of the precious natural resource of our planet. Water is vital to the existence of all living organisms, but this valued resource is increasingly being threatened as human population grows and demand more water of high quality for domestic use, agricultural production, industrial production, power generation, mining, and forestry practices can lead to deterioration in water quality and quantity that impact not only the aquatic

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ecosystem but also the availability of safe water for human consumption. However, a systematic study on biodiversity of molluscs at Wainganga river of Wadsa (Desaiganj) was not done, that is why, the topic was chosen for research.

**Freshwater molluscs** are those members of the Phylum Mollusca which live in freshwater habitats, both lotic (flowing water) such as rivers, streams, canals, springs, and cave streams (stygobite species) and lentic (still water) such as lakes, ponds (including temporary or vernal ponds), and ditches.

This article is about freshwater Mollusca in general; for information on one particular family of freshwater molluscs, please follow the appropriate links in the lists below.

The two major classes of molluscs have representatives in freshwater: the gastropods (snails) and the bivalves (freshwater mussels and clams.) It appears that the other classes within the Phylum Mollusca - the cephalopods, scaphopods, polyplacophorans, etc. - never made the transition from a fully marine environment to a freshwater environment.

A few species of freshwater molluscs are among the most notorious invasive species. In contrast, numerous others have become threatened or have become extinct in the face of anthropogenic change.

Typical freshwater species (such as many river mussel species in the family Unionidae) have a range which may consist of a series of adjacent river systems, a series of adjacent tributaries, or part of a single large river system. Large rivers and small tributary creeks typically share few species, and distribution patterns suggest large lowland rivers represent substantial barriers to the dispersal of species adapted to small upland streams. Endemism is common in some families, and species may be endemic to a single creek or spring. In contrast, some of the tiny pill clams have a nearly worldwide distribution (Burch, 1972)

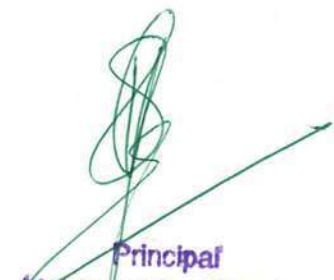
Challenges in the natural environment faced by freshwater Mollusca include floods, droughts, siltation, extreme temperature variations, predation, and the constant unidirectional flow characteristic of river habitats. Osmoregulation, or the maintenance of constant salinity within body tissue and fluids, is another challenge faced by freshwater Mollusca. Dillon (2000)<sup>[2]</sup> indicates that they have characteristically low tissue salinities relative to other freshwater animals, and unionid mussels have some of the lowest tissue salinities of any animal.

  
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## CONCLUSION

The bivalves and gastropods are abundantly seen in the Wainganga river coastal waters at the selected sample station. The molluscs especially gastropods mentioned here in act as important supplementary food for cerbs. Many water bird species feed on both bivalve and gastropod species. Increasing anthropogenic activity pressures especially by fishing, discharge of polluted water in river, use of water for agriculture and grazing cattle is affecting population ecology of molluscs. Molluscs act as natural recy clers of organic debris converting it into biomass that an be further utilized by fishes. The rate of pumping of water from Wainganga is increasing. The mollusk fauna is however rich but in near future it could get affected and threatened by the anthropogenic pressures on river. Therefore Wainganga river should be properly managed in terms of water quality and quantity so that this diversity of organisms is preserved to the future generations.

  
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**M.Sc.**  
**Zoology**  
**Project Work**

**A project report on**  
**Study of fish diversity available in market**

Submitted to

Gondwana university, Gadchiroli in partial fulfilment of the requirements  
for the degree of

**MASTER OF SCIENCE**

**SUBJECT: ZOOLOGY**

Submitted by:

**Ku. RESHMA PRABHAKAR GONDOLE**

Under The Guidance of

Dr. J.B. Papadkar

Prof. S. B. Kumare



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ARMORI.**

**YEAR: 2020-2021**



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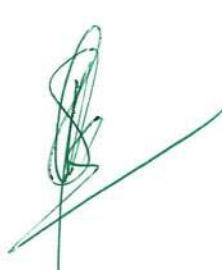
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## Introduction

India has a rich biological background that show it is one of the nation with mega diversity of the world. There are 1000 of small and big rivers in India. Rivers are place of freshwater and are dynamic in environmental conditions. Rivers are areas of physical and biological transition between the lands. Importance of rivers is well understood in many parts of the world as breeding and nursery grounds for a wide variety of fishes. The mangrove ecosystem of river in India act as a nursery ground for a variety of shrimps, crabs and fin-fishes. River environments are among the most productive on earth creating more organic matter each year than comparably sized areas of forest, grasslands or agricultural land and have important commercial value with providing economic benefits for fisheries, tourism and recreational activities. Fishes form one of the most important groups of vertebrates influencing life in various ways. Fish plays an important role as it is not only useful for food but also be used in recreation and biological control. The Thane district (Now divided into two districts Thane and Palghar) alone shares about 23.6% of the total fish landing from Maharashtra. Today rivers are heavily exploited and are among the most threatened ecosystems. Hence it is necessary to carefully asses the diversity status in these ecosystems. Present study deals mainly with diversity of fishes along Wainganga River.

India is the third largest fish producing country and the second largest aquaculture fish producer in the world. India contributes about 7% to the global fish production. The country is also home to more than 10% of the global fish biodiversity and is one of the 17-mega biodiversity rich countries. Around 14 million people are engaged in fisheries and its allied activities. Andhra Pradesh is the largest fish producer in the country followed by West Bengal and Gujarat. The total fish production during 2017-18 is estimated to

be 12.60 million metric tonnes, of which nearly 70% is from inland sector and about 50% of the total production is from culture fisheries. More than 50 different types of fish and shellfish products are being exported to 75 countries around the world. Fish and fish products have presently emerged as the largest group in agricultural exports from India, with 13.77 lakh tonnes in terms of quantity and Rs. 45,106.89 crore in value. This accounts for around 10% of the total exports and nearly 20% of the agricultural exports, and contribute to about 0.91% of the GDP and 5.23% to the Agricultural GVA of the country

Freshwater fish are not only the most diverse group of vertebrates but also have the greatest proportion of threatened species [1-4]. Fish assemblages are also an important element in aquatic ecosystems, which are used as one of four biological indicators for aquatic ecosystem assessment [5-8]. However, freshwater fish had reduced ability for inter-basin movement in the relatively limited space [7, 9], in contrast marine fish had the relatively free movement in the broad space, which was at the root of the conservation problems of the former [3, 10]. In addition, fish are important elements of the economy for many nations as they have been a staple to the diet of many people. Over the past few decades, fish resources decreased dramatically, and endemic species have faced continuous threats globally. Dams, overfishing, pollution, deforestation, land erosion and other human activities are considered as the main threats to fish biodiversity. Therefore, the conservation of fish biodiversity has become more important.

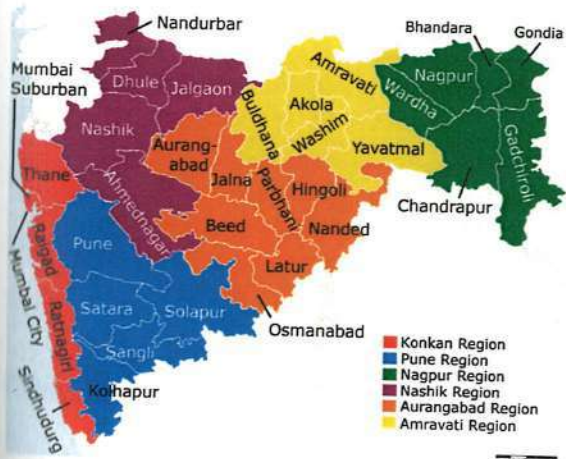
India is the third largest fish producing country and the second largest aquaculture fish producer in the world. India contributes about 7% to the global fish production. The country is also home to more than 10% of the global fish biodiversity and is one of the 17-mega biodiversity rich countries.

attractive and brilliant colouration and potentiality for developing techniques for captive breeding. However, no attempt has so far been made to introduce most of these species in the international trade and securing positions in the national as well as international markets for which they deserve<sup>1</sup>

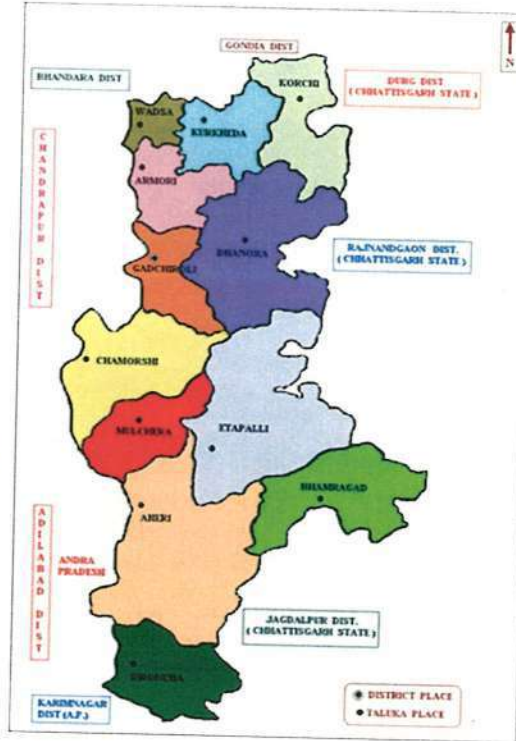
**Aim:** Study of fish diversity in market.

**Objective:** To understand fish diversity in rivers and reservoir.

# PLATES



Map of Maharashtra



Map Of Gadchiroli



Location of Armori

## Conclusion

The results indicate that the diversity and distribution of fish fauna in upstream and downstream areas of the Koto Panjang Reservoir were varied, and the evenness was low. The abundance and composition of fish in each site was dominated by Cyprinidae families, although exotic species were more dominant in the upstream reservoir compared to the downstream reservoir areas. Therefore, the management of the river and reservoir in a more holistic manner is important, for example, the management of land use, sand mining and aquaculture activity, as well as possible habitat restorations. All the factors above are a prerequisite for the environmental sustainability and conservation of fish diversity in the upstream and downstream areas at Koto Panjang reservoir and other regions.



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**Zoology**  
**Project Work**

**MAHATMA GANDHI ARTS, SCIENCE & LATE N. P.  
COMMERCE COLLEGE ARMORI, DIST GADCHIROLI**

Submitted to the Gondwana University, Gadchiroli In part fulfillment of  
the Requirement for the degree of

**MASTER OF SCIENCE IN ZOOLOGY**

**Submitted By,**

**MS. SUJIT SHRIRAM NIMBEKAR**



**Guided By**

**MISS. SUNANDA KUMARE**

**PROJECT**

**SUBMITTED**

**TO**

**GONDWANA UNIVERSITY GADCHIROLI  
FOR THE AWARD OF DEGREE IN M.SC. ZOOLOGY  
SESSION 2020-2021**



**Mahatma Gandhi College of Science, Arts and Late  
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## CHAPTER - 1

### INTRODUCTION

Cleaning the barn was probably the most undesirable chore faced by a young man growing up on a dairy farm. Only in looking at the alternative of working with dirty cows in a malodorous atmosphere could there be any enthusiasm for this chore. Years ago, when commercial fertilizers were not so readily available, dairymen sought to use these wastes in a manner that could enhance the productivity of their land, allowing more cows and ultimately more income. By the mid-1950's beneficial values of animal wastes began to be overlooked. Commercial fertilizer was readily available and allegedly more cost-effective to apply.

Handling animal waste became a millstone around dairymen's necks and a necessary cost to production for which they had a difficult time attributing any direct financial benefit. In the 1970's a series of environmental quality laws were enacted and guidelines promulgated that caused even greater costs to dairymen. Today, the picture is changing, and dairymen again are looking at cost-offsetting, beneficial uses of wastes.

During the previous two-and-a-half decades, India's economic growth has been among the most rapid in the world. The last ten years have seen a six percent gross domestic product (GDP) growth per annum, and, measured in purchasing power parity (PPP), India represents the fourth largest economy in the world today. The economic progress shows no sign of slowing down; the target set in the Tenth Five Year Plan (2002-07) is an eight percent annual GDP growth. As the result of recent

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**Product Makes from Recycle Plastic Material**



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## CHAPTER - 5

### CONCLUSION

The proposed construction activities associated with the proposed works will generate a number of waste materials. These include:

- Vegetation and demolition wastes from site clearance
- excavated materials
- Construction waste
- Chemical waste
- Municipal waste
- Animal Waste

Waste generated from the operational phase of the road widening project is likely to be restricted to small volumes associated with intermittent maintenance works (e.g. asphalt from resurfacing works) and landscape upkeep (vegetation). The potential impacts of wastes arising from the construction and operational phases of the road widening project have been assessed. Provided that the mitigation measures outlined above are in place, potential impacts to the environment associated with waste generated by the construction and operational phases of the project will be controlled. With the recommended procedures/measures in place, the construction and operational wastes generated / disposed as part of this project, will not lead to any significant adverse environmental impacts.

Further to this assessment, these waste management measures should be included in the contractors Environmental Pollution and



Biogas was produced from a substrate of cow dung with water only without any additive. Anaerobic digestion of the cow dung took place at any temperature between 10 and 40 OC. The value of 36.5 OC was taken as optimum. The rate of biogas formation was very slow below 20 OC. The digestion temperature variation was between 0.5 to 2 OC. Methane bacteria work best in the temperature ranges between 34 and 37 OC. After the liquefaction process (conversion of the biogas to liquid form), 30 cm<sup>3</sup> of biogas was generated. Out of the 30cm<sup>3</sup>, methane occupies 25.002 cm<sup>3</sup>, 4.467cm<sup>3</sup> of carbon dioxide, 0.468cm<sup>3</sup> of nitrogen while carbon monoxide occupies 0.063cm<sup>3</sup>. Cow manure is an excellent substrate for biogas production in anaerobic digesters. The biomass generated after digestion can be used both as animal feed and to improve soil fertility.

**M.Sc.**  
**Zoology**  
**Project Work**

*A project report on*

**“Study of zooplankton diversity in pond”**

*Submitted to Gondwana university, Gadchiroli in partial fulfilment of the  
Requirements for the Degree of*

**MASTER IN SCIENCE (ZOOLOGY)**

*Submitted By,*

**Ku. Shiwani Dadaji Donadkar**

**M.Sc.II(Zoology) Semester-IV**

*Under the Guidance of*

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**YEAR: 2020-2021**





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## INTRODUCTION

Zooplankton are free floating microscopic heterogenous assemblage of aquatic micro-organism found in aquatic ecosystem. They are represented by wide array of taxonomic groups viz, Protozoa, Cladocera, Copepoda and Rotifera in a freshwater ecosystem which are often armoured by different organs like pines for protecting themselves from the predator (Verma et al., 2013). They are cosmopolitan in nature and inhabit all freshwater habitats of the world. Zooplankton are important link in the transformation of energy in an aquatic food web because of their drifting nature, large density, high species diversity and tolerance to the stress (Bhat et al., 2014). It forms a major link in transfer of energy at secondary level between autotrophs and heterotrophs in an aquatic food web.

They are the integral part of aquatic food web and contribute significantly to aquatic biological productivity in freshwater ecosystem (Nimbalkar et al., 2013). Diversity and density of zooplankton refers to the variety within the community. As a major element in aquatic biota, the zooplankton exhibits drastic changes in response to the changes in aquatic environment such as physico-chemical properties (Koli and Muley, 2012). Study of community structure of freshwater zooplankton is significantly potential for assessing aquatic ecosystem. They are not only useful as bio-indicators but also helpful for ameliorating polluted water in an aquatic ecosystem (Jose and Sanalkumar, 2012).

It has great significance as pollution indicators and hence, its association, abundance, biomass and diversity can be used for the assessment of water pollution. Zooplankton study is necessary to evaluate the ecological status of the freshwater reservoirs as they are important in nutritive level and evaluating as well as ameliorating pollution status and then used for determining the health of an aquatic ecosystem (Dede and Deshmukh, 2011). Zooplankton constitute important food item of fishes as the larvae of carps are known to feed mostly on zooplankton (Dewan et al., 1977). Zooplankton having higher protein content are found to be essential for fish larval growth as they contain broad spectrum of digestive enzymes that are able to serve as exo-enzymes in the gut of fish larvae (Bhat et al., 2013). For aquaculture development and increase in production level proper knowledge on zooplankton diversity of the pond is very much important. Both quantitative and qualitative diversity and density of zooplankton in an aquacultural pond are of great importance in management of successful aquaculture operation as they vary from pond to pond even within similar ecological conditions. The presence of

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Zooplankton are small animals that float freely in the water column of lakes and oceans and whose distribution is primarily determined by water currents and mixing. The zooplankton community of most lakes ranges in size from a few tens of microns (Protozoa) to >2 mm (macrozooplankton).

In terms of biomass and productivity, the dominant groups of zooplankton in most lakes are Crustacea and Rotifera and these protocols emphasize those groups. Zooplankton play a pivotal role in aquatic food webs because they are important food for fish and invertebrate predators and they graze heavily on algae, bacteria, protozoa, and other invertebrates.

Zooplankton are susceptible to variations in a wide number of environmental factors including water temperature, light, chemistry (particularly pH, oxygen, salinity, toxic contaminants), food availability (algae, bacteria), and predation by fish and invertebrates. It is generally desirable to have as much information on these variables as possible. Clearly, this will frequently be practical. Some variables are relatively easy to measure (e.g. temperature), but others are more difficult (e.g. fish-predation intensity, toxic contaminants). Many environmental factors affect zooplankton only at extreme levels (e.g. toxic contaminants, salinity oxygen) and will not be important in all lakes. Ideally, most sample collections should be accompanied by measures of water temperature, pH, and algal biomass (chlorophyll-*a* concentration or phytoplankton biomass). Temperature and pH can be measured using portable field instruments whereas the estimation of phytoplankton biomass requires more involved techniques (see Findlay and Kling, EMAN protocols for phytoplankton).

**Aim :** Study of zooplankton diversity of pond

**Objective :** To understand the zooplankton the zooplankton in pond

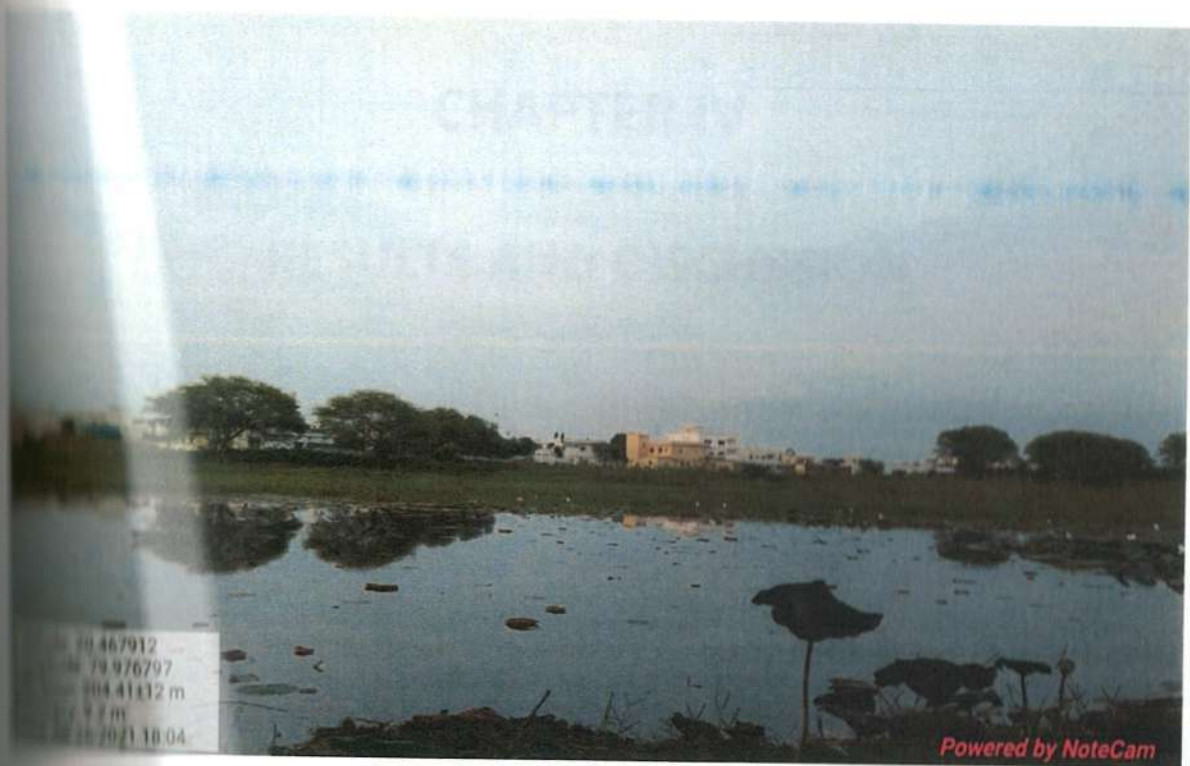


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Ramsagar Pond in Armori



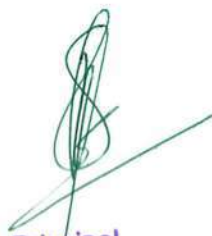
Arsoda Pond near by Armori

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## CONCLUSION

Zooplankton diversity of the Ramada pond and Arsoda pond confirm the habitat for zooplankton population and suitable for aquaculture, as zooplankton are known to be the best food for fish larvae in aquaculture. In the present study, Rotifer, Cladocera, Copepod and protozoans formed the zooplankton population of Arsoda pond. The Cladocerans dominated the zooplankton population. The abundance and distribution of zooplankton indicating that there was very less or no pollution in Ramala pond making the water potable. Therefore pond should be properly managed in terms of water quality and quantity so that this diversity of organisms is preserved to future generations.



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**M.Sc.**  
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**Project Work**

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This is to certify that **Miss. Sonali S. Madavi** has carried out his project work on the topic entitled **“Diversity of spider fauna in and around Armori”** during the academic session **2020-21** under my supervision in the Post Graduate Department of Zoology, **M.G. Arts Science and Late. N.P. Commerce College Armori** This research work presented in this project is own work of the candidate.

Armori


Date: 27-08-2021



**Prof. S. Kumare**  
(Supervisor)



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Head  
(Dept. of Zoology)  
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Dept. of Zoology  
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## CERTIFICATE

This is to certify that **Ku. Sonali Suresh Madavi** is bonafide student of P. G. Department of Zoology, Mahatma Gandhi College Armori. She has submitted the project work for the partial fulfillment of the Master Degree in Zoology of Gondwana University, Gadchiroli.

Date :- 27-08-2021

Place :-

Date :-



**Dr. L. H. Khalsa**  
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## INTRODUCTION

India is rich in both flora and fauna and is mega diverse country. Knowledge about the Diversity, Spiders is one of the most diverse groups of organisms. Though spiders form one of the most ubiquitous and diverse groups of organisms existing in India, their study has always remained largely neglected. They have, however, largely been ignored because of the human tendency to favor some organisms over others of equal importance because they lack a universal appeal (Humphries et al. 1995). Due to high species endemism, Western Ghats are listed in the 34 'Biodiversity hotspots' of the world (Mittermeier et al. 2005). In this Forest there are considerable plans for its protection. Due to less awareness about the spiders, diversity study in Western Ghats remains unexplored. Also there are man environmental factors that affect species diversity (Rosenzweig 1995). Studies have demonstrated that a correlation exists between the structural complexity of habitats and species diversity (Hawksworth and Kallin-Arroyo 1995). Diversity generally increases when a greater variety of habitat types are present (Ried and Miller 1989). Structurally more complex shrubs can support a more diverse spider community (Uetz 1991). Spiders are extremely sensitive to small changes in the habitat structure; including habitat complexity, litter depth and microclimate characteristics (Downie et al. (1999) and New (1999). Spiders generally have humidity and temperature preferences that limit them to areas within the range of their "physiological tolerances" which make them ideal candidates for land conservation studies (Riechert, Gillespie 1986). Therefore, documenting spider diversity patterns in this ecosystem can provide important information to justify the conservation of this ecosystem. Species richness is only one way of assessing habitat quality. The arachnids are the second largest contributor (8.3%) of total arthropod diversity after insects. Spiders belong to the order Araneae of class Arachnida and are one of the diverse and functionally important predators. Hence, spiders can play a very important role in regulating the terrestrial arthropod populations (Coddington and Levi, 1991). Considering, the potentiality of spiders as bio- control agents of insect pests and bio-indicator as well, exploration of spider diversity need to be done with

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disappearance of many species remains undocumented. With the extinction of such species any prospect for their future utilization ceases. Considering the importance of spiders in the natural suppression of many insect pests and as bioindicators, urgent efforts are needed to understand their diversity. The present knowledge on the spiders of Western Ghats remains confined to the works of Pocock (1895, 1899, 1900), Hirst (1909), Gravely (1915, 1935), Sherriff (1919, 1927a,b,c), Sinha (1951), Subramanian (1955) and Charpentier (1996). Recently Jose, Sebastian (2001), Smith (2004), Sugumaran et al. (2005), and Jose et al. (2006) tried to document the diversity of spider fauna in and around Western Ghats. However, there are many works on the vertebrate and invertebrate diversity in the Mannavan shola forest (Nair 1991), but there is no work on spider diversity. The aims of this study were to investigate the diversity of spiders in this shola ecosystem and to reveal the species richness, endemism, affinity and similarity with other geographic faunas. Though the study of spiders from Mannavan shola forest is still far from complete, the present study forms a basis for further investigations on this group. Spiders are fascinating creatures with unique and unusual lifestyles. They being good hunters play vital role as predators, help maintaining ecological balance in nature. They have 7th place in of animal diversity in the world with count of 113 families 3873 genera with 43700 species. About 70 percent of the species are predators [1] Spiders belong to Order Araneae, Class Arachnida of Phylum Arthropoda. Spiders constitute largest order and are different from other arachnids by the presence of pedicel, which joins cephalothorax and abdomen. Despite being highly ignored group, spiders are unique as they possess spinnerets near the hind end of the abdomen, which produce silk of which some are of economic importance. Currently 1442 species have been identified in India, inhabiting various habitats like trees, plants, grasslands and buildings 3) Humphries CJ, PH Wilson, RI Vane-Wright (1995). Many spiders are important as biological control agents to control several agricultural pests, especially in the paddy fields. 4) Mittermeier RA, RG Patricio, M Hoffman, J Pilgrim, T Brooks, CG Mittermeier, J Fumieux, GAB Fonseca (2005).



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### Spiders Photographs



25

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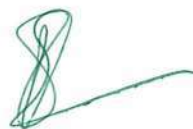


## Conclusion

Armori, Dist. Gadchiroli, Maharashtra India is rich in spider diversity. Sub district hospital Armori also exhibits good number of spiders and remarkable diversity in guilds of spider fauna. This study serves as a baseline for future study of spiders in these ecosystems. But further study is required to confer. This study was conducted only for six months. So seasonal variation in diversity and abundance of spider fauna will needed to be studied It also emphasizes the need for conservation of this ecosystem by characterizing species diversity and highlighting rare and endemic species in this ecosystem.

Spiders (order Araneae) are air-breathing arthropods that have eight legs, chelicerae with fangs generally able to inject venom, and spinnerets that extrude silk.[3] They are the largest order of arachnids and rank seventh in total species diversity among all orders of organisms.

Spiders are found worldwide on every continent except for Antarctica, and have become established in nearly every habitat with the exceptions of air and sea colonization. As of August 2021, 49,623 spider species in 129 families have been recorded by taxonomists. However, there has been dissension within the scientific community as to how all these families should be classified, as evidenced by the over 20 different classifications that have been proposed since 1900.



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**M.Sc.**  
**Zoology**  
**Project Work**

# **“VERTEBRATE DIVERSITY IN & AROUND ARMORI”**

**A Project Report**

Submitted to the  
**Gondwana University Gadchiroli**

For the degree of  
Master of Science (**Zoology**)

By

**Miss. Soniya S. Fating**

M.Sc. Zoology. Sem. - IV

Under the **Supervision** of

**Prof. S. Kumare**

**Dr. J.N. Papadkar**

(HOD Zoology Dept.)



**P.G. Department of Zoology**

**M.G. Arts, Science & Late. N.P. Commerce**

**College Armori**

**2020-21**





**Mahatma Gandhi Arts, Science & Late. N.P.**

**Commerce**

**College Armori, Dist.- Gadchiroli**

**2020-21**

**CERTIFICATE**

This is to certify that **Miss. Soniya S. Fating** has carried out his project work on the topic entitled "**Vertebrate Diversity in & Around Armori**" during the academic session **2020-21** under my supervision in the Post Graduate Department of Zoology, **M.G. Arts Science and Late. N.P. Commerce College Armori** This research work presented in this project is own work of the candidate.

Armori

Date:

  
**Dr. L.H. Khalsa**  
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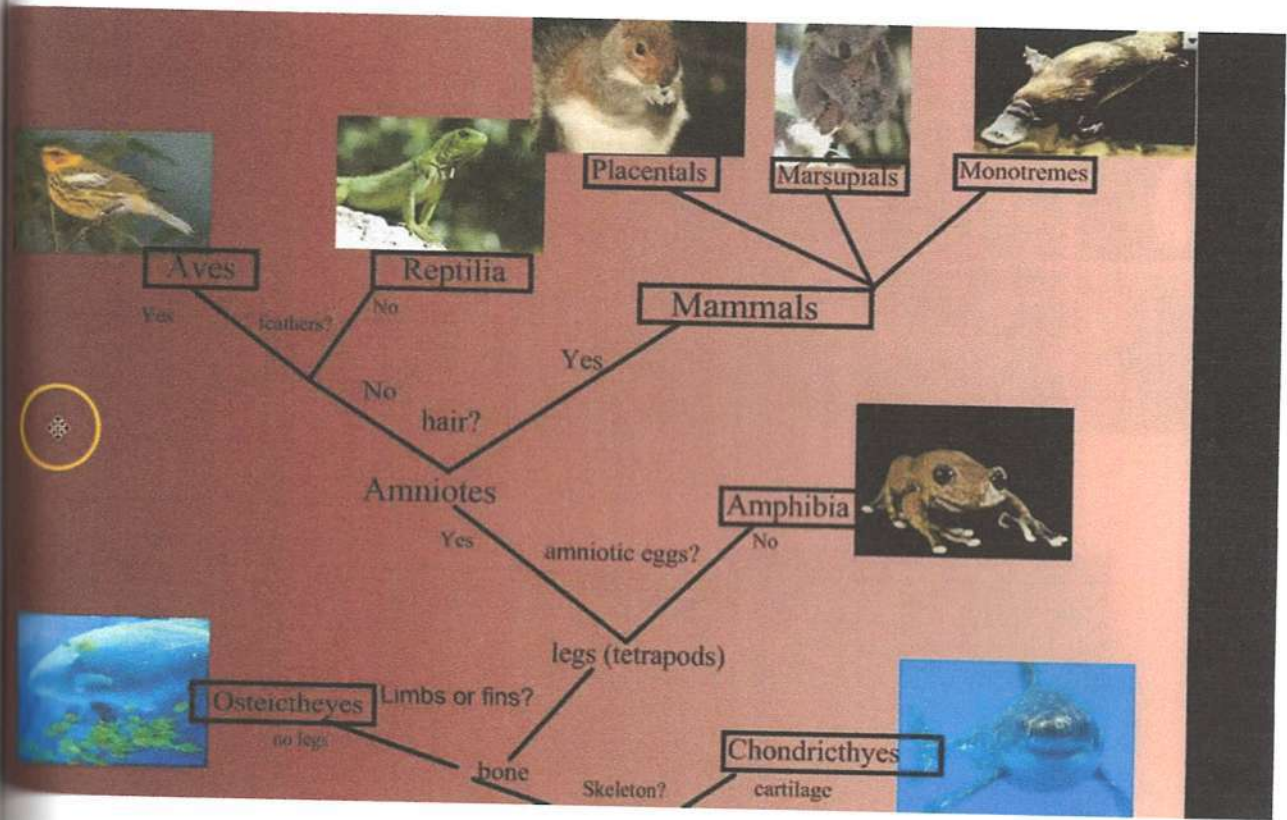
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## Introduction

Understanding the mechanisms that have produced the abundant diversity of life on earth has been a goal of biologists for a very long time. This goal is far from being achieved, but nowadays, this topic is of great public interest as well as of scientific importance. The term diversity is widespread in the media and is well known. Its definition encompasses life's manifestations, including genetic, population, community, and ecosystem variation, also the ecological processes linking them and the most recognizable measurement of diversity, species diversity. Despite the fact that there are many species concepts in the scientific literature, here the one referred to as the biological species concept will be used, where two individuals are considered to be the same species when they are capable of producing fertile progeny. Basically, for the definition we will use, reproductive isolation defines different species. Two other concepts worth mentioning are "richness", which is the variety of species present in a given locality, and "diversity", which takes into consideration the number of species present as well as the abundance of each species. Diversity can be measured over different spatial scales, and when it comes to comparing diversities of different places there is alpha ( $\alpha$ ) diversity, which is used when comparing the differences of diversity within habitats; beta ( $\beta$ ) diversity, which compares the differences of diversity between types of habitats or ecosystems, and; gamma ( $\gamma$ ) diversity, which compares the diversity between two geographical regions. Gamma diversity is also defined as the product of alpha and beta diversity.





## Conclusion

Nearly all vertebrates undergo sexual reproduction. They produce haploid gametes by meiosis. The smaller, motile gametes are spermatozoa and the larger, non-motile gametes are ova. These fuse by the process of fertilisation to form diploid zygotes, which develop into new individuals.

### Inbreeding

During sexual reproduction, mating with a close relative (inbreeding) often leads to inbreeding depression. Inbreeding depression is considered to be largely due to expression of deleterious recessive mutations.[45] The effects of inbreeding have been studied in many vertebrate species.

In several species of fish, inbreeding was found to decrease reproductive success.

Inbreeding was observed to increase juvenile mortality in 11 small animal species.

A common breeding practice for pet dogs is mating between close relatives (e.g. between half- and full siblings).[50] This practice generally has a negative effect on measures of reproductive success, including decreased litter size and puppy survival.

Incestuous matings in birds result in severe fitness costs due to inbreeding depression (e.g. reduction in hatchability of eggs and reduced progeny survival).

### Inbreeding avoidance

As a result of the negative fitness consequences of inbreeding, vertebrate species have evolved mechanisms to avoid inbreeding.



**M.Sc.**  
**Zoology**  
**Project Work**

**“EFFECT OF POLLUTION ON BIODIVERSITY WITH  
SOCIAL REFERENCE TO FISH FAUNA”**

*Submitted in partial fulfilment of the requirement of the Degree of*

*Master of Science,*

**Gondwana University, Gadchiroli**



**Submitted By :  
TASSARUN PATEL**

**Under the Guidance of:**

**Prof. Mrs S. KUMRE MAM  
DEPARTMENT OF ZOOLOGY**

Mahatma Gandhi Arts , Science & Late N.P Commerce College

ARMORI-

2020-2021

## CERTIFICATE

This is the certify that the report entitled "EFFECT OF POLUTION ON BIODIVERSITY WITH SOCIAL REFERENCE TO FISH FAUNA" is a bonafied work.

And the submitted to the **Gondwana University Gadchiroli**

Carriedout by mention student of Post Graduate Department of Zoology in partial fulfillment of the requirement for the award of the Master of Science offered by the **Gondwana University, Gadchiroli**

**PANBARUN PATEL**



A handwritten signature in green ink, appearing to be "Dr. L.H. Khalsa".

**Dr. L.H. KHALSA**  
Principal  
M. G. Arts, Science & Late N.P.  
Commerce College, Armori



## ABSTRACT

More than 70% of the fresh water in liquid form of our country is converted into being unfit for consumption. Not only India, but other countries are also suffering from the same problem. This has been explained clearly by the help of considerable number of references in this paper. Various sources of pollution such as sewage discharge, industrial effluents and agricultural runoff and their potential has been studied in mass. Various prescribed standards for different category of inland water have been explained. The paper also consists of the potential and extent of various components which pollute the water. Finally, effect of water pollution has been shown in nutshell.



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## Introduction

Water pollution happens when some unwanted constituents enter into the water bodies and change the water quality (Alrumman et al., 2016), and becomes harmful to human health and their environment (Briggs, 2003). Water plays an important role in nutrient recycling and is an imperative natural source used for drinking and other developmental purposes. Aquatic systems are usually used for disposal and reutilizing the sewage and contaminated wastes and drain off the excess to the sea. Due to the increase in the pollutant level and in turn overexploitation of the water resources for various developmental activities i.e. for agriculture, construction activities, industrial processes, and also in thermal power plants to encounter the necessities of the large-scale population, significantly lessens their assimilative volume. Thus, the double pressure wielded on the water bodies is eventually faced by the biological communities dwelling them.

Generally, the fish species are one of the most important aquatic communities concerning humans. The pollution generally denotes any unwanted alteration in the natural quality of any ecosystem brought around by the changes in their physical, chemical, as well as in biological factors (Subhendu, 2000).

Aquatic ecosystems are delicate and at high risk mostly due to the majority of pollutants derived from domestic, urban and industrial sources i.e. various agricultural practices (Figure 1) result in the release of pollutants into the marine system (Kaur and Dua, 2014; Pinto et al., 2015; Byrne et al., 2015).

Mainly in aquatic ecosystem, the most frequent contaminants are in the forms of heavy metals and pesticides

(Khoshnood, 2016). The heavy metals are one of the major pollutants, which quickly amass in the body and are leisurely digested in and excreted from

aquatic animals. Mainly the pesticides used in agricultural activities are directly released into the open atmosphere by drift spray, volatilization and wind erosion of soil (Qiu et al., 2004). These pesticides present in aquatic ecosystem can affect the life cycle of aquatic organisms (Ventura et al., 2008). Increases in the population rate resulted in an increase in the development and urbanization, water pollution by domestic activities, agronomic processes, the municipal and industrial processes have become a key concern for the wellbeing of humanity. Water-soluble pollutants released from different industries and municipal activities, leached in soils directly and in turn, the atmosphere has quickly transported to natural water bodies. Some of the toxins decay or volatilize to form insoluble salts and rest are precipitated and get combined into the substrate in bed surface. Fish species are the perfect model for sensing the occurrence of genotoxic toxins in aquatic ecosystems (Aich et al., 2015; Walia et al., 2015; Sharma et al., 2018) because these aquatic organisms are very sensitive to little quantity of metals within the water body, are abundant, and also live in some different habitats (Ali et al., 2008). Aquatic organisms like fish species directly uptake these toxic substances may be followed by the metabolism of these toxic substances which results in more toxic by-products. For example, mercury can be converted into very high toxic methyl-mercury by the microbial action which in turn taken up

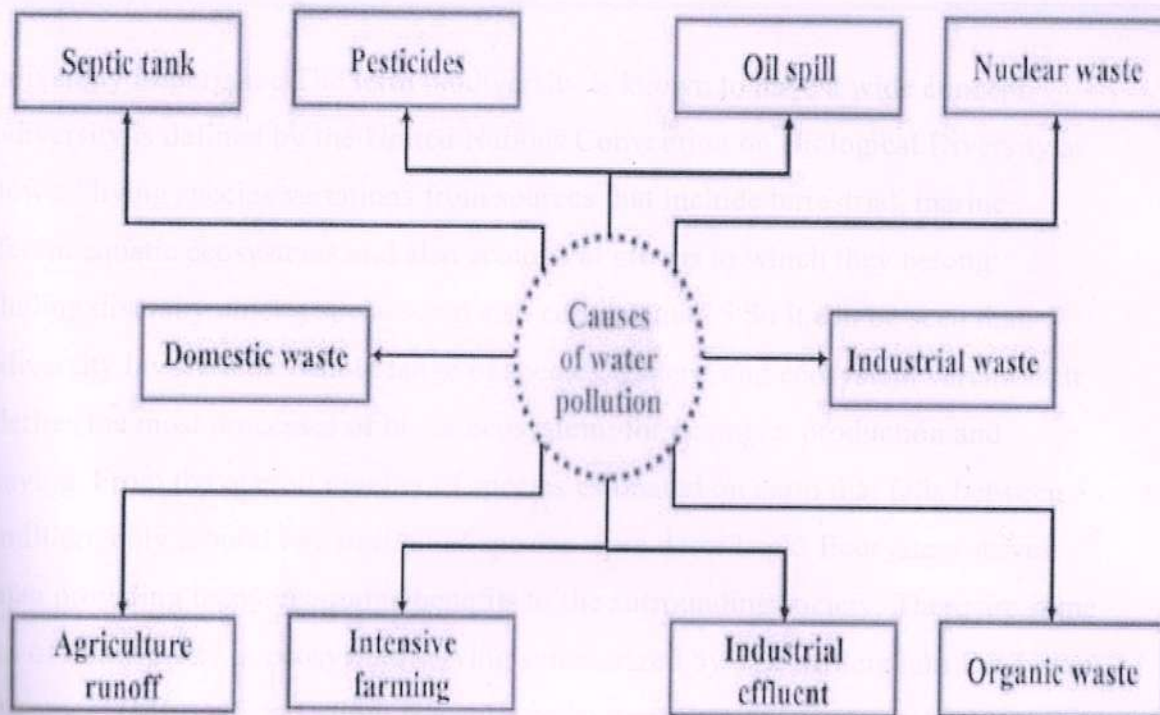


Figure 1. Different causes and sources of water pollution that affect aquatic life.

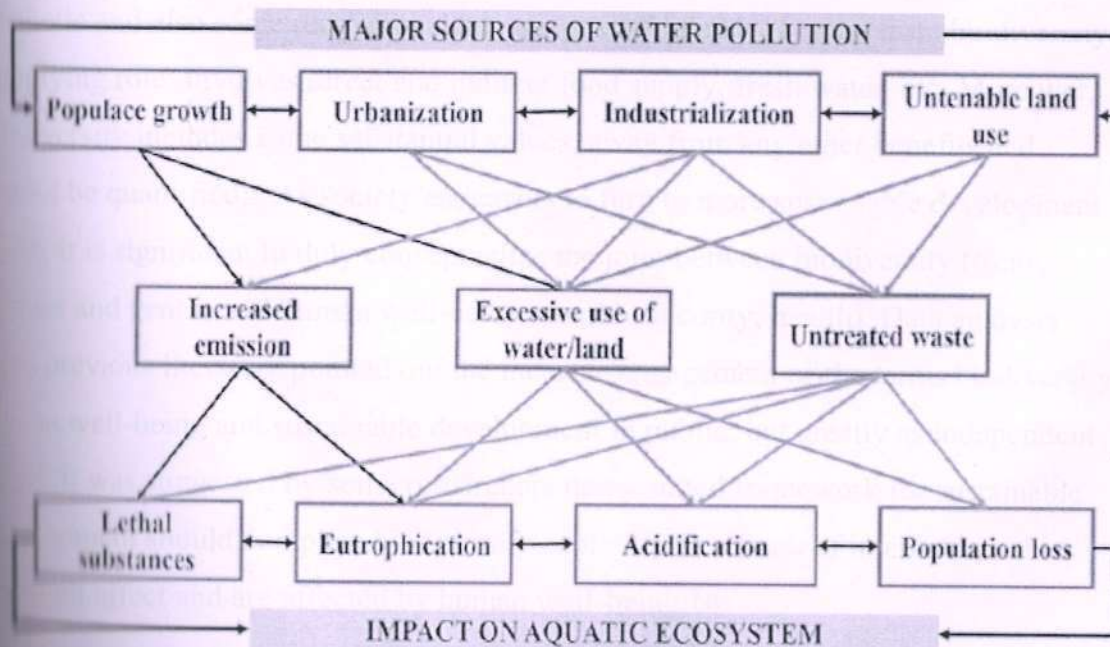


Figure 2. Impact of water pollution on aquatic ecosystem.



Both caged shortfin eels and wild common bully demonstrated exposure to chemicals contained in or derived from discharges into the Tarawera River. The responses were more substantial than expected given previous results of experiments that utilised mesocosm and laboratory studies to examine impacts of one of the two effluents from pulp & paper mills. These previous studies demonstrated that though subtle reproductive and biochemical effects were previously observed, these effects disappeared a number of years ago, including liver detoxification enzyme induction.

There is a difference in exposure between effluent and actual exposure within the river itself. It is strongly suspected that these discrepancies between effluent and river studies are due to the presence of sediments in the river that may be contaminated with historical pulp & paper-related compounds. Due to the unexpected difference in the reproductive timing of the upstream and downstream Tarawera River common bully, no comparison of reproductive success has yet been performed. Given the knowledge that the Rangitaiki River is similar to the Lower Tarawera in regards to spawning time, this comparison can now be conducted with the Rangitaiki River. This study has certainly served to indicate one example of the limited understanding of the basic biology of New Zealand native fishes.

The common bully has proved to be an excellent monitoring species. However, a more comprehensive understanding of the basic biology is required in order to use this native species to understand the life-sustaining capability of the New Zealand environment. Similarly, biochemical tools to assist in demonstrating causality are non-existent from most native species and development of such tools is required.



**M.Sc.**  
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**Project Work**

# **“LIFE CYCLE OF HONEY BEE”**

**To Gondwana University, Gadchiroli in partial fulfillment of the  
Requirements for Degree of  
Master of Science (Zoology)**

**Submitted By**

**Ku. Varsha Ghanshyam Selve  
M.Sc. II (Zoology) Semester –IV**

**Under the Guidance of**

**PROF. MISS. KUMARE MADM**

**H.O.D**

**Dr. J. N. PAPADKAR SIR**



**Post Graduate teaching Department Zoology Mahatma Gandhi Arts,  
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(M.S.)**

**Mahatma Gandhi Arts, Science and Late N. P. Commerce  
College Armori Dist. Gadchiroli (M.S.)**

**2020-21**








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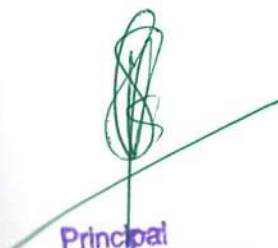
This is to certify that Miss. VARSHA GHANSHYAM SELVE has carried out his project work on the topic entitled "LIFE CYCLE OF HONEY BEE" during the academic session 2020-21 under my supervision in the Post Graduate Department of Zoology, M.G. Arts Science and Late. N.P. Commerce College Armori. This research work presented in this project is own work of the candidate.

  
**Dr. L. H. Khalsa**  
Principal  
M. G. Arts, Science &  
Mahatma Gandhi College Armori.  
ARMORI, Dist. Gadchiroli



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## Introduction

Many subspecies have adapted to the local geographic and climatic environments; in addition, breeds such as the Buckfast bee have been bred. Behavior, color, and anatomy can be quite different from one subspecies or even strain to another. *A. mellifera* phylogeny is the most enigmatic of all honey bee species. It seems to have diverged from its eastern relatives only during the Late Miocene. This would fit the hypothesis that the ancestral stock of cave-nesting honey bees was separated into the western group of East Africa and the eastern group of tropical Asia by desertification in the Middle East and adjacent regions, which caused declines of food plants and trees that provided nest sites, eventually causing gene flow to cease.

The diversity of *A. mellifera* subspecies is probably the product of a largely Early Pleistocene radiation aided by climate and habitat changes during the last ice age. That the western honey bee has been intensively managed by humans for many millennia – including hybridization and introductions – has apparently increased the speed of its evolution and confounded the DNA sequence data to a point where little of substance can be said about the exact relationships of many *A. mellifera* subspecies.

*Apis mellifera* is not native to the Americas, so it was not present when the European explorers and colonists arrived. However, other native bee species were kept and traded by indigenous peoples. In 1622, European colonists brought the German honey bee (*A. m. mellifera*) to the Americas first, followed later by the Italian honey bee (*A.m. ligustica*) and others. Many of the crops that depend on western honey bees for pollination have also been imported since colonial times. Escaped swarms (known as "wild" honey bees, but actually feral) spread rapidly as far as the Great Plains, usually preceding the colonists. Honey bees did not naturally cross the Rocky Mountains; they were transported by the Mormon pioneers to Utah in the late 1840s, and by ship to California in the early 1850s.



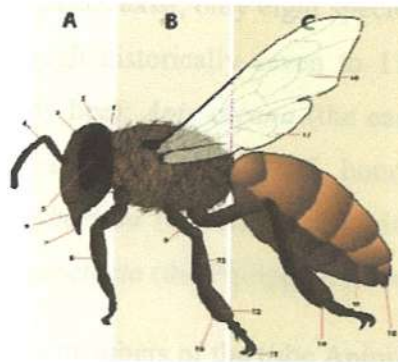
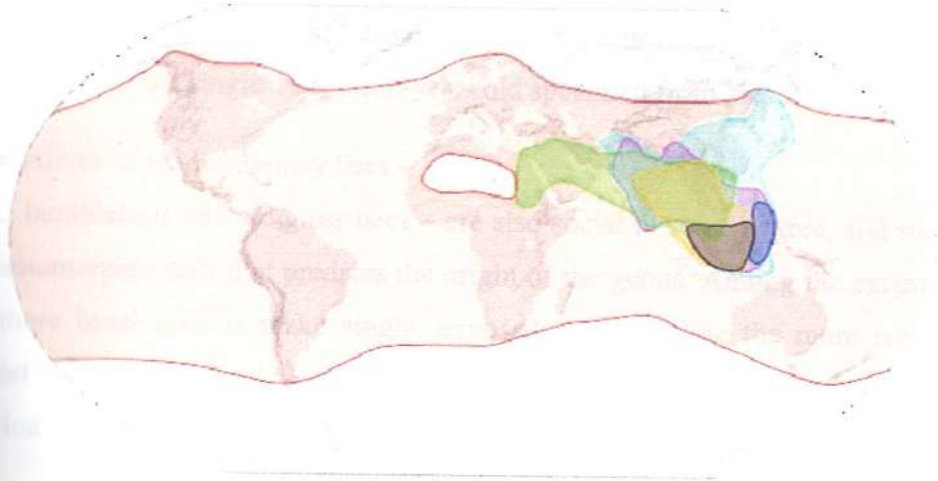
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## Origin, systematics, and distribution



Distribution of honey bees around the world Morphology of a sterile female worker honey bee Honey bees appear to have their center of origin in South and Southeast Asia (including the Philippines), as all the extant species except *Apis mellifera* are native to that region. Notably, living representatives of the earliest lineages to diverge (*Apis florea* and *Apis andreniformis*) have their center of origin there. The first *Apis* bees appear in the fossil record at the Eocene-Oligocene boundary (34 mya), in European deposits. The origin of these prehistoric honey bees does not necessarily indicate Europe as the place of origin of the genus, only that the bees were present in Europe by that time. Few fossil deposits are known from South Asia, the suspected region of honey bee origin, and fewer still have been thoroughly studied.

  
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## CONCLUSION

The *apis indica* honey bees are abundantly seen in M. G. College of Aarmori, Dist. Gadchiroli, Maharashtra. In Aarmori honey bee production are in middle scale. Be keeping in Aarmori they follows now traditional method as well as new methods. This species of *apis indica* I found in **Temba (Chak)** village of Aarmori by the co operation of forest department. About 20,000 species of bees exist, *apis indica* is found in India. Honey is coming from duu offset Honey bees are amazing insects for many reasons. Their complex social life, along with their elaborate foraging mechanisms allows them to stand out among other bees. Honey bees are also crucial to agricultural success because they pollinate so many of the flowers, fruits and vegetables we see daily in grocery stores. Though they may be viewed as pests in the eyes of many, honey bees should be appreciated for all the they do to keep our ecosystem running. Next time you try to swat h honey bee, remember where your



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**M.Sc.**  
**Zoology**  
**Project Work**

**A PROJECT Submitted to Gondwana university, Gadchiroli as  
partial fulfilment of the Requirement for Degree of Masster of  
Science(Zoology)**

**Submitted By**

**Ku. YOGESHRI GHANSHYAM MONGARKAR**

**Under The Guidance of**

**Dr. J.B. Papadkar**

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COMMERCE COLLEGE, ARMORI.**

**YEAR: 2020-2021**





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**CERTIFICATE**

This is certify that Miss. Yogeshri Ghanshyam Mongarkar is bonafide student of P.G.. Department of Zoology, Mahatma Gandhi Senior College, Armori She has submitted the project work for the partial fulfillment of the Master Degree in Zoology of Gondwana University, Gadchiroli

Date:



Dr. J.N. Papadkar

Head of dept. of Zoology

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Dr. L.H. Khalsa

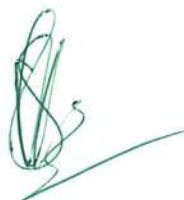
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## Chapter-1

### INTRODUCTION

Oxygen and carbon dioxide dissolve in water, and most fishes exchange dissolved oxygen and carbon dioxide in water by means of the gills. The gills lie behind and to the side of the mouth cavity and consist of fleshy filaments supported by the gill arches and filled with blood vessels, which give gills a bright red colour. Water taken in continuously through the mouth passes backward between the gill bars and over the gill filaments, where the exchange of gases takes place. The gills are protected by a gill cover in teleosts and many other fishes but by flaps of skin in sharks, rays, and some of the older fossil fish groups. The blood capillaries in the gill filaments are close to the gill surface to take up oxygen from the water and to give up excess carbon dioxide to the water.

Most modern fishes have a hydrostatic (ballast) organ, called the swim bladder, that lies in the body cavity just below the kidney and above the stomach and intestine. It originated as a diverticulum of the digestive canal. In advanced teleosts, especially the acanthopterygians, the bladder has lost its connection with the digestive tract, a condition called physoclastic. The connection has been retained (physostomous) by many relatively primitive teleosts. In several unrelated lines of fishes, the bladder has become specialized as a lung or, at least, as a highly vascularized accessory breathing organ. Some fishes with such accessory organs are obligate air breathers and will drown if denied access to the surface, even in well-oxygenated water. Fishes with a hydrostatic form of swim bladder can control their depth by regulating the amount of gas in the bladder. The gas, mostly oxygen, is secreted into the bladder by special glands, rendering the fish more buoyant; the gas is absorbed into the bloodstream by another special organ, reducing the overall buoyancy and allowing the fish to sink. Some deep-sea fishes may have oils, rather than gas, in the bladder. Other deep-sea and some bottom-living forms have much-reduced swim bladders or have lost the organ entirely.

The swim bladder of fishes follows the same developmental pattern as the lungs of land vertebrates. There is no doubt that the two structures have the same historical origin in primitive fishes. More or less intermediate forms still survive among the more primitive types of fishes, such as the lungfishes *Lepidosiren* and *Protopterus*.

Oxygen consumption of carp acclimated at 10 and 20° C has been measured under routine conditions. Some complications and precautions necessary in continuous flow respirometry are discussed. Routine  $V_{O_2}$  at different levels of hypoxia have been determined. Individual variation leads to scatter in the data and different methods of plotting the relationship between  $V_{O_2}$  and  $P_{O_2}$  are proposed; attention is drawn to differences between inlet (or ambient)  $P_{O_2}$  and inspired  $P_{O_2}$ . Using certain criteria a 'critical' oxygen tension of about 95 mm Hg was found at 20° C;  $Q_{10}$  values are about 2 at normoxia and some suggestions of an increase near to the critical oxygen tension were found. Blood samples from the dorsal aorta showed rising  $P_{a,O_2}$  of 16 mm Hg which increased to 70–80 mm Hg when  $P_{insp}$  was 90 and they then

fall as the inspired oxygen is lowered. During periods of deep hypoxia (25 mm Hg) blood lactate concentration increases steadily and indicates an increasing dependence on anaerobic mechanisms.

Fish and many other aquatic organisms have evolved gills to take up the dissolved oxygen from water. Gills are thin tissue filaments that are highly branched and folded. When water passes over the gills, the dissolved oxygen in water rapidly diffuses across the gills into the bloodstream. The circulatory system can then carry the oxygenated blood to the other parts of the body. In animals that contain coelomic fluid instead of blood, oxygen diffuses across the gill surfaces into the coelomic fluid. Gills are found in mollusks, annelids, and crustaceans.

The folded surfaces of the gills provide a large surface area to ensure that the fish gets sufficient oxygen. Diffusion is a process in which material travels from regions of high concentration to low concentration until equilibrium is reached. In this case, blood with a low concentration of oxygen molecules circulates through the gills. The concentration of oxygen molecules in water is higher than the concentration of oxygen molecules in gills. As a result, oxygen molecules diffuse from water (high concentration) to blood (low concentration), as shown in Similarly, carbon dioxide molecules in the blood diffuse from the blood (high concentration) to water (low concentration).

Within recent years much has been added to the knowledge concerning the mechanism of the respiratory function of the blood. Haldane and Priestley (1905) have shown that, at least in the higher animals, the respiratory movements are affected by the carbon dioxide tension of the arterial blood. It has been shown definitely (Hasselbalch, 1912 and citations) that the exciting agent is the hydrogen ion concentration of the blood bathing the respiratory center. Krogh and Litch (1919) undertook to study the respiratory function of the blood of fishes in view of the knowledge of the influence of temperature upon the dissociation curve of oxyhemoglobin as investigated by Barcroft and Hill (1909) and Barcroft (1914). These workers found that the blood of the fish was especially adapted to its needs. Certain marine fishes are known to react to a gradient of acidity and alkalinity (Shelford and Powers, 1915). It has been found that certain species react positively to a definite range of hydrogen ion concentration of the sea water, others are less definite in their reaction, and still others seemingly do not respond to differences in alkalinity and acidity (Powers, 1921). In view of these facts experiments were undertaken to determine the ability of marine fishes to extract oxygen from the sea water at different hydrogen ion concentrations. Interest in this question was \* Studies from The University of Nebraska, stimulated by the theory held by Roule (1915) that the salmon (*Salmo salar* L.) does not respond to salinity or temperature but that it always reacts in such a way as to bring it into water having a higher oxygen content. Method. A very simple technique was employed. A fish was placed in a 2 quart Mason jar filled with sea water and made air-tight with a rubber stopper. The jar was then immersed in a water bath of running sea water in which the temperature was almost

constant. The oxygen content of the water at the beginning of an experiment was always sufficiently high so that the fish did not at first suffer from oxygen want. The hydrogen ion concentration was determined by the colorimetric method; and the oxygen, by the Winkler method immediately after all movements of the fish had ceased. The hydrogen ion concentration of the sea water was varied by aerating with carbon dioxide-free air or by the addition of a small amount of sea water made alkaline by the addition of sodium hydroxide and by the introduction of carbon dioxide. The fishes used in these experiments were kept in a small aquarium of running sea water. They were allowed to rest from 6 to 12 hours, so that they might recover from any shock suffered when collected. All were rejected after being in the laboratory 2 or 3 days so as to avoid as far as possible erratic results due to the ill effect of keeping them under unnatural conditions.

In general the gills are able to utilize 80% of oxygen dissolved in water (van Dam, 1938; Saunders, 1962) and also they are the sites of ion exchange and osmoregulation. In this context the measurement of gill area and other allied parameters becomes a fascinating field of research, which throws light not only on the inter and intraspecific variations in the architectural plan of gill sieve of different fishes, but also on the degree and mode of their respiratory adaptation (Hughes, 1984). Exact quantitative measurements applying statistical methods have been made by Hughes (1966, 1970a, b, 1972), Muir (1969), Muir and Hughes (1969), Hughes and Gray (1972), Landolt and Hill (1975), Hakim et al. (1978), Sharma et al. (1982) and Oikawa and Itazawa (1985). The present work is an attempt to evaluate and correlate gill surface area and its allied parameters in relation to body weight of a freshwater major carp, *Cirrhinus mrigala* (Hamilton).

The activity pattern of the adductor muscles of the gill filaments has been determined with E.M.G. techniques and analysed in relation to the activity of the respiratory pump muscles, the respiratory movements and the hydrostatic pressures in buccal and opercular cavities. The gill filament adductor muscles contract twice during a normal respiratory cycle. First during the transition from the contraction to the expansion phase and for a second time at the end of the expansion phase. These two contractions serve different purposes.

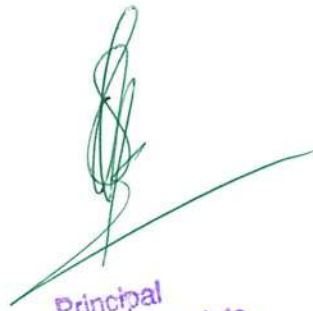
The first 'primes' the opercular pump for the start of the next expansion phase in the following way. At the end of the contraction phase, the final adduction of the opercula results in a positive pressure in the opercular cavities. If this pressure persisted until the start of the expansion, it would make the opercular suction pump inoperative, because it would blow away the flexible opercular flap which, as a passive valve, seals the widening opercular slit during abduction. Filament adduction at the transition from contraction to expansion, however, by lowering the resistance of the gill curtain, allows water to escape from the opercular cavities through the mouth and so reduces opercular pressure to zero before expansion starts.

The second contraction of the filament adductor muscles, at the end of the expansion phase, occurs when the opercular flap separates from the body of the fish, opening the opercular slit. At this moment, there is a considerable negative pressure in

the opercular cavity. Nevertheless, inflow of water through the opercular slit is negligible, because flow reversal is counteracted by the kinetic energy of the normal water flow from the buccal to the opercular cavities. This process is significantly facilitated by a reduction in gill resistance through filament adduction. In the cough, a burst of filament adductor activity occurs during the intermediate expansion. It then increases water flow velocity over the gills by lowering the gill resistance and also brings the filaments in such a position that the water flows parallel to their surface

**Aim:-** Study of function and structure respiratory organ of Carp and *Cyprinus carpio*.

**Objective:-** How to take place respiration in Carp *Cyprinus carpio* fishes



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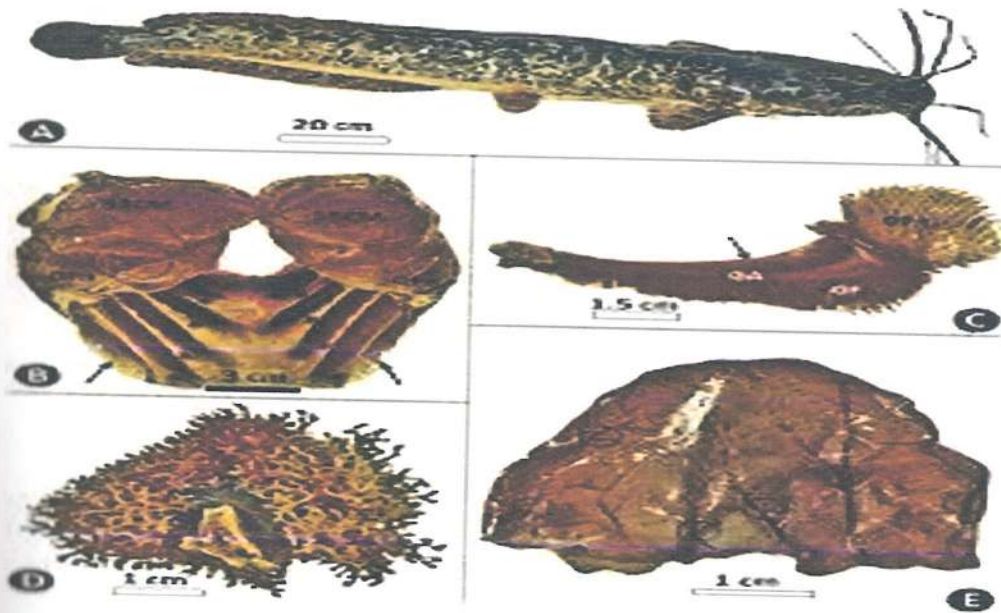


Fig. 1 Respiratory organs

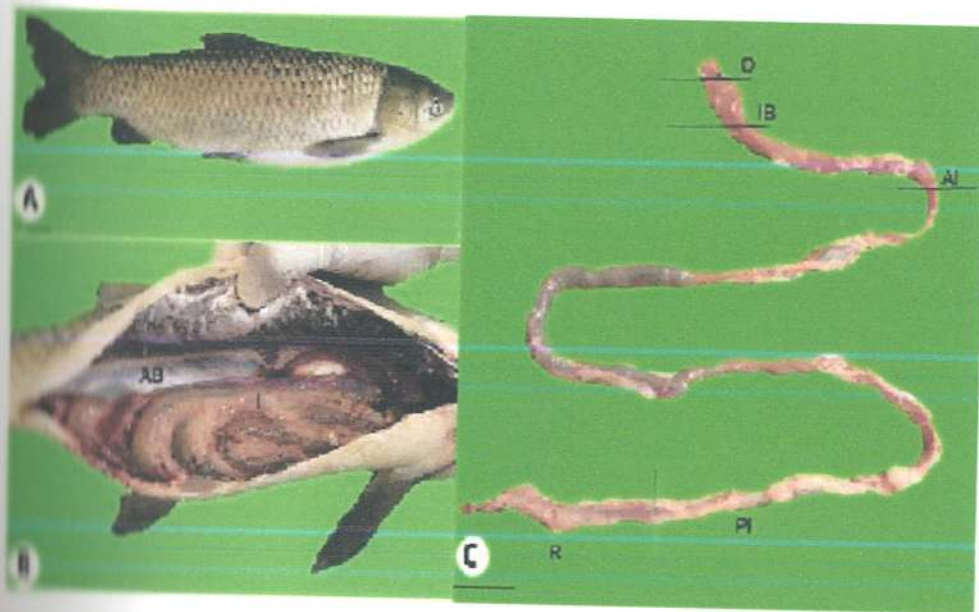


Fig. 2 Morphology-of-grass-carp-intestine-A-Lateral-view-of-grass-carp-B

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## Conclusion

The common expression 'like a fish out of water' bespeaks of the well-known inability of most fish and other aquatic life-forms to survive and acquire adequate amount of oxygen from air through gills. In teleosts, for example, secondary lamellae and gill filaments in the crustacean gills, closely packed, delicate, leaf-like respiratory units, dry out and become impermeable to oxygen. Furthermore, they cohere due to surface tension and collapse under their own weight. This reduces the respiratory surface area, creates large diffusion distances in the lamellae and increases branchial vascular resistance. The animal becomes anoxic and hypercapnic. It eventually succumbs to asphyxia, inspite of being exposed to a respiratory medium (air) richer with oxygen



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**M.Sc.**  
**Geology**  
**Project Work**

**A  
PROJECT  
ON**

**A REVIEW ON GROUNDWATER INFORMATION OF GADCHIROLI  
TALUKA OF GADCHIROLI DISTRICT, MAHARASTRA.**



**SUBMITTED BY**

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**GUIDED BY**

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# GROUND WATER INFORMATION

## GADCHIROLI TALUKA

### INTRODUCTION :

**Groundwater** is the water present beneath Earth's surface in rock and soil pore spaces and in the fractures of rock formations. A unit of rock or an unconsolidated deposit is called an aquifer when it can yield a usable quantity of water. The depth at which soil pore spaces or fractures and voids in rock become completely saturated with water is called the water table. Groundwater is recharged from the surface; it may discharge from the surface naturally at springs and seeps, and can form oases or wetlands. Groundwater is also often withdrawn for agricultural, municipal, and industrial use by constructing and operating extraction wells. The study of the distribution and movement of groundwater is hydrogeology, also called groundwater hydrology.

The climate of the taluka is characterized by a hot summer, a well distributed rainfall during the southwest monsoon and general dryness except during rainy season. The winter is from December to February followed by summer from March to May. The southwest monsoon season is from June to September. October and November constitute the post-monsoon. The mean minimum temperature is  $14.6^{\circ}\text{C}$  and mean maximum temperature is  $42.1^{\circ}\text{C}$ .

The normal annual rainfall over the taluka varies from about 1300mm to 1750 mm. The average annual rainfall for the period 2002-2011 ranges from 921.83 mm (Chamorshi) to 1643.43 mm (Kurkheda), Whereas year wise data suggested that minimum rainfall was in 2002 (962.20 mm) and maximum was in 2010 (1852.54 mm). It is noticed that the average annual rainfall has decreased during the last 10years period as compared to the the normal rainfall. The overall average annual rainfall for last 10 year is 1345.19 mm and is presented in table given bellow.

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## LOCATION

Gadchiroli district lies between north latitudes  $18^{\circ}08'$  and  $20^{\circ}50'$  and east longitude  $79^{\circ}45'$  and  $80^{\circ}54'$  and falls in parts of survey of India degree sheet 55 P, 56 M, 56 N, 64 D, 65 A and 65 B. The district has geographical area of 14915.54 sq. km.

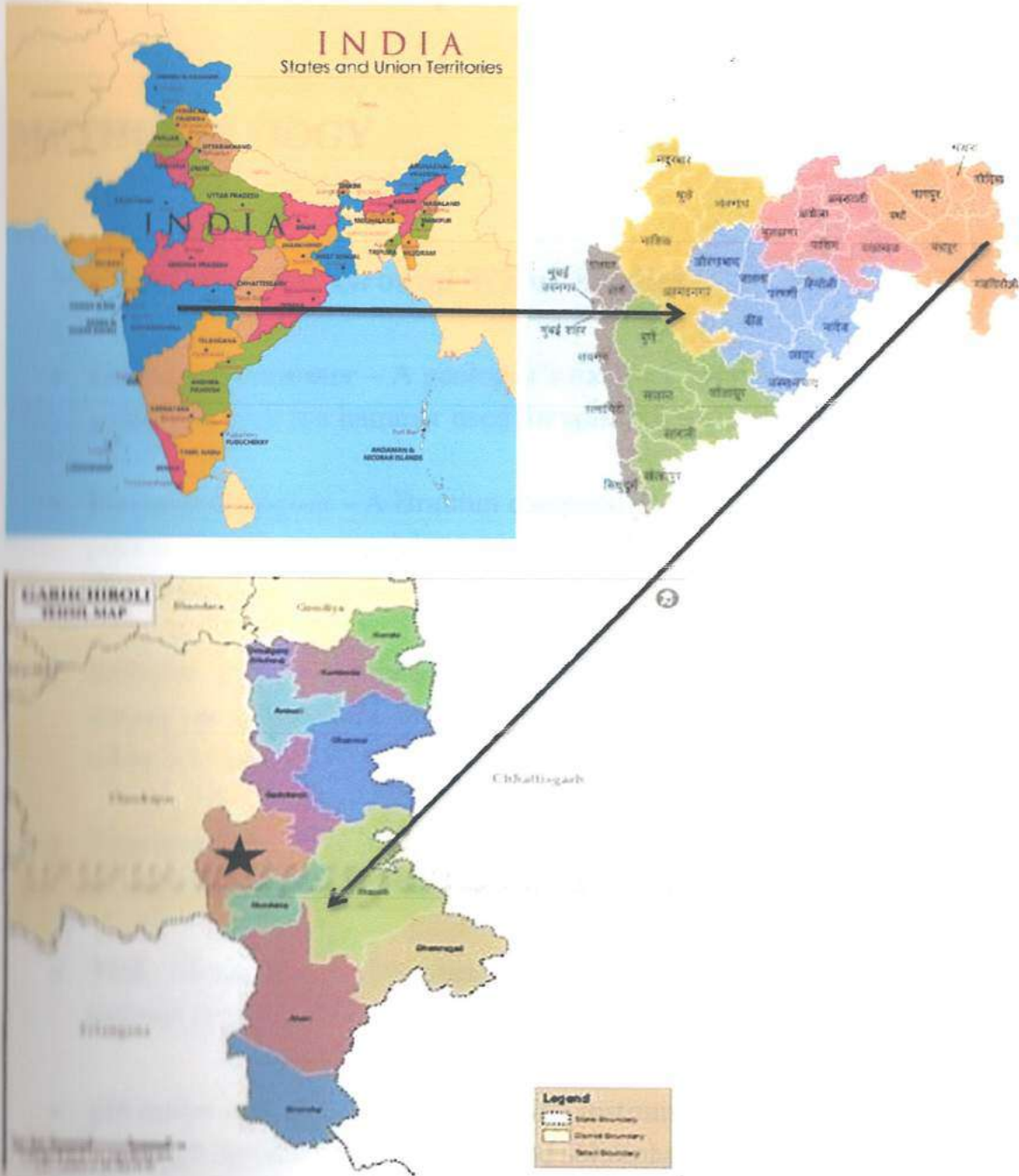
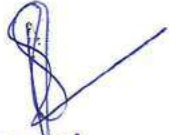


Figure – 1 (Location of Gadchiroli Taluka)

## CONCLUSIONS

1. Major part of the taluka is underlain by hard rock, where only dugwells are most feasible structures for ground water development. The sites for borewells need to be selected only after proper scientific investigation
2. Borewells generally tap deeper fractures, which may not be sustainable. Besides, the borewells should only be used for drinking water supply and not for irrigation.
3. The overall stage of ground water development for the taluka is only about 17%. Therefore, there is scope for further development for ground water resources, in the plain and habitated/unforested area.
4. The ground water development in the soft rock areas of the taluka is recommended by constructing tubewells of 90-100m, with yield of 5-10 lps. Whereas in hard rock areas DCB and borewells can be drilled, wherever the weathered thickness is more than 25 m bgl.
5. However, the water level trends in soft rock formations occurring in southern parts and hard rock areas of central part are showing declining trends thus future ground water development should be done in these areas with adherence to the precautionary measures, i.e., artificial recharge to augment the ground water resources and adoption of ground water management practices, so that the sustainable development is achieved.
6. The Gadchiroli taluka and watershed in the taluka fall in "safe" category. So that is a plenty of scope for ground water development.
7. The existing village pond need to be rejuvenated to act both as water conservation and artificial recharge structures.

  
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**A  
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ON  
A REVIEW ON GEOLOGICAL SOFTWARES WITH SPECIAL REFERENCE  
TO HYDROGEOLOGY.**



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## 1. INTRODUCTION

Present desertation is a part of fulfilment of the degree of master in geology under faculty of science of M. G. College Armori, Gondwana University ,Gadchiroli. ``A Review on Geological Software with Special Reference to Hydrogeology'' is topic chosen by me for dissertation.

Hydrogeology (hydro- meaning water, and -geology meaning the study of the Earth) is the area of geology that deals with the distribution and movement of groundwater in the soil and rocks of the Earth's crust (commonly in aquifers). The terms groundwater hydrology, geohydrology, and hydrogeology are often used interchangeably. Groundwater engineering, another name for hydrogeology, is a branch of engineering which is concerned with groundwater movement and design of wells, pumps, and drains. The main concerns in groundwater engineering include groundwater contamination, conservation of supplies, and water quality.

Hydrogeology is an interdisciplinary subject; it can be difficult to account fully for the chemical, physical, biological and even legal interactions between soil, water, nature and society.

The study of the interaction between groundwater movement and geology can be quite complex. Groundwater does not always follow the surface topography; groundwater follows pressure gradients (flow from high pressure to low), often through fractures and conduits in circuitous paths. Taking into account the interplay of the different facets of a multi-component system often requires knowledge in several diverse fields at both the experimental and theoretical levels.

## 2. OBJECTIVE

- To start the software used for hydrology.
- To understand the software used hydrology.
- To know the prospective efficiency.



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### 3.METHODOLOGY:

The study has been carried out completely on secondary data And was reffered from various sources to achieve the objectives and considered as a prime sources for conclusion drawn. Various online materials (research article, books, etc) were studied to collect the appropriate secondary data.

### 4.HYDROGEOCHEMISTRY

Hydrogeochemistry (uncountable) **The chemistry of ground and surface waters**, particularly the relationship between the chemical characteristics and quality of waters and the areal and regional geology.


The study of **hydrochemistry** is of prime importance in deciding about the quality of groundwater supply. **Hydrochemistry** helps to evaluate hydrogeochemical processes responsible for temporal and spatial changes in the chemistry of groundwater.

Hydrogeochemical analysis of groundwater Acquired physicochemical data were graphically analysed using Piper, Durov, and Schoeller diagrams that were plotted using Aquachem v3.7 software.

The Piper diagram modified by Handa<sup>16</sup> consists of 2 separate triangular representations of cations and anions and a diamond shape of combined ions that are used to explain hydrogeochemical faces of water samples.

This tri-linear diagram depicts water chemical aspects definitively and have been used in many studies.

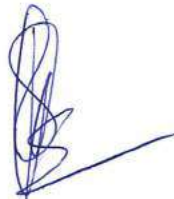
A Durov diagram was used to explain the chemical characteristics of groundwater by displaying dominant ions as percentage milli-equivalents in 2 ternary graphs representing ions and summing up to 100%.

  
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## 6.CONCLUSION

- The hydrological data is complex for analysis.
- The Aquachem is the software quiet efficient for hydrological analysis.
- The various plots, grapher, ArcGIS ,Aquachem, systematically presented through software.
- Aquachem software Create simple to complex data queries and easily extract vital information about your water quality data.



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A  
PROJECT  
ON

**“A REVIEW ON RECENT GEOLOGICAL STUDIES OVER  
GONDWANA SEDIMENTS”**



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## 1. INTRODUCTION

The Gondwana sediments over Peninsular India are around a 5000 m thick strata sequence belonging to the age from Permo-Carboniferous to Early Cretaceous. These sequences are into limelight due to the existence of coal deposits in the Barakar formation within it. Present study titled “**A Review on Recent Geological Studies over Gondwana Sediments**” is an attempt to discuss the studies on sediments of Gondwana supergroup. The word Gonde was created by H. B. Medlicott in 1872 from the kingdom of Gond, an ancient tribe of central India. This tribe still exists in the state of Madhya Pradesh and Maharashtra. The term supergroup is used here for its stratigraphical hierarchy as it is sub-divided into several groups and formations. The Gondwana term is also used in a tectonostratigraphic manner – the supercontinent of the Gondwanaland. This supercontinent existed between Permian to cretaceous period as the southern half of Pangaea (Figure 1).



  
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Figure 1: Gondwanaland in prehistoric times.



## 7. CONCLUSION

The Gondwana Basins of India account for nearly 99% of coal resource of the country. The basins occur along major river valleys either as discrete bodies or are unified by post-Permian strata and are named after the Rivers Damodar, Son, Mahanadi, Godavari etc. or the linear hill ranges like Satpura and Rajmahal. Around 5 km thick strata, deposited over 200 million years, from Upper Carboniferous to Lower Cretaceous, are preserved in these basins and are clubbed into Gondwana Supergroup. Upper Cretaceous Lameta-Bagh beds and Deccan Trap have not been included within Gondwana Supergroup since by that time India was completely separated from the rest of Gondwanaland and moved far towards north. Gondwana Supergroup is sub-divided into Permian-carboniferous Lower Gondwana Group, characterized by Gangopteris-Glossopteris flora and Mesozoic Upper Gondwana Group containing Dicroidium-Lepidopteris-Ptylophylum flora. The coal seams are found only in the lower group within Karharbari and Barakar Formations of Lower Permian and Raniganj Formation and its equivalents of Upper Permian age. Barakar Formation is the major storehouse of coal in all the basins having more than 90% of total resource of the country. Karharbari and Raniganj Formations present only in a few basins.

The Gondwana Basins of Peninsular India occur along four major linear belts namely

  
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“A REVIEW ON GROUNDWATER CONDITIONS AROUND  
ARMORI TALUKA IN GADCHIROLI DISTRICT,  
MAHARASHTRA”**



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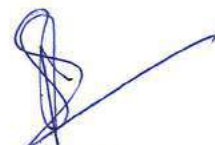
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## 1. INTRODUCTION

Present dissertation is a part fulfillment of the degree of Master of Science in Geology in Faculties of Science of M. G. College Armori, Gondwana University, "A Review on Groundwater Conditions around Armori Taluka in Gadchiroli District, Maharashtra" is chosen by candidate for dissertation.

Groundwater is fresh water (from rain or melting ice and snow) that soaks into the soil and is stored in the tiny spaces (pores) between rocks and particles of soil. Groundwater accounts for nearly 95 percent of the nation's fresh water resources. India is the largest user of groundwater in the world. It uses an estimated 230 cubic kilometers of groundwater per year - over a quarter of the global total. More than 60% of irrigated agriculture and 85% of drinking water supplies are dependent on groundwater. Groundwater, which is in aquifers below the surface of the Earth, is one of the Nation's most important natural resources. With represents population. Due to growing water-intensive crops like paddy, Punjab and Haryana use groundwater for flood irrigation. With the state's arid climate, groundwater overexploitation has affected majority of Rajasthan's population. It often takes more work and costs more to access groundwater as opposed to surface water, but where there is little water on the land surface, groundwater can supply the water needs of people.

  
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## 5. AQUIFER SYSTEM

The major aquifer rock in the Armori taluka is weathered Gneiss rock of Archean age. The weathered and fractured zones provide a better avenue of groundwater storage.

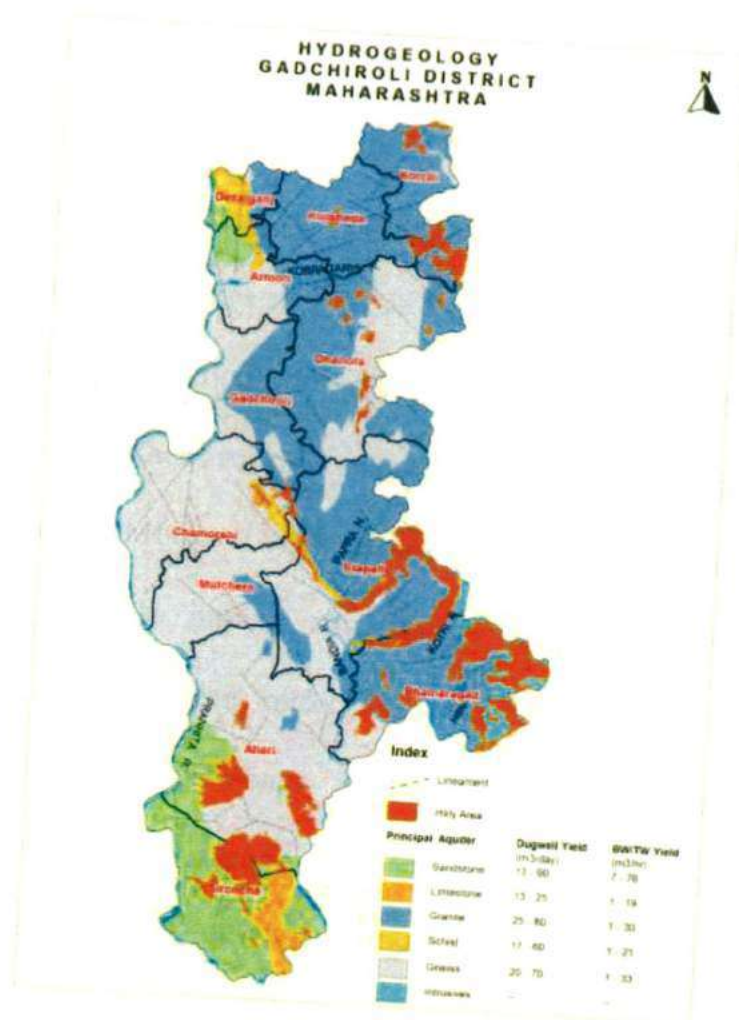


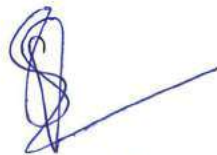
Figure 1 - Principal Aquifers of Gadchiroli (GSDA, 2013)

  
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## 7. CONCLUSION

- a. The groundwater level in the Armori taluka is at moderate level and deeps in during summer.
- b. The groundwater level fluctuate form 5 to 2 m below ground level during different seasons.
- c. The weathered Gneiss rock is the chief aquifer in the Armori taluka.
- d. The groundwater is suitable for drinking and domestic purpose.



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**M.Sc.**  
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**Project Work**

**A  
PROJECT  
ON**

**“A REVIEW ON SEDIMENTOLOGICAL STUDIES”**



**SUBMITTEDBY**

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**2020-21**



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## I. INTRODUCTION

Present dissertation is a part of fulfilment of the degree of master in geology faculty of science of M. G. College, Armori affiliated to Gondwana University, Gadchiroli. "A Review on Sedimentological Studies" has been chosen by candidate for dissertation. Sedimentology encompasses the study of modern sediments such as sand, silt, and clay and the processes that result in their formation (erosion and weathering) transport, deposition and diagenesis. Sedimentologists apply their understanding of modern processes to interpret geologic history through observations of sedimentary rocks and sedimentary structures.


Sedimentary rocks cover up to 75% of the Earth's surface, record much of the Earth's history, and harbor the fossil record. Sedimentology is closely linked to stratigraphy, the study of the physical and temporal relationships between rock layers or strata. The premise that the processes affecting the earth today are the same as in the past is the basis for determining how sedimentary features in the rock record were formed. By comparing similar features today to features in the rock record; for example, by comparing modern sand dunes to dunes preserved in ancient aeolian sandstones geologists reconstruct past environments. The consequence of sedimentological processes is in four primary types of sedimentary rocks: clastics, carbonates, evaporites, and chemical.

  
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## 7. CONCLUSION

- The general review over sedimentological studies elucidated the various concepts of sediment formation and consequent processes.
- The review explained the significance of sedimentology in various branches of geology like; stratigraphy, geomorphology, palaeoclimates, etc.
- Being a separate and unique branch in geology, the sedimentological studies have a great and broad implication in many multidisciplinary segments.

  
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**M.Sc.**  
**Geology**  
**Project Work**

**A  
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ON  
“SEDIMENTOLOGICAL STUDIES AROUND ARMORI TALUKA  
OF GADCHIROLI DISTRICT, MAHARASHTRA”**



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## 1. INTRODUCTION

Present dissertation is a part of fulfillment of the degree of master in geology under faculty of science of M.G. College, Armori, Gondwana University, Gadchiroli. **“Sedimentological Studies around Armori Taluka of Gadchiroli District, Maharashtra”** is the topic chosen by me for dissertation. Gadchiroli district is situated in the easternmost parts of Maharashtra and covers an area of 15433sq. km. Armori taluka is in Gadchiroli district. It is included in Survey of India Toposheet No. 64 D/3, 55 P/15, latitudes  $20^{\circ} 15'$  and longitudes  $80^{\circ} 30'$ . Armori is about 170 km from Nagpur. The study area lies towards south of Gadchiroli at a distance of about 33km. Bramhapuri and Wadsa are the nearest railway station situated at a distance of about 114km and 127km from Nagpur respectively.

Various geomorphic processes left their distinct imprints upon landform and each geomorphic process develops its own characteristic assemblage of landforms which constitute the topography of the area and geological history of the area. Most of the area is a peneplain. Some hills of the area are relict type, ie. They represent the survival of harder masses of rocks which escaped from weathering and erosion. Wainganga and Gadhavi river forms the main drainage of the area. The river Gadhavi flows from east to west and it is joined to wainganga river. The drainage pattern is mainly dendritic

  
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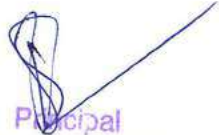


## 6. SEDIMENTOLOGY OF GADHAVI RIVER

Gadhavi River near Armori sedimentological observation were done with the help of sedimentary geology stage of river is concluded to be sub-mature. Sub-maturity describes the composition and texture of grains in clastic rocks, most typically low transported sandstones. Sediment is mature when the grains in sediment become well sorted and well-rounded due to weathering or abrasion of the grains during transport. There are two components to describe maturity, texture and composition. Texture describes how rounded and sorted the sample is while composition describes how much the composition trends toward stable minerals and components.

In Gadhavi River near Armori textural sub-maturity was observed. The less sediment is involved in the transportation cycle, the less time it has to become well-sorted. Similarly, the less the sediment is transported, the less time is available for grains to lose their rough edges and corners by abrasion. Thus, we consider texturally mature sediment to be sediment that is well-sorted and well-rounded.

In Gadhavi near Armori sub-mature mineralogy was observed, mineralogically sub-mature sediment or sedimentary rock is one which consist largely mixture of stable and unstable minerals, particularly quartz and some low silica rich minerals.

  
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## 7. CONCLUSION

On the basis of field observation following conclusion are drawn.

- The preliminary sedimentology of the Wainganga show maturity in sediments and mineralogy with good sorting indicating long distant distance travel.
- The preliminary sedimentology studies of the Gadhavi show Sub-maturity in sediments and mineralogy with moderate sorting indicating medium distant provenance.
- The source area of sediments have geological effect on the sedimentology of both rivers.

  
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**M.Sc.**  
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**A  
PROJECT  
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“A REVIEW ON GEOLOGICAL SOFTWARE WITH SPECIAL  
REFERENCE TO GEOCHEMISTRY”**



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## 1. INTRODUCTION

Present dissertation is a part of fulfillment of the degree of master in geology under faculty of science of M.G. College, Armori, Gondwana University, Gadchiroli. "A Review on Geological Software with Special Reference to Geochemistry" is the topic chosen by me for dissertation. The term geochemistry was first used by the Swiss-German chemist Christian Friedrich Schönbein in 1838: "a comparative geochemistry ought to be launched, before geochemistry can become geology, and before the mystery of the genesis of our planets and their inorganic matter may be revealed." However, for the rest of the century the more common term was "chemical geology", and there was little contact between geologists and chemists. Geochemistry emerged as a separate discipline after major laboratories were established, starting with the United States Geological Survey (USGS) in 1884, and began systematic surveys of the chemistry of rocks and minerals. The chief USGS chemist, Frank Wigglesworth Clarke, noted that the elements generally decrease in abundance as their atomic weights increase, and summarized the work on elemental abundance in The Data of Geochemistry. The composition of meteorites was investigated and compared to terrestrial rocks as early as 1850. In 1901, Oliver C. Farrington hypothesised that, although there were differences, the relative abundances should still be the same. This was the beginnings of the field

  
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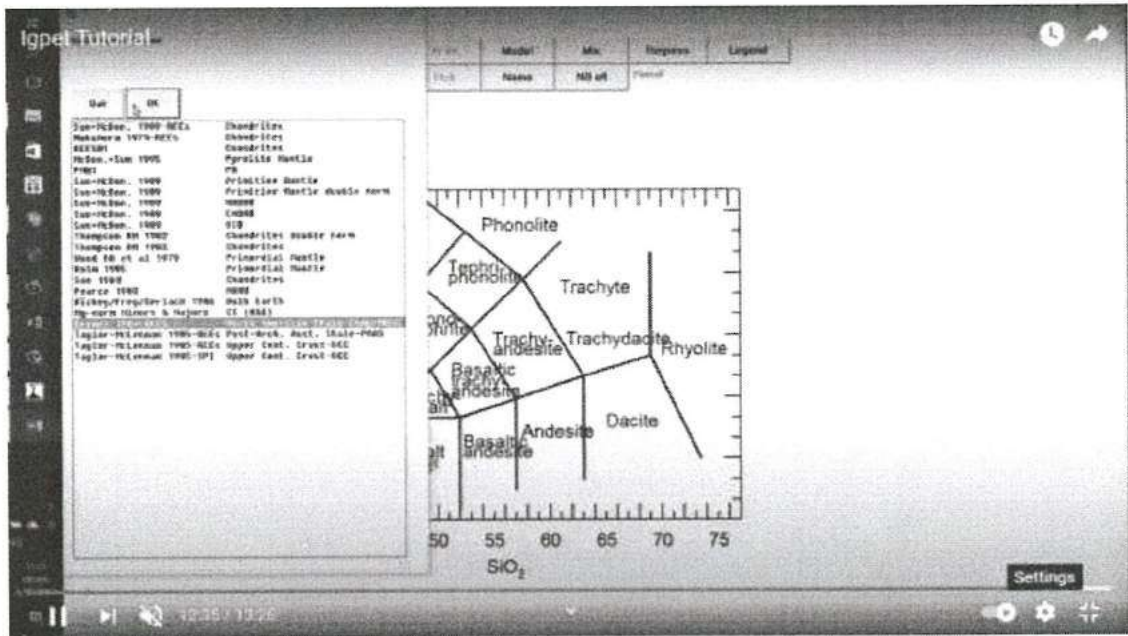


Figure 1 - IgPet Software Screenshot 1

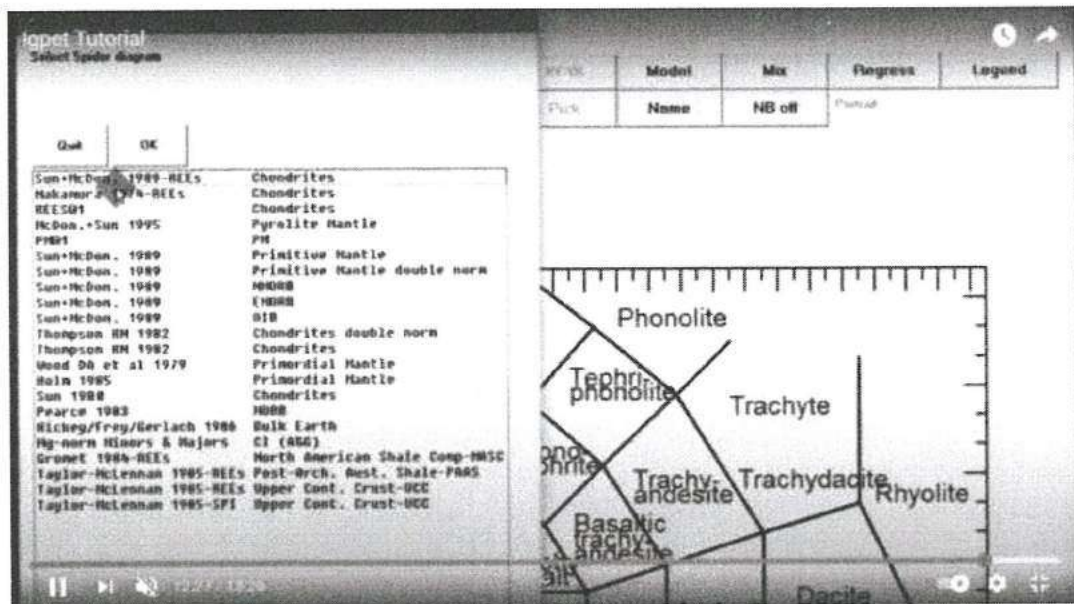


Figure 2 - IgPet Software Screenshot 2

  
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## 6. CONCLUSION

- The geochemical data is complex for analysis.
- The IgPet is the software quite efficient for geochemical analysis.
- The various plots, spider diagram, tri-linear plots, etc. can be systematically presented through IgPet.
- The operation is sight complex but a manual guidance can aid a lot.

  
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**M.Sc.**  
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**Project Work**

**A  
PROJECT  
ON  
A REVIEW ON RECENT HYDROGEOLOGICAL STUDIES.**



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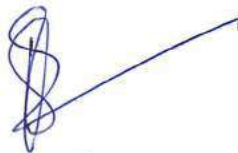
## CHAPTER NO.1

### INTRODUCTION

Hydrogeology is an interdisciplinary subject; it can be difficult to account fully for the chemical, physical, biological and even legal interactions between soil, water, nature and society. The study of the interaction between groundwater movement and geology can be quite complex.

Groundwater does not always follow the surface topography; groundwater follows pressure gradients (flow from high pressure to low), often through fractures and conduits in circuitous paths.

Taking into account the interplay of the different facets of a multi-component system often requires knowledge in several diverse fields at both the experimental and theoretical levels.



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**Hydrogeology** (*hydro-* meaning water, and *-geology* meaning the study of the Earth) is the area of geology that deals with the distribution and movement of groundwater in the soil and rocks of the Earth's crust (commonly in aquifers). The terms **groundwater hydrology**, **geohydrology**, and **hydrogeology** are often used interchangeably

**Boy drink a water**



**Figure 1. Boy drink a water**



**Figure2.checking well**



**Figure 3. Boy under a waterfall**

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MAP OF WAINGANGA RIVER – DESAIGANJ WADSA AREA (Showing Four Spots)



Fig 1 : Map of Wainganga river, Desaiganj (Wadsa) showing four sampling sites denoted by dot

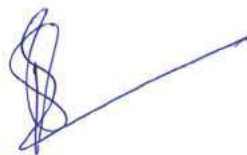
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## CHAPTER NO.5

### Conclusion

1. The rate at which water infiltrates into the ground depends on the permeability of the rocks and the state of the ground surface. Below the ground surface there is an unsaturated zone which has air in the pore spaces, and a saturated zone which has all the pores filled with water.
2. The water table is the boundary between the unsaturated zone and the saturated zone, and is the level at which water stands in wells. Water below the water table is called groundwater. The water table follows the topography of the ground surface but with more gentle gradients.
3. A cone of depression is formed in the water level around a well from which water is being pumped. The difference in height between the water table before pumping and the water level in the well during pumping is called the drawdown.
4. There is usually saline groundwater under the land at a coast, with a wedge of denser saline groundwater under the fresh groundwater. The depth to the saline groundwater depends on the height of the water table above sea level and on the densities of the fresh and saline water.



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**M.Sc.**  
**Geology**  
**Project Work**

**A  
PROJECT  
ON  
“A REVIEW OVER GEOLOGICAL STUDIES ON TALCHIR  
FORMATION OF LOWER GONDWANA SUPERGROUP”**



**SUBMITTED BY**

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## 1. INTRODUCTION

Present study titled “**A Review over Geological Studies on Talchir Formation of Lower Gondwana Supergroup**” is an attempt to discuss the studies on Talchir formation of Gondwana supergroup. The Talchir formation is the lowermost rock sequence in the Gondwana supergroup. The word Gonde in Gondwana was coined by H. B. Medlicott in 1872 from the kingdom of Gond, an ancient tribe of central India. This tribe still exists in the state of Madhya Pradesh and Maharashtra. The term supergroup is used here for its stratigraphical hierarchy as it is sub-divided into several groups and formations. The Gondwana term is also used in a tectonostratigraphic manner – the supercontinent of the Gondwanaland. This supercontinent existed between Permian to cretaceous period as the southern half of Pangaea. The Gondwana sediments over Peninsular India are around a 5000 m thick strata sequence belonging to the age from Permo-Carboniferous to Early Cretaceous. These sequences are into limelight due to the existence of coal deposits in the Barakar formation within it.

  
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## 8. CONCLUSION

- The Talchir formation is the lowermost sequence of the Lower gondwana supergroup.
- The presence of varve, pebbly mudstone, turbites, etc. reveals the glacio-fluvial deposition.
- The upper sequence of the Talchir is of the Barakar formation of fluvial origin and hosting the major coal deposits of India.



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**Geology**  
**Project Work**

A  
PROJECT  
ON

**“A BRIEF STUDY OVER FLUVIAL SYSTEMS OF INDO-  
GANGETIC ALLUVIAL PLAINS”**



**SUBMITTED BY**

**NAMODITA K. SONTAKKE**

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This is certified that **Namodita K. Sontakke** has carried out project work on "**A Brief Study over Fluvial Systems of Indo-Gangetic Alluvial Plains**" under the supervision of **Prof. P. S. Ganvir** for the partial fulfillment of the Post-Graduate degree in Geology. She has carried out project work in laboratory of the Post Graduate Department of Geology, M. G. Arts, Science & Late N. P. Commerce College Armori, affiliated to Gondwana University, Gadchiroli.

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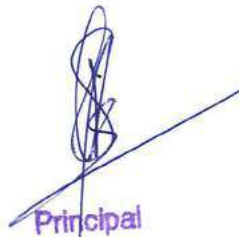
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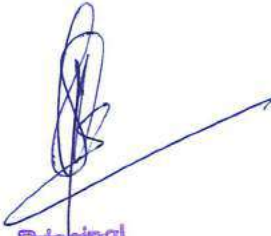


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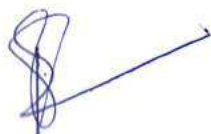
  
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## 1. INTRODUCTION


The fluvial systems of the Indo-gangetic plains were developed after the emergence of Himalayas at the northern edge of the Indian sub-continent. Present dissertation is titled on "**A Brief Study over Fluvial Systems of Indo-Gangetic Alluvial Plains**" for the partial fulfillment of Master of Science in Geology.

The Ganga basin is an important constituent of the Himalayan foreland, formed as a consequence of the India-Asia collision processes that were initiated in the Palaeogene. The Ganga is the axial river of the basin, and originates in the Himalayan orogen, being joined by a number of major Himalayan tributaries including the Yamuna, Ramganga, Ghaghra, Gandak, Kosi, and Tista before draining into the Bay of Bengal. The mighty Brahmaputra also meets the Ganges and forms a major deltaic depocenter in the Bengal basin. A number of tributaries join the Ganga system from the Indian craton and Deccan Basalt terrain such as the Chambal, Betwa and Ken (which join the Yamuna), Son, and Punpun. Since the inception of the basin and due to the continuing rise of the Himalaya, the rivers draining the Ganga basin have formed a large conduit of sediment transfer from the Himalaya to the Ganges delta. Although the bulk of the sediments are transferred to the Ganges delta, considerable sediment has accumulated in the Ganga plains to generate a



## 7. CONCLUSION

- The development of the Indo-Gangetic plains fluvial system can fully be credited to the upliftment of the Himalayan ranges.
- The fluvial system is wide-spreaded and are sub-divided into multiple sections.
- Each and every section represents the a seprate watershed adding to the cummilative watershed system.
- The plains are quite fertile and has developed a massive layer of alluvial deposits and flood plains.

  
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**M.Sc.**  
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**Project Work**

**A  
PROJECT  
ON  
“A REVIEW ON GROUNDWATER CONDITIONS AROUND  
KURKHEDA TALUKA IN GADCHIROLI DISTRICT,  
MAHARASHTRA”**



**SUBMITTEDBY**

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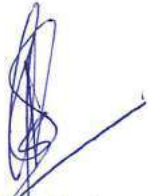
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## 1. INTRODUCTION

Present dissertation is a part fulfillment of the degree of Master of Science in Geology in Faculties of Science of M. G. College Armori, Gondwana University, "A Review on Groundwater Conditions around Kurkheda Taluka in Gadchiroli District, Maharashtra" is chosen by candidate for dissertation. Groundwater is fresh water (from rain or melting ice and snow) that soaks into the soil and is stored in the tiny spaces (pores) between rocks and particles of soil. Groundwater accounts for nearly 95 percent of the nation's fresh water resources. India is the largest user of groundwater in the world. It uses an estimated 230 cubic kilometers of groundwater per year - over a quarter of the global total. More than 60% of irrigated agriculture and 85% of drinking water supplies are dependent on groundwater. Groundwater, which is in aquifers below the surface of the Earth, is one of the Nation's most important natural resources. With represents population. Due to growing water-intensive crops like paddy, Punjab and Haryana use groundwater for flood irrigation. With the state's arid climate, groundwater overexploitation has affected majority of Rajasthan's population. It often takes more work and costs more to access groundwater as opposed to surface water, but where there is little water on the land surface, groundwater can supply the water needs of people. The Gadchiroli district is situated in the easternmost parts of

  
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Maharashtra and covers an area of 15433sq. km. Kurkheda taluka is in Gadchiroli district.

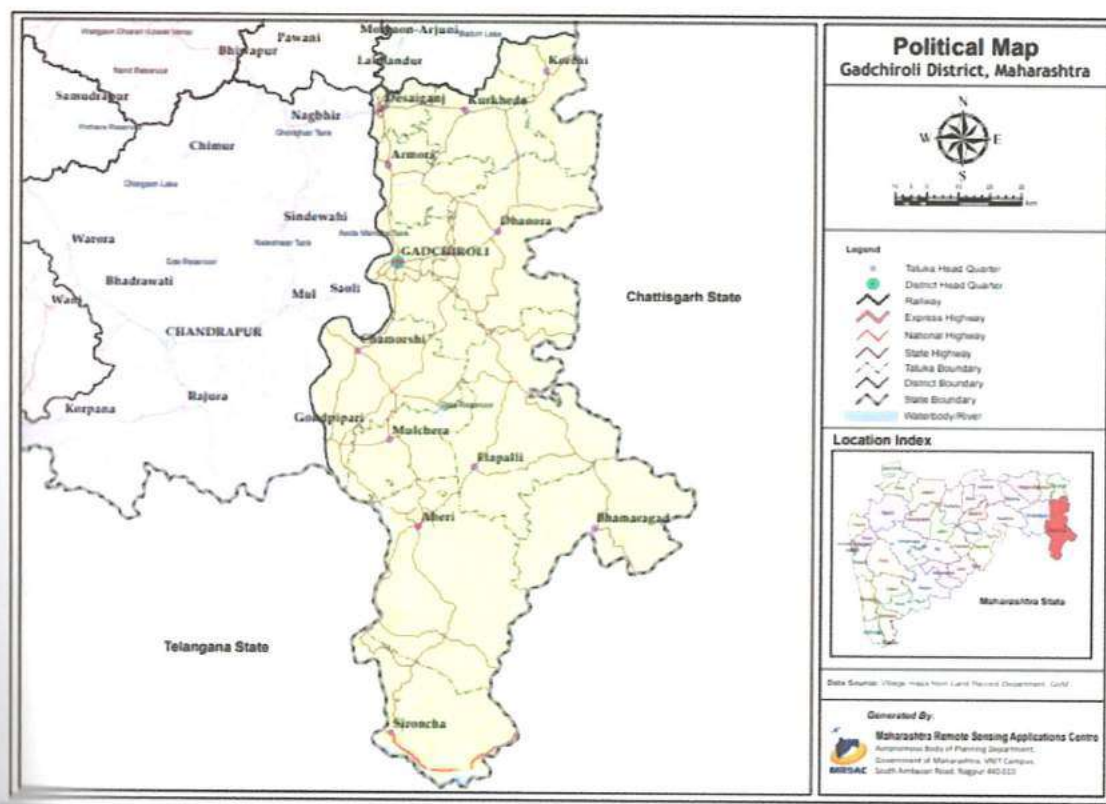


Figure 1 - Political Map of Gadchiroli District

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## 7. CONCLUSION

- a. The groundwater level in the Kurkheda taluka is at moderate level and deeps in during summer.
- b. The groundwater level fluctuates from 5 to below 2 m below ground level during different seasons.
- c. The weathered Granite rock is the chief aquifer in the Kurkheda taluka.
- d. The groundwater is suitable for drinking and domestic purpose.
- e. The Kurkheda taluka has the highest contribution in the stage of groundwater development in the Gadchiroli district.

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A  
PROJECT  
ON  
“A REVIEW ON HYDROGEOLOGICAL SAMPLING  
TECHNIQUES”



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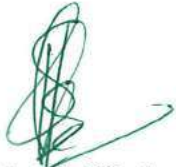
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## 1. INTRODUCTION

Present Study is focused on the review of hydro-geological sampling techniques, which are the prerequisites for the surface and groundwater studies. The fundamental objectivity behind the hydrological sampling is as follows;

- To study the composition of water in its natural state for quality assessment.
- Protection of water against pollutions.
- To monitor the water quality and support the control of hazardous constituents of water.
- Assess the suitability of water for drinking and irrigation purposes.
- To observe the speed of ground water movement form hydrogeological and geochemical mapping, temporal variation in ground water regimes.
- For exploration of mineral water, & geothermal water, and disposal of liquid & solid waste.

The need of to study the sampling techniques is because that the United Nations identified water quality as one of the key concerns in Asia in the 21st century. This concern is based on the fact that water quality degradation is so severe in many Asian countries that it is placing serious constraints on: Economic Growth Public Health Biodiversity and Environmental Quality

  
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#### 4. SAMPLE AND SAMPLING

The process of collecting the representatives among selected ones is called as sampling and the collected item as sample. There are various types of samples depending upon objective of study and their respective collection processes. Basically there are two kinds of sample; Quantitative and Qualitative having different scope. Following are some basic terminologies;

- a. **Sample Size** – The number of samples collected. Higher the number will give higher accuracy, but less than 33 is not preferred due to statistical issues.
- b. **Sampling element** – Each unit of sample is called as sample element.
- c. **Sample Statistics** – Findings obtained from samples are called as sample statistics from which population parameters are obtained.
- d. **Sampling frame** – List or index used as a basis for sampling.

There are various types of sampling following are some discussed below;

- a. **Random Sampling** – It is also called as probability sampling in which every sample element has equal and independent chance of selection. Following are sub types

- Simple Random
- Stratified Random

  
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## 9. CONCLUSION

The guidelines described below are based on procedure outlined in Environmental Science and Technology 1987, 21, 749.

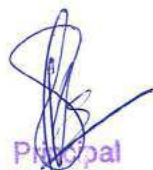
Water Sampling Procedures Perform a visual inspection of the site.

Please note the following aspects:

- a. Potential pollution sources (industrial, agricultural, domestic, animals)
- b. Condition of water (clear, cloudy, color, smell, foam)
- c. Map of Site (electronic or sketched, photograph if possible)
- d. Brief written description of site.

Samples and Controls:

- a. Sample all sites in triplicate.
- b. Collect all samples in 100mL or 1L Whirlpak bags
- c. Use a field blank. This consists of taking one of Whirlpak bags, filled with deionized water, along to the sampling site. The bag is opened for roughly the same amount of time it took you to sample. The bag is then reclosed and returned to evaluate with your samples.
- d. Use a lab blank.

  
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## 1. INTRODUCTION

Present Study is focused on the review of mineral chemistry studies, which are the prerequisites of the mantle geology and many other petrological branches. The mineral chemistry studies can be classified as follows;

- a. Wet Chemical Analysis
- b. Powder or wet spectroscopy
- c. In-situ spectroscopy

Once again, depending on your goals, some methods of chemical analysis may be more appropriate than others; however, there is considerable overlap between all techniques. In general, wet chemistry involves dissolving a mineral in an acid then analyzing the solution. Despite the variety of spectroscopic techniques, all involve some energy source that is used to bombard samples in order to produce an electromagnetic signal that can be detected and analyzed.


There are many different types of both qualitative and quantitative analysis available to mineralogists and petrologists. Specific techniques are chosen based on the goals of the researcher and the characteristics of the samples being studied. The four most important things to know before beginning any type of chemical analysis are:



  
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## 6. CONCLUSION

- a. The mineral chemistry studies can confirm the individual grain to the bulk chemistry of the rocks.
- b. The wet chemical analysis is the traditional ones; whereas, for higher accuracy, EPMA, XRF, XRD and SEM-EDX can be engaged.
- c. The mineral chemistry studies not only reveal the chemical constituent of mineral but also decipher the evolution of the mineral grain.

  
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**“A REVIEW ON PETROGRAPHIC STUDIES”**



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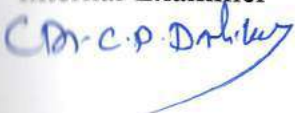


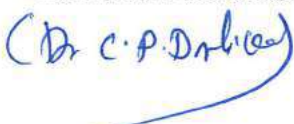
  
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## 6. CONCLUSION

- a. The microscopic studies are the best tool to identify the preliminary petrography.
- b. The optical properties act as a confirmatory study for megascopic petrography.
- c. Apart from them, the mineral chemistry studies can confirm the individual grain to the bulk chemistry of the rocks.

  
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**“A REVIEW ON RECENT CRATONIC STUDIES”**



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## 1. INTRODUCTION

Present Study is focused on the review of cratonic studies, which are the prerequisites of the understanding the evolutionary geology of the Earth. Craton, the stable interior portion of a continent characteristically composed of ancient crystalline basement rock. The term craton is used to distinguish such regions from mobile geosynclinal troughs, which are linear belts of sediment accumulations subject to subsidence.

Cratons are generally found in the interiors of continents and are characteristically composed of ancient crystalline basement crust of lightweight felsic igneous rock such as granite. They have a thick crust and deep roots that extend into the mantle beneath to depths of 200 km. Stable continental crust is an end product of intense magmatic, tectonic, and metamorphic reworking; hence, cratons consist of polydeformed and metamorphosed crystalline and metamorphic rocks. Archean cratons consist of crustal granite-greenstone terrains (GGTs) coupled to roots of strong, buoyant cratonic lithospheric mantle (CLM). ... Crustal plateaus, which are isostatically supported by a compositionally controlled low-density root, host a distinctive surface called ribbon-tessera terrain.

  
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chlorite, haematite and magnetite-schists, felspathic schists: quartzites and highly altered volcanic rocks, like rhyolites and andesites turned into hornblende-schists; abundant and widespread granitic intrusions; crystalline limestones and marbles; serpentinous marbles; steatite masses; beds of jaspers and massive beds of iron and manganese oxides.

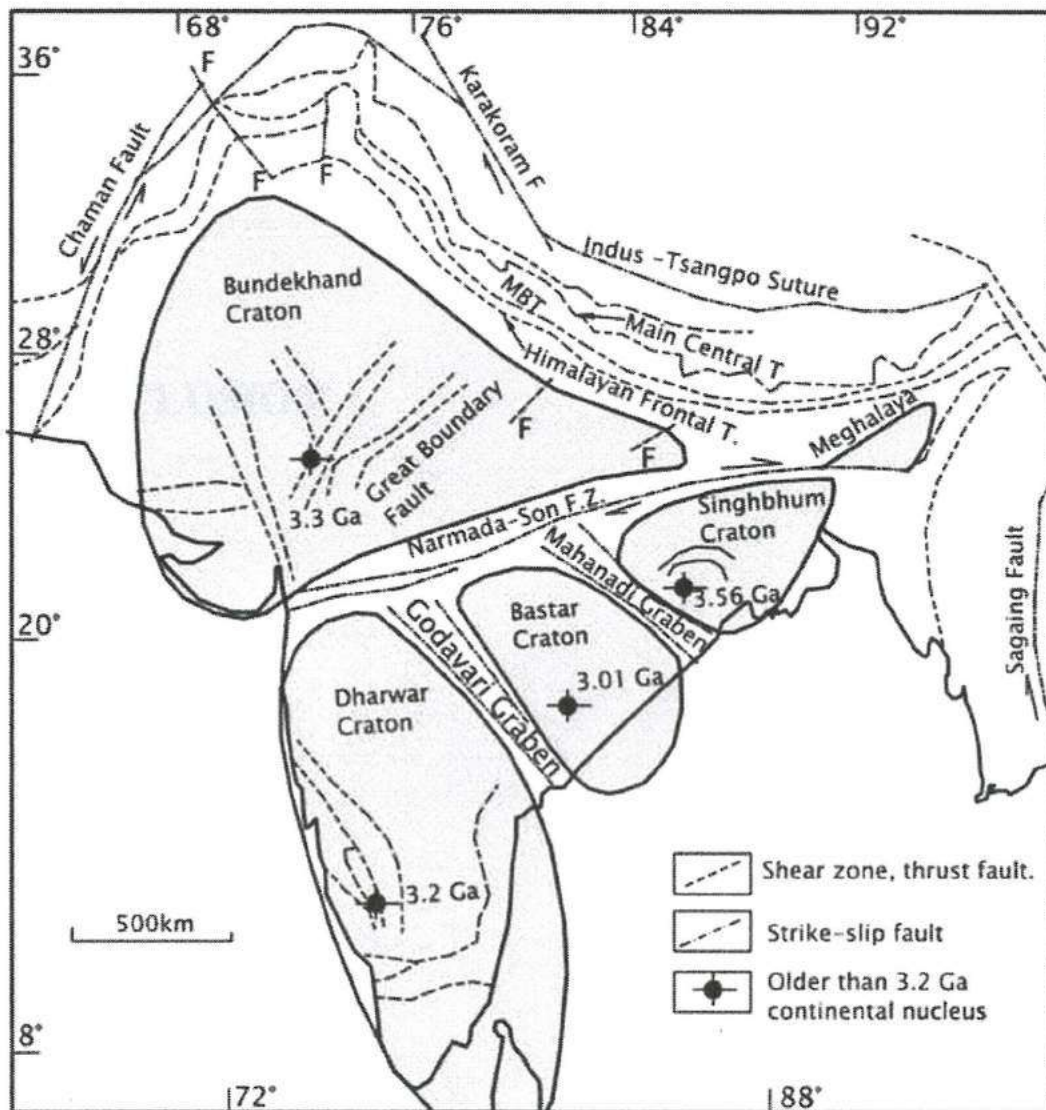


Figure 3 - Indian Cratons

  
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 ARMORI, Distt.Gadchiroli



## 7. CONCLUSION

- a. The cratons are the important geological features representing the remnants of old crust.
- b. The cratons also aid in the studies of mantle petrology.
- c. The spatial distribution of the cratons over the world supports the theory of one ancient continent.

  
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**M.Sc.**  
**Geology**  
**Project Work**

**A CASE STUDY ON MINEROLOGY &  
PETROLOGY IN AND AROUND DEWULGAON AREA,  
ARMORI TAHSIL, GADCHIROLI DISTRICT,  
MAHARASHTRA**

A Dissertation Thesis Submitted to  
Gondwana University, Gadchiroli  
As a part fulfillment for the award of  
The Degree of

*Master of Science in Geology*

Under The  
Faculty of science & Technology  
Submitted By

***Rohit A. Bawane***

M. sc. Final Year (Geology)

Supervisor  
***Dr. C.P. Dorlikar***  
Department of Geology



**POST GRADUATE DEPARTMENT OF GEOLOGY  
MAHATMA GANDHI ARTS, SCIENCE & LATE N. P.  
COMMERCE COLLEGE  
ARMORI. DIST. GADCHIROLI (M.S.) 441208  
2021**




**POST GRADUATE DEPARTMENT OF GEOLOGY  
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***Certificate***

This is to certify that the dissertation thesis entitled  
**"A CASE STUDY ON MINEROLOGY & PETROLOGY IN AND AROUND  
DEWULGAON AREA, ARMORI TAHSIL, GADCHIROLI DISTRICT,  
MAHARASHTRA"** Being submitted here as a part – fulfillment for the award of the  
degree of **Master of Science in Geology, Faculty of Science, Mahatma Gandhi Arts,  
Science & Late N. P. Commerce College Gondwana University, Gadchiroli, embodies  
result of the bonafide research and field work carried out by Rohit A. Bawane , during  
2021-21.**

I further certify that work has not formed the basis for the award of any such  
degree, diploma or other title earlier.

  
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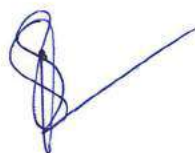
Date: 12/7/2021  
Place: Armori

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## CHAPTER - 1

### INTRODUCTION

#### 1.1 Purpose and Scope of Dissertation

Present Dissertation work is a part - fulfillment of the Degree of Master of Science in Geology, Faculty of science, Mahatma Gandhi Arts, Science & Late N. P. Commerce College Gondwana University, Gadchiroli. The scope of Dissertation work is limited to geological field mapping, collection of samples of rocks and minerals, preparation and analysis of these samples and their interpretation.

#### 1.2 Aim and Objective

The Dissertation work is aimed at study iron ore Hill study occurring in the Dewulgaon area using Mineralogical & Petrological study.

To collect the representative rock samples from the study area and prepare their thin section for Petrological studies.

To interpret the geological history of the area on the basis of field and Petrographic characteristics.

To correlate the geology of the study area in the regional stratigraphic and tectonic framework.

To write a technical report using result of the above work.

#### 1.3 Location and Accessibility

The area under study comprises Dewulgaon (Latitude  $N20^{\circ}23'42.93''$  & Longitude  $E79^{\circ}59'33.35''$ ) covering Parts of Armori tahshil of Gadchiroli District of Maharashtra. The study area is included in the Toposheet No 55P/15.of Survey of India. Dewulgaon is a small village in which is Armori Tahshil, situated towards NE of Gadchoroli at a distance of 28 kms. It can be approached by metalled road.



## 1.4 Methodology

The Dissertation work was carried out as per the Methodology outline below

Collection and study of the published literature.

Detailed mapping and sampling of the metabasalt occurring in the area.

Preparation of thin section of the collected Rock samples.

Microscopic study of thin sections.

Fieldwork was carried out by the author during 17<sup>th</sup> June to 20<sup>th</sup> June 2021.

**Following equipments are used for field study.**

Toposheet No.55 P/15 ,Brunton compass, Geological hammer, Coloured Pensil, Acid bottle, Magnifying hand lens, Sample bag , Marker pen, Measuring tape

## 1.5 Climate

The area experiences tropical monsoon climate. It receives good rainfall, the average rainfall being 125 to 150 cm/year. Rainy season starts from June and continuous till September. Winter season is between February and may; summer temperature rises up to  $-45^{\circ}\text{C}$  whereas the winter temperature goes down to  $-7^{\circ}\text{C}$ .

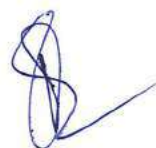
On the whole, the area shows high variation in temperature with hot summer and cold winter and average relative humidity of about 62%.

## 1.6 Soil

The study area having the soil is generally reddish in colour, formed by the alteration of granite gneiss and other metamorphic rocks underlying this region.

## 1.7 Vegetation

Mostly eighty percent of the area is covered with dense forest. The reserved forest of this area comes under Waada division forest range containing deciduous type of vegetation . Most commonly occurring trees are Saag, Tendu, Neem, Peepal, Palas , Teak etc. Dendulation hills and low relief hills mostly covered by vegetation.



## 1.8 Morphology and Drainage

Geologically the district contains almost all the geological formations except Deccan Trap. The area forms an undulating plain with small hillocks towards NW side of the study area. The highest elevation of area is 300 meter whereas lowest contour is at 210 meter.

The area is mainly drained by wainganga river and her tributaries; overall drainage pattern in the area is sub-dendritic to dendritic.

This river flows during monsoon but get dried during summer except for small ponds. Wainganga river is joined by Khobragadi and Gadhvi rivers near Awalgoan. this rivers flow in the NW-SW direction along a lineaments passing through the area.

## 1.9 Previous work

Dr. L. I. Fermor 1930-31 gave a detailed account to The Sausar group and Sakoli group with their characteristic mineralogical differences. According to him the rocks of less metamorphosed sakoli group of Bhandara, Chandrapur, and Gadchiroli show chlorite as a pre-dominant constituent biotite is rare and feldspar is commonly absent. Other characteristic features such as intrusive nature of Quartz vein, grade of metamorphism were also discussed by him.

The stratigraphic classification for the rocks of the south western part of sakoli belt was proposed Roy and Handyopadhyay (1989).

The area under study which is the small part of the Sakoli fold Belt (SFB) was studied by Bhaskar (1983); Deshpande (1998); Huin and Money (1995) and Yedekar (1994).



## Chapter -5

### SUMMARY

- \* Iron is the second most abundant metallic element in the Earth's crust and accounts for 5.6% of the lithosphere.
- \* It is the basic raw material for iron and steel industry. Steel is an alloy that consists mostly of iron and has carbon content between 0.2% and 2.1% by weight, depending on the grade.
- \* The principal minerals of iron are the oxides (Haematite and Magnetite), hydroxide (limonite and goethite), carbonate (siderite) and sulphide (pyrite).
- \* The haematite and magnetite type are associated with banded iron formations (BIF).
- \* The larger and rich iron ore deposits are mainly concentrated in Jharkhand, Orissa, Chhattisgarh, Karnataka and Goa.
- \* Comparatively small deposits are situated in Maharashtra, Andhra Pradesh, Tamil Nadu, Kerala and Rajasthan.
- \* Iron ore is used mainly for making pig iron, sponge iron and steel. Iron and steel together form the largest manufactured products in the world and each of them enters into every branch of industry and is a necessary factor in every phase of our modern civilization.
- \* It is used widely in the construction of roads, railways, other infrastructure, appliances, and buildings.
- \* Most large modern structures, such as stadiums and skyscrapers, bridges, and airports, are supported by a steel skeleton.



**M.Sc.**  
**Geology**  
**Project Work**

**A  
PROJECT  
ON  
“A BRIEF REVIEW OVER DYKE SYSTEMS”**



**SUBMITTEDBY**

**RUCHITA C. DHORE**

**GUIDEDBY**

**Dr. C. P. DORLIKAR**

**P.G. DEPT. OF GEOLOGY**

**MAHATMA GANDHI ARTS, SCIENCE & LATE  
NASARUDDINBHAI PANJAWANI COMMERCE COLLEGE,  
ARMORI  
2020-21**

## CERTIFICATE

This is certified that **Ruchita C. Dhore** has carried out project work on “**A Brief Review over Dyke Systems**” under the supervision of **Dr. C. P. Dorlikar** for the partial fulfillment of the Post-Graduate degree in Geology. She has carried out project work in laboratory of the Post Graduate Department of Geology, M. G. Arts, Science & Late N. P. Commerce College Armori, affiliated to Gondwana University, Gadchiroli.


She has fulfilled all the necessary requirements of the regulation related to the prescribed period of work as per rules required under the ordinance related to the Post-Graduation in Post Graduate Department of Geology, M. G. Arts, Science & Late N. P. Commerce College Armori, affiliated to Gondwana University, Gadchiroli.

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*Dr. C. P. Dorlikar*

External Examiner  
*Dr. H. W. Khandare*

  
Principal  
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Science & Late  
N. P. Commerce College,  
Armori, Dist - Gadchiroli



## Declaration

I hereby declare that the project report entitled “**A Brief Review over Dyke Systems**” submitted for fulfillment of Post-Graduation degree in Geology at Post Graduate Department of Geology, M. G. Arts, Science & Late N. P. Commerce College Armori, affiliated to Gondwana University have been carried out by me under the guidance of **Dr. C. P. Dorlikar**.

I further declared that this project report work or any part thereof has not been previously submitted for any degree in any other university.

Date:

Place: *Armori*

*Dhore.*

**Ruchita C. Dhore**

  
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## 1. INTRODUCTION

Present dissertation is a part fulfillment of the degree of Master of Science in Geology in Faculties of Science of M. G. College Armori, Gondwana University, "A Brief Review over Dyke Systems" is chosen by candidate for dissertation. A dyke or dyke in geological usage is a sheet of rock that is formed in a fracture of a pre-existing rock body. Dykes can be either magmatic or sedimentary in origin. Magmatic dykes form when magma flows into a crack then solidifies as a sheet intrusion, either cutting across layers of rock or through a contiguous mass of rock. Clastic dykes are formed when sediment fills a pre-existing crack. They are often tabular or sheet like igneous body that is often oriented vertically or steeply inclined to the bedding of preexisting intruded rocks; similar bodies oriented parallel to the bedding of the enclosing rocks are called sills. A dyke set is composed of several parallel dykes; when the number of dykes is large, the term dyke swarm is used. Dykes have a wide range of rock compositions. They commonly have a porphyritic texture, i.e., larger crystals within a finer-grained groundmass, indicating two periods of crystallization.


Although dykes may range in size from a few centimetres to greater than 10 metres (about 33 feet) in width, they average between 0.3 and 6 metres (between about 1 and 20 feet) wide. The length of a dyke usually depends upon how far it can be traced across the surface; dykes can be up to hundreds of miles long. The

  
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## 6. CONCLUSION

- a. The dyke system aids in elucidating the crustal evolution events.
- b. They the signatures of crustal dynamics.
- c. The Indian sub-continent is a shield with Archean exposures.
- d. These are also called as cratons where igneous intrusions are traceable.
- e. The dyke systems along Deccan volcanic province, Bastar craton, Dharwar craton, etc. signifies their respective evolutionary trend.

  
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**M.Sc.**  
**Geology**  
**Project Work**

**A  
PROJECT  
ON  
“A REVIEW ON PALEONTOLOGICAL STUDIES”**



**SUBMITTED BY**

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**ARMORI**

**2020-21**

## CERTIFICATE

This is certified that **Shital K. Pardhi** has carried out project work on “**A Review on Paleontological Studies**” under the supervision of **Dr. C. P. Dorlikar** for the partial fulfillment of the Post-Graduate degree in Geology. She has carried out project work in laboratory of the Post Graduate Department of Geology, M. G. Arts, Science & Late N. P. Commerce College Armori, affiliated to Gondwana University, Gadchiroli.


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## I. INTRODUCTION of fossil org-

Present dissertation is a part fulfillment of the degree of Master of Science in Geology in Faculties of Science of M. G. College Armori, Gondwana University, "A Review on Paleontological Studies" is chosen by candidate for dissertation. Palaeontology also referred as palaeobiology, is the scientific study of life that existed prior to, and sometimes including, the start of the Holocene epoch (roughly 11,700 years before present). It includes the study of fossils to classify organisms and study their interactions with each other and their environments (their paleoecology). Paleontological observations have been documented as far back as the 5th century BCE. The science became established in the 18th century as a result of Georges Cuvier's work on comparative anatomy, and developed rapidly in the 19th century. Palaeontology lies on the border between biology and geology, but differs from archaeology in that it excludes the study of anatomically modern humans. It now uses techniques drawn from a wide range of sciences, including biochemistry, mathematics, and engineering. Use of all these techniques has enabled palaeontologists to discover much of the evolutionary history of life, almost all the way back to when Earth became capable of supporting life, almost 4 billion years ago.<sup>[2]</sup> As knowledge has increased, palaeontology has developed specialised sub-divisions, some of which

  
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1

## 6. CONCLUSION

- a. The paleontological studies are the key players in the past environmental studies.
- b. The correlation efficiency of these studies is very high.
- c. The stratigraphic implications of paleontological studies are inevitable.
- d. The implications of paleontology can be seen in many sectors like palaeoclimate, palaeogenetic, etc.

  
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**M.Sc.**  
**Geology**  
**Project Work**

A  
PROJECT  
ON

**“A REVIEW ON GEOCHEMICAL SAMPLING TECHNIQUES”**



**SUBMITTED BY**

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**2020-21**



## CERTIFICATE

This is certified that **Shivali D. Barsagade** has carried out project work on “**A Review on Geochemical Sampling Techniques**” under the supervision of **Prof. P. S. Ganvir** for the partial fulfillment of the Post-Graduate degree in Geology. She has carried out project work in laboratory of the Post Graduate Department of Geology, M. G. Arts, Science & Late N. P. Commerce College Armori, affiliated to Gondwana University, Gadchiroli.

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## 1. INTRODUCTION

Present Study is focused on the review of Geo-chemical sampling techniques, which are the prerequisites for the geochemical studies. Geochemistry is the science that uses the tools and principles of chemistry to explain the mechanisms behind major geological systems such as the Earth's crust and its oceans. The realm of geochemistry extends beyond the Earth, encompassing the entire Solar System, and has made important contributions to the understanding of a number of processes including mantle convection, the formation of planets and the origins of granite and basalt. It is an integrated field of chemistry and geology.

Geochemical sampling is taking a small portion of Earth's material for finding its mineralogy, composition and grade such that it represents the whole area. Geochemical sampling is the basic technique used for the exploration of minerals and their ores. Geochemical exploration is any method of mineral or petroleum exploration that utilizes systematic measurements of one or more chemical properties of a naturally occurring material. The materials analyzed most commonly are rock, soil, stream and lake sediment, natural waters, vegetation and soil air. Analytical methods include all common and many special fields of inorganic and organic geochemistry and mineralogy. The samples originate from many parts of

  
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## 7. CONCLUSION

- a. The geochemistry of any area (leaching of elements into environment) can be accessed by geochemical sampling.
- b. The geochemical sampling is an efficient method in ore exploration.
- c. Depending upon the ore migration the sampling techniques can be selected.
- d. The geochemical sampling can use only after the preliminary investigation of the study area.

  
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**M.Sc.**  
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**Project Work**

**A  
PROJECT  
ON  
“A REVIEW ON ENVIRONMENTAL HAZARDS”**



**SUBMITTEDBY**

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## CERTIFICATE

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## I. INTRODUCTION

Present dissertation is a part fulfillment of the degree of Master of Science in Geology in Faculties of Science of M. G. College Armori, Gondwana University, "A Review on Environmental Hazards" is chosen by candidate for dissertation. A natural hazard is a natural phenomenon that might have a negative effect on humans and other animals, or the environment. Natural hazard events can be classified into two broad categories: geophysical and biological. An example of the distinction between a natural hazard and a disaster is that an earthquake is the hazard which caused the 1906 San Francisco earthquake disaster. Natural hazards can be provoked or affected by anthropogenic processes, e.g. land-use change, drainage and construction.

An environmental hazard is a type of hazard resulting from chemical, biological, or physical agents either from ongoing or previous human activity or the hazard may be a property present in the natural environment. This type of hazard poses a risk to either human health or to the natural environment. There are 3 categories in the environmental hazard;

- physical,
- chemical,
- biological, and
- cultural

  
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#### 4. TYPES OF ENVIRONMENTAL HAZARDS

##### Physical


A physical hazard is a type of occupational hazard that involves environmental hazards that can cause harm with or without contact, for examples;

- Earthquake

An earthquake (also known as a quake, tremor or temblor) is the shaking of the surface of the Earth resulting from a sudden release of energy in the Earth's lithosphere that creates seismic waves. Earthquakes can range in size from those that are so weak that they cannot be felt to those violent enough to propel objects and people into the air, and wreak destruction across entire cities.



Figure 1 - Earthquake consequences

  
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## 6. CONCLUSION

- a. The environmental hazards are of both natural and anthropogenic origin.
- b. The effects of them are severe and grave for human health.
- c. The physical hazards are mostly of natural origin; whereas rest has much share in anthropogenic origin.
- d. The well planned polices are the most important steps for the mitigations of the environmental hazards.

  
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**M.Sc.**  
**Geology**  
**Project Work**

**A  
PROJECT  
ON  
“A REVIEW ON ENVIRONMENTAL HAZARDS”**



**SUBMITTEDBY**

**SHRADDHA D. SAMARTH**

**GUIDEDBY**

**Dr. C. P. DORLIKAR**

**P.G. DEPT. OF GEOLOGY**

**MAHATMA GANDHI ARTS, SCIENCE & LATE**

**NASARUDDINBHAI PANJAWANI COMMERCE COLLEGE,**

**ARMORI**

**2020-21**




## CERTIFICATE

This is certified that **Shraddha D. Samarth** has carried out project work on "A Review on Environmental Hazards" under the supervision of **Dr. C. P. Dorlikar** for the partial fulfillment of the Post-Graduate degree in Geology. She has carried out project work in laboratory of the Post Graduate Department of Geology, M. G. Arts, Science & Late N. P. Commerce College Armori, affiliated to Gondwana University, Gadchiroli.


She has fulfilled all the necessary requirements of the regulation related to the prescribed period of work as per rules required under the ordinance related to the Post-Graduation in Post Graduate Department of Geology, M. G. Arts, Science & Late N. P. Commerce College Armori, affiliated to Gondwana University, Gadchiroli.

Place- Armori

Date-

  
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Late N. P. Commerce College  
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Dr. C. P. Dorlikar  
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This is certified that **Shraddha D. Samarth** has carried out project work on "**A Review on Environmental Hazards**" under the supervision of **Dr. C. P. Dorlikar** for the partial fulfillment of the Post-Graduate degree in Geology. She has carried out project work in laboratory of the Department of Geology, M. G. Arts, Science & Late N. P. Commerce College Armori, affiliated to Gondwana University, Gadchiroli.

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Internal Examiner

External Examiner



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## 1. INTRODUCTION


Present dissertation is a part fulfillment of the degree of Master of Science in Geology in Faculties of Science of M. G. College Armori, Gondwana University,

**"A Review on Environmental Hazards"** is chosen by candidate for dissertation.

A natural hazard is a natural phenomenon that might have a negative effect on humans and other animals, or the environment. Natural hazard events can be classified into two broad categories: geophysical and biological. An example of the distinction between a natural hazard and a disaster is that an earthquake is the hazard which caused the 1906 San Francisco earthquake disaster. Natural hazards can be provoked or affected by anthropogenic processes, e.g. land-use change, drainage and construction.

An environmental hazard is a type of hazard resulting from chemical, biological, or physical agents either from ongoing or previous human activity or the hazard may be a property present in the natural environment. This type of hazard poses a risk to either human health or to the natural environment. There are 3 categories in the environmental hazard;

- physical,
- chemical,
- biological, and
- cultural

  
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## 6. CONCLUSION

- a. The environmental hazards are of both natural and anthropogenic origin.
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- d. The well planned polices are the most important steps for the mitigations of the environmental hazards.

  
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**M.Sc.**  
**Geology**  
**Project Work**

**A  
PROJECT  
ON  
"A REVIEW ON GROUNDWATER CONDITIONS AROUND  
WADSA TALUKA IN GADCHIROLI DISTRICT, MAHARASHTRA"**



**SUBMITTEDBY**

**TRUPTI J. KAR**

**GUIDEDBY**

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She has fulfilled all the necessary requirements of the regulation related to the prescribed period of work as per rules required under the ordinance related to the Post-Graduation in Post Graduate Department of Geology, M. G. Arts, Science & Late N. P. Commerce College Armori, affiliated to Gondwana University, Gadchiroli.

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Date- 10/07/2024

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## 1. INTRODUCTION

Present dissertation is a part fulfillment of the degree of Master of Science in Geology in Faculties of Science of M. G. College Armori, Gondwana University, "A Review on Groundwater Conditions around Wadsa Taluka in Gadchiroli District, Maharashtra" is chosen by candidate for dissertation. Groundwater is fresh water (from rain or melting ice and snow) that soaks into the soil and is stored in the tiny spaces (pores) between rocks and particles of soil. Groundwater accounts for nearly 95 percent of the nation's fresh water resources. India is the largest user of groundwater in the world. It uses an estimated 230 cubic kilometers of groundwater per year - over a quarter of the global total. More than 60% of irrigated agriculture and 85% of drinking water supplies are dependent on groundwater. Groundwater, which is in aquifers below the surface of the Earth, is one of the Nation's most important natural resources. Width represents population. Due to growing water-intensive crops like paddy, Punjab and Haryana use groundwater for flood irrigation. With the state's arid climate, groundwater overexploitation has affected majority of Rajasthan's population. It often takes more work and costs more to access groundwater as opposed to surface water, but where there is little water on the land surface, groundwater can supply the water needs of people. The Gadchiroli district is situated in the easternmost parts of

  
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## 7. CONCLUSION

- a. The groundwater level in the Wadsa taluka is at moderate level and deeps in during summer.
- b. The groundwater level varies within different aquifer and among different seasons.
- c. The weathered Granite-Schist and Sandstone rock is the chief aquifer in the Wadsa taluka.
- d. The groundwater is suitable for drinking and domestic purpose.
- e. The Wadsa taluka has the lowest contribution in the stage of groundwater development in the Gadchiroli district.

  
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**M.Sc.**  
**Chemistry**  
**Project Work**

*A PROJECT REPORT  
ON*

**“ANALYSIS OF VARIOUS CONTENT OF DIFFERENT  
COLD DRINK- AVAILABLE IN ARMORI MARKET”**

*A Project Report*

*Submitted to the*

**MAHATMA GANDHI ARTS, SCIENCE & LATE N.  
P. COMMERCE COLLEGE, ARMORI**

*Affiliate to*

**GONDWANA UNIVERSITY, GADCHIROLI**



**For the degree of  
Master of Science (Chemistry)**

**By**

**Mr. Aditya Maroti Bagmare**

*(M.Sc. Chemistry Sem-IV)*

*Under the Supervision of*

**DR. SATISH S. KOLA**

*Assistant Professor  
Dept. of Chemistry*

**DR. NARESH D. BANSOD**

*Assistant Professor  
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**PROF. S. M. SONTAKKE**

*Head of Dept. of Chemistry*

**P.G. DEPARTMENT OF CHEMISTRY**

**MAHATMA GANDHI ARTS, SCIENCE & LATE N. P.  
COMMERCE COLLEGE, ARMORI**

**(2020- 2021)**



## DECLARATION

I declare that this project work on “**Analysis of various content of different coldrink- available in armor market.**” Was done by me in Department of Chemistry, M. G. Arts Science and Late. N. P. Commerce College, Armori during the academic session 2020-21. This project has not been submitted earlier to any university or institution for the award of any diploma or a degree.

Date: 28/07/21

Place : Armori

*ABagmare*

**Mr. Aditya Maroti Bagmare**

*(M.Sc. chem Sem- IV)*



## CERTIFICATE

This is certify that dissertation entitled on "Analysis of various content of different coldrink- available in armori market" is a bonafide research work done by **Mr. Aditya Maroti Bagmare** under the supervision of the Department of Chemistry of M. G. Arts Science and Late. N. P. Commerce College, Armori and the same has not been submitted elsewhere for any degree.

Date: 28/07/21

Place: Armori

  
28/07/21

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# “Analysis of various content of different Coldrink- available in Armori market”

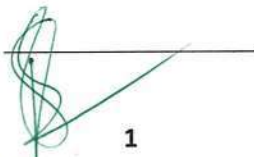
## Introduction:-

We all love to have a sip of our favorite soft drinks (aka cold drinks, carbonated water or just soda water) when we are thirsty, especially in summers. And we also love to have a little fizz in it. This fizz is the bubbly effervescence that is produced by adding pressurized carbon dioxide gas to water. The aim of this project is to highlight the composition of cold drinks, the purpose of uses of its ingredients and their impact on human health and the chemistry behind these effects.

Joseph Priestley was the first person to invent soda water. He suspended a bowl of water over a beer vat in a brewery and patiently waited to see what happened. Soon the bowl of water was fizzing with carbon dioxide released from the fermentation of beer. And that was how soda water was born. However, it was only in the later part of the 19th century that soda water was introduced as a popular soft drink. Today, soda water is made by sending pressurized carbon dioxide through water. The high pressure allows more carbon dioxide to dissolve than it would normally be possible. The soda is then packed into an airtight bottle. When this pressurized bottle is opened, the gas rises to the top bubbling. And if you shake the bottle before opening, the soda will spill out splashing all over, when opened.

The era of cold drinks/soft drinks began in early 1950s but as this industry was quite luring as well as profitable, many multinational companies launched their products in different flavours with various brand names such as Sprite, 7up, Pepsi, Coka cola, Mountain Dew, Fanta, Miranda, etc. People take these drinks according to their temperaments and moods, e.g. it is generally believed that Miranda, Fanta and especially Sprite give a feeling of lightness where as Pepsi & Coka Cola activate pulse and brain.

Often a distinction is made between a soft drinks and a cold drink. A soft drink is a non-alcoholic drink which may or may not include fizzy drinks. Examples of such drinks include lemonade or fruit juices. Whereas, the cold drinks (pepsi, Miranda, Fanta, spirite, etc) are majorly composed of alcohol, carbohydrates, carbon dioxide, phosphate ions, sodium benzoate, acesulfame potassium (Ace-K) and caffeine. These ingredients are responsible for the feeling of warmth, lightness and tangy taste which is liked by everyone. But unfortunately, these soft / cold drinks not only provide taste and a little energy but also cause some severe effect on our health which most probably we forget when we take such drinks.



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## HISTORY OF SOFT DRINK CONSUMPTION

The category of soft drinks falls under consumer goods. Soft drinks tend to be non durable and do not last for over 3 years. As non durables' it has relative price stability in comparison to durable goods.

This history of soft drink has not been traced by scholarly research at present. However preliminary inquiry and investigation of soft drink consumption patterns in human history has revealed that —Soft drinks (may have) first appeared in seventeenth-century Europe as a mixture of water and lemon juice sweetened with honey. In 1676, the Paris-based Compagnie de Limonadiers was founded and granted a monopoly by the French monarchy. Company vendors dispensed cups of lemonade from tank packs on their backs. The first carbonated beverages, which also debuted in Europe, were inspired by the popularity of effervescent water from natural springs, which were widely thought to have medicinal value.11

Many believe that Joseph Priestley was the founder of soft drink manufacturing. He was among the first who experimented with carbon dioxide gas from brewery fermenting vats. In 1772, he invented a small carbonating apparatus in London that pumped carbon dioxide into water.

Mineral salts and flavors were later added as the appeal of soft drinks spread.

Today the soft drink industry is among the most dominant industries in the world. Valuation of the industry differs according to organizations/firms but it is undoubted that the Mineral Waters, Soft Drinks, Fruit and Vegetable Juices industry has a substantial demand around the world. For example the Soft Drink Concentrates Market was estimated to be \$25,500.00 million in 2013, and is projected to reach \$34,761.36 million by 2019.2

However this does not mean that soft drink consumption has remained uniform or static throughout the world. Soft drink consumption varies widely by region and by culture. As a result, consumption does not necessarily coincide closely with population or economic development.



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## **Conclusion:-**

After conducting several tests, it was concluded that the different brands of cold drinks namely 1. Slice 2. Coca cola 3. Sprite 4. Mountain dew 5. Fanta All contains glucose, alcohol, sucrose, phosphate, ions and carbon dioxide. All are acidic in nature. On comparing the pH value of different brands coca cola is most acidic and limca is least acidic of all the four brands taken. pH value of coca cola is nearly equal to disinfectant which is harmful for body.

Carbon Dioxide Among the four samples of cold drinks taken –sprite has maximum amount of dissolved carbon dioxide and Fanta has minimum amount of dissolved carbon dioxide.

### **A. Disadvantages of cold drinks:-**

- Soft drinks are little more harmful than sugar solution. As they contain sugar in large amount which cause “diabetes”.
- Soft drinks can cause weight gain as they interfere with the body’s natural ability to suppress hunger feeling.
- Soft drinks have ability to dissolve the calcium so they are also harmful for our bones. Soft drinks contain “phosphoric acid” So they can dissolve a nail in about 4 days.
- Soft drinks have also ability to remove blood stains.

### **B. Uses of cold drinks:-**

- Cold drinks can be used as toilet cleaners.
- They can remove rust spots from chromecar humpers.
- They clean corrosion from car battery terminals.
- Soft drinks are used as an excellent ‘detergent’ to remove grease from clothes. They can lose a rusted bolt.




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### Discussion:-

A vast amount of laboratory research has been carried out on the effects of carbonated beverages in relation to dental caries and erosion,<sup>15</sup> but very much less has been done on humans and there is a paucity of data. Hence, a randomized comparative clinical trial was done to know the salivary pH changes and buffering capacity of saliva after consumption of cold drink, mixed fruit juice in children. In the present study glass combination electrode was used for assessing salivary pH as it is an established, sensitive and accurate methodology. Usually various colorimetric methods have been employed to determine the pH of saliva. The electronic method with the glass electrode is preferable because of its accuracy.<sup>16</sup> In the present study there were two groups, cold drink & fruit juice. Our study showed a drop in salivary pH after consuming cold drink and fruit juice with more drop in pH in juice group when compared to cold drink users. In the present study, there was a drop in mean salivary pH immediately after consuming cold drinks to  $5.47 \pm 0.78$  from baseline pH  $6.99 \pm 0.36$ . There was a slight increase in the pH after 5 minutes ( $6.52 \pm 0.54$ ) and decrease in pH after 10 minutes ( $6.46 \pm 0.53$ ). After 20 minutes the pH started to rise ( $6.54 \pm 0.46$ ) and a sustained rise was seen after 30 minutes ( $6.86 \pm 0.45$ ) trying to bring back to baseline pH. The time variations with salivary pH were found to statistically significant. When pairwise comparisons were done there was a significant difference obtained in between all the timings except between 5 and 10, 15 minutes as well as between 10 minutes and 15 minutes. The carbonated beverages contain phosphoric acid, citric acid and maleic acid<sup>21</sup> which may be the reason for decreased salivary pH as shown in this study and enamel demineralization resulting in dental erosion. Presence of acids in the carbonated beverage would have caused the immediate decrease in salivary pH which may have rendered the buffering capacity of saliva to be slow. The present study showed a drastic drop ( $4.89 \pm 0.97$ ) in salivary pH from baseline ( $6.97 \pm 0.39$ ) immediately after consumption of mixed fruit juice. After 5 minutes the pH recovered ( $6.35 \pm 1.07$ ) and this recovery was sustained throughout from 10, 20 and 30 min ( $6.43 \pm 0.53$ ,  $6.59 \pm 0.51$  and  $6.87 \pm 0.46$  respectively). The time variations with salivary pH showed a significant difference ( $df = 5$ ,  $F = 59.599$ ,  $p = < 0.001$ ,  $S$ ). Pair wise comparisons showed a significant variation in between all-time intervals except baseline to 30 minutes and 5 minutes to 10, 15 minutes.



  
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**M.Sc.**  
**Chemistry**  
**Project Work**

***“ To Study Different Parameter of Soil Nearby  
Armori Villages of Gadchiroli District,  
Maharashtra ”***

**A Project Report**

Submitted to the

**Gondwana University Gadchiroli**

For the degree of

Master of Science (Chemistry)

Submitted By

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M.Sc. Chemistry Final Year

Under the **Supervision** of

**Dr. Satish S. Kola**

**Dr. Naresh D. Bansod**

**Prof. S.M. Sontakke**

**P.G. Department of Chemistry**

**M.G. Arts, Science & Late. N.P. Commerce**

**College Armori**

**2020-21**





# Certificate

This is to certify that **Mr. Ankit Deora Jawanjalkar** has carried out his project work on the topic entitled "To Study Different Parameter of Soil Nearby Armori Villages of Gadchiroli District, Maharashtra" during the academic session 2020-21 under my supervision in the Post Graduate Department of Chemistry, **M.G. Arts Science and Late. N.P. Commerce College Armori** This research work presented in this project is own work of the candidate.

Armori

Date: 04/05/2021

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**ENDORSEMENT BY THE HOD/ PRINCIPAL/ CO-  
ORDINATOR OF THE INSTITUTION**

This is to certify that dissertation entitled "To Study Different Parameter of Soil  
Nearby Armori Villages of Gadchiroli District, Maharashtra" is a bonafide  
research work done by **Mr. Ankit Deorao Jawanjalkar** under the guidance of  
Professor **Dr. Satish S. Kola** and **Dr. Naresh D. Bansod**



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Place:- Armori

Date:- 04/08/2021

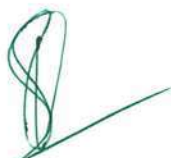


**HOD/Co-Ordinator**  
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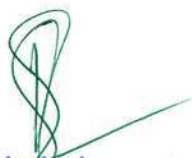


## Introduction

Soil carbon is an important attribute of soil quality and its productivity. The soil quality is defined as, “the capacity of a soil to function, within ecosystem boundaries, to sustain biological productivity, improve environmental quality and support human and plant health”. Soil quality cannot be measured directly but inferred indirectly by measuring soil physical and chemical properties which serve as quality indicators (Diack, M. 2001). However, soil properties do have different degrees of influence on soil quality. The soil's native ability to supply sufficient nutrients has decreased with higher plant productivity levels associated with increased human demand for food.

Therefore one of the greatest challenges today is to develop and implement soil, crop and nutrients management technologies that enhance the plant productivity and the quality of soil, water and air. If we do not improve the production capacity of our fragile soils, we cannot continue to support the food and fiber demands of our growing population. (Havlin J.L., 2010). Soil organic matter is not only important for maintenance of the soil physical conditions but it also supplies essential plant nutrients for successful crop production.

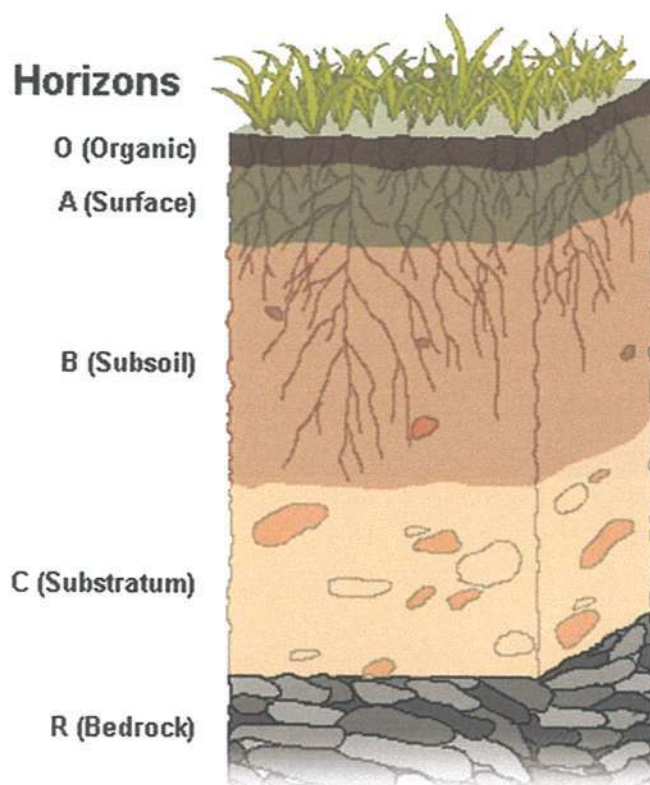
Soil characterization in relation to evaluation of fertility status of the soils of an area is an important aspect in context of sustainable agricultural production (Singh and Mishra, 2012). Periodic assessment of important soil physical, chemical and biological properties and their responses to changes in land management is necessary to apply appropriate agricultural Technologies and effective design of soil fertility management techniques; and to improve and maintain fertility and productivity of soil (Wakene N. and Heluf G., 2003).



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Soil is the most important feature of Physiography, the formation of which largely depends upon the topography rock types and drainage. The cropping pattern in the area is governed by the thickness of soil mantle, its texture and constancy. The soils of Gadchiroli district are of various types. Each type covering a well-defined tract which displays cropping pattern of totally different level. The soils occurring in the Wardha and the Waingangā valleys are generally most fertile he predominant soil cover in the district is clay, clay-gravel, sandy loam, deep black soil, reddish & yellowish brown soils on hill slopes, brown & gray soils of plains and Laterite & lateritic soil.



  
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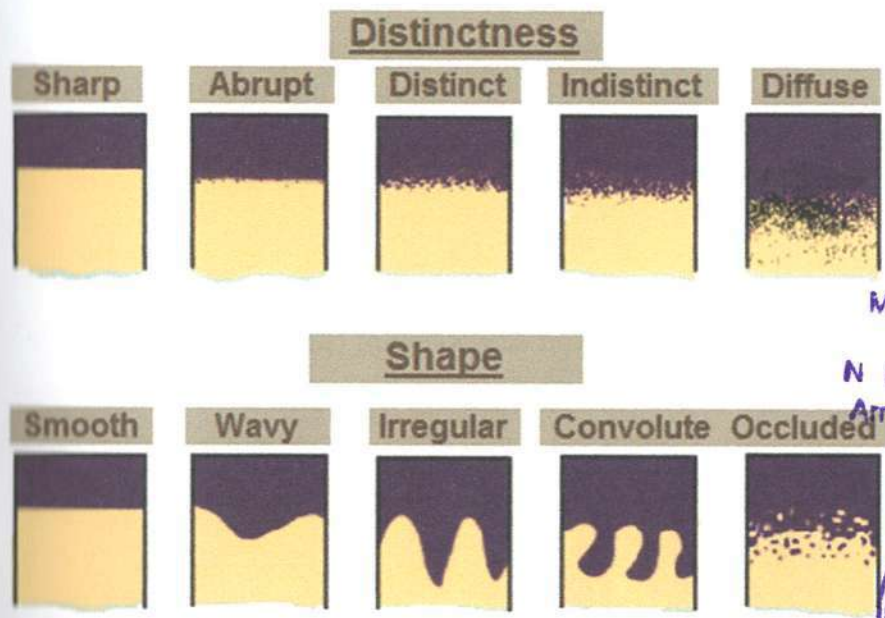


Soil horizons are layers within the soil profile and are approximately parallel to the ground surface. A soil profile is made up of several horizons and each is distinguished from the horizon above or below by being different in one or more characteristics. These differences include colour, texture, structure, consistence, and coatings. (see Hamilton Ash picture)

Soil horizons are usually given letter codes (horizon notation) to identify the type of horizon. For example, the topsoil is referred to as the A horizon and subsoil horizons are referred to as B horizons. C horizons are those which have been slightly altered by soil forming processes and generally occur deep in the soil. Other horizon notations include R for rock, O for organic material such as leaves or peat, and E for a layer leached of organic matter, iron or clay.

Each of these horizon notations can be made more specific by adding additional codes. E.g. Oh is an organic horizon of strongly decomposed material, Bt is a B horizon containing clay translocated from the horizon above,

Bg is a pale wet horizon with at least 2 % mottles.



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### Conclusions:

Soil organic carbon, pH, electrical conductivity and calcium carbonate of soil were analyzed for ten samples of Armori tehsil of Gadchiroli District. For organic carbon, four samples found in low range, three samples found in middle range and three samples in high range in study area. The variation of pH range from 6.11 to 7.27, the variation of electrical conductivity range from 0.06 to 0.14 and the variation of calcium carbonate ranges from 0.24% to 0.73%.

The correlation in between organic carbon with pH of paddy field soil of Armori tehsil showed that low positive correlation ( $r = 0.317^*$ ), The result is not significant at  $p < 0.05$ . The correlation in between organic carbon with EC showed that, Low negative correlation ( $r = - 0.052^*$ ), the result is not significant at  $p < 0.05$ . The correlation in between organic carbon with  $\text{CaCO}_3$  showed that, high negative correlation ( $r = 0.969^*$ ), the result is significant at  $p < 0.0$

  
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**M.Sc.**  
**Chemistry**  
**Project Work**

**“A REVIEWE OF SOME HETEROCYCLIC MOIETY  
AND ITS BIOLOGICAL APPLICATIONS”**

**A Project report**

submitted to the

**GONDWANA UNIVERSITY, GADCHIROLI**

For the degree of

Master of Science (Chemistry)

By

**Mr. Ashish Baburao Wankar**

M.Sc. Chem. Sem-IV Student

Under the **Supervision of**

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**2020-2021**



## CERTIFICATE

This is to certify that the work presented in this project entitled “**A REVIEWE OF SOME HETEROCYCLIC MOIETY AND ITS BIOLOGICAL APPLICATIONS**” is an own work of **Mr. Ashish B. Wankar** performed at M.G. Arts, Science & Late. N.P. Commerce College Armori for the partial fulfillment of degree of Master of Science in Chemistry in the faculty of Science under my supervision. To the best of my knowledge, this work has been not submitted earlier to any University or Institution for the award of any diploma or degree.

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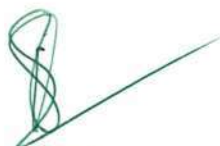
  
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II

## ACKNOWLEDGEMENT

I would like to express my deep and sincere gratitude to my supervisor, **Dr. Satish S. Kola** for his valuable and inspiring guidance throughout the course of my research work.

I wish to express my warm and sincere thanks to **Dr. L. S. Khalsa**, Principal, M.G. Arts, Science & Late. N.P. Commerce College Armori and **Prof. S. M. Sontakke**, Head of Department, Chemistry, M.G. Arts, Science & Late. N.P. Commerce College Armori for providing necessary laboratories facilities.

I must also express heart full thanks to **Dr. N. D. Bansod** for their valuable advice and help.

I would also like to extend my thanks to **Mr. L. Nimje** for providing timely help as well as guidance during the entire laboratory work.

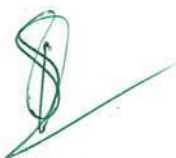
At Last, but not least I would like to extend my thanks to, almighty god, my family and all my dear friends for the whole hearted support and their kind blessings which helped me for the successful completion of this project work.



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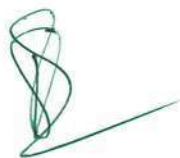


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## INTRODUCTION

Heterocyclic chemistry is a branch of chemistry that deals with the properties, synthesis and applications of heterocycles (Alvarez-Builla et al., 2011) [1]. A cyclic compound is that which contains a ring of atoms, if all the atoms in the ring are the same, the compound is homocyclic (eg cyclohexane) but if atoms of different elements are involved in the ring it is heterocyclic (eg aziridine) Daintith (2005) [2,3]. Therefore, a ring atom that is not carbon is called a heteroatom from the Greek word heteros which mean different (Bruice, 2005) [4]. Organic compounds in which one carbon is common to two rings are called spirocyclic compounds eg. spiro pentane and those for which two or more carbon atoms are common to more than one ring are called polycyclic compounds like bicyclobutane [5]. These molecules are classified as bicyclic, tricyclic, tetracyclic [6] according to the number of bond cleavages required to generate a noncyclic structure (Carey, 2000). Cyclic compounds could be saturated, that is containing no double or triple bonds (eg oxirane) or unsaturated and contain double or triple bonds (dihydropyran) (Clayden et. al., 2001) [7]. Unsaturated cyclic compounds are either aromatic (that is, are planar rings of atoms linked by alternate double and single bonds (Daintith, 2005) or nonaromatic under the following conditions [17].

- 1) The Huckel molecular orbital theory which states that, planar completely conjugated hydrocarbons will be aromatic if the ring contains  $(4n+2) \pi$  electrons where  $n$  is an integer  $n = 0, 1, 2, 3$  (Carey and Sundberg, 2007).
- 2) The Mobius aromaticity which states that,  $4n \pi$  electron annulenes consisting of planar cyclic array of  $p$ -orbitals could distribute  $\pi$ -twisting more readily without a loss in  $\pi$  electron energy (McKee et al., 2013) and for 12, 16 or 20 carbon atoms the Mobius twist results in there being one point in the ring at which the atomic orbitals have a phase reversal (node). In such systems provided the twist is small the Huckel rule is reversed and aromaticity is observed for the  $4n\pi$  electron system  $4n\pi$  electrons cannot be aromatic even though they may be cyclic, planar and conjugated and are said to be anti-aromatic as delocalization of their  $\pi$ -electrons will instead lead to destabilization (Mc Murry, 2008 & Carey and Sundberg, 2007).

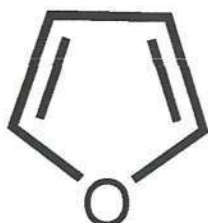
Based on these rules, conjugated heterocyclic compounds containing  $(4n+2) \pi$  electrons are aromatic (hence referred to as hetero aromatics in order to be able to recognize their heterocyclic and aromatic nature while those containing by definition an aromatic compound is a planar ring of atoms linked by alternate single and double bonds. Delocalization of the electrons of aromatic systems is a major contribution to the stabilization of these molecules and yield properties that are characteristic of aromaticity such as diamagnetic ring current. The Huckel molecular orbital theory is often used to express the relationship between a molecular orbital description of the structure and aromaticity.

There are three criteria used for evaluating aromaticity and include:-

## BIOLOGICAL APPLICATIONS

### FURAN

Furan is a five member heterocyclic organic compound with four carbon and one oxygen atom. It has formula of  $C_4H_4O$ . It is colorless, flammable, highly volatile (boiling point =  $31.4^\circ\text{C}$ ) cyclic ether found in cigarette smoke, and is used in the production of resins and lacquers [97-99], agrochemicals, and pharmaceuticals.



FURAN

Furan and its derivatives have long been known to occur in heated foods and contribute to the sensory qualities of food. However, attention has been brought to the presence of furan in a wide variety of heat processed foods (coffee, juices, soups, and canned and jarred fruits and vegetables, including baby food) by the FDA on the occurrence of the contaminant in food. The concerns over furan stem from its classification as a 'possible carcinogen to humans' (Group 2B) (IARC, 1995), and the finding that the compound causes cancer in rodents [100]. Shortly after FDA published data on furan levels in food, there was interest by the scientific and regulatory community to determine occurrence of the contaminant in different food categories, determine exposure to furan, explore the mechanisms of formation of furan, and assess methods for reducing furan levels in foods. The furan heterocycle displays a peculiar chemical character based on mixed aromatic-dienic properties. Compared with the sulfur (thiophene) and nitrogen (pyrrole) homologues, furan is the least aromatic in character [101] and thus the most dienic member of the series.

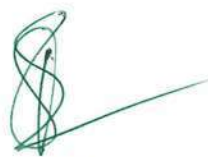
### APPLICATION OF FURAN

#### ANTI-INFLAMMATORY ACTIVITY:

Furan natural derivatives can affect immune responses in some cell lines. In this way, Jih-Jung Chen et al. isolated a new dibenzofuran, lucidafuran and some known compounds from the stems of a small endemic arboreal tree and investigated their anti-inflammatory effects. The anti-inflammatory effects of the isolated compounds were evaluated on fMet-Leu-Phe (fMLP)-induced  $O_2$  generation by human

## CONCLUSION

In the current review, it has been found out that heterocyclic moieties bears tremendous potential as biological agents especially. Their properties as drugs give a vital support in the treatment of certain dreadful diseases like cancer, CNS depressant, analgesic, cardiac disorders etc., similarly one cannot ignore the other parts like toxicity and disadvantages like side effects, creating havoc for human race. So, more extensive research has to be done in order to explore the biological application of heterocyclic compounds. Their prominent role as biological agents with minimal side effects and maximum benefits has to extend further more.



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**M.Sc.**  
**Chemistry**  
**Project Work**

***“Sampling & Analysis and Analysis of Water  
Sample of Chamorshi and Chichdoh Villages of  
Chamorshi Tahsil Dist. Gadchiroli ”***

**A Project Report**

Submitted to the

**Gondwana University Gadchiroli**

For the degree of

Master of Science (**Chemistry**)

By

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M.Sc. Chemistry Final Year

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## Background of Study Area

1) Chamorshi 2) Chichdoh village area is situated in backward tribal region of Chamorshi town. This area is well connected to district as well as Nagpur by S.H. 257 and the soil of this area is yellowish in colour and it has low water holding capacity. Most of these area has dug wells but all peoples of this area use filter plant water for drinking purpose.

1) Chamorshi 2) Chichdoh town located on the left banks of the Wainganga River, a tributary of the Pranhita River which meets the Godawari Rivers. 1) Chamorshi 2) Chichdoh is located at  $22.28^{\circ}\text{N}$ ,  $79.52^{\circ}\text{E}$ (1). It has an average elevation of 199 meters (67 ft).

The main occupation of locals people are farming and it has many rice processing mills in town and nearby area.



  
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## CONCLUSIONS

The lake water is of course not advisable for drinking as well as for washing or any other purposes. One of the reasons affecting the quality of water in the Vembanad Lake is that the waste water and industrial effluents are discharged untreated directly into the river Periyar which ends up in the Vembanad Lake, which thus pollutes the water body. This can be shown by the mass fish kill incidents occurring in the parts of Kochi like Eloor, Pathalam, etc..also the water has turned thick black in these regions. The values of the parameters are applicable to changes, according to the time of collection, because the water in Vembanad Lake is always flowing thus giving new samples every time. From the values, interestingly corporation water seems very good for drinking and other human use. The borewell of the Thevara region, from the values of the parameters is comparable to Lake water. The well water seemed a bit advisable though never will be recommended.

  
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**M.Sc.**  
**Chemistry**  
**Project Work**

***“ Comparative study and Quality Analysis of  
caffeine in various brands of tea samples Available  
in Lakhandur Market Area Dist. Bhandara ”***

**A Project Report**

Submitted to the

**Gondwana University Gadchiroli**

For the degree of

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## Comparative study and Qualitative analysis of caffeine in various brands of tea sample available in Lakhandur Market Area



### INTRODUCTION:-

Tea is the most commonly and widely used soft beverage in the household. It acts as a stimulant for central nervous system and skeletal muscles. That is why tea removes fatigue, tiredness and headache. It also increases the capacity of thinking. It is also used for lowering body temperature. The principal constituent of tea, which is responsible for all these properties, is the alkaloid-caffeine. For example some people boast their ability to drink several cups of coffee in evening and yet sleep like a long, on the other hand there are people who are so sensitive to caffeine that even a single cup of coffee will cause a response bordering on the toxic. The xanthene beverages also create a medical problem. They are dietary of a stimulant of the CNS. Often the physicians face the question whether to deny caffeine containing beverages to patients or not. In fact children are more susceptible than adults to excitation by xanthene's. After all our main stress is on the presence of caffeine in xanthene beverages and so in this project we will study and observe the quality of caffeine varying in different samples of tea. Results of this study could be used to facilitate selection of the appropriate method in order to obtain satisfactory data on caffeine content in plant

## Principle

The principle constituent of tea which is responsible for all these properties is the alkaloid caffeine. The amount of caffeine in tea leaves varies from sample to sample.

Originally it was thought caffeine is responsible for the taste and flavour of tea. But pure caffeine has been found to be tasteless. Therefore the taste and flavour of tea is due to some other substance present in it. There is a little doubt that the popularity of the xanthene's beverages depends on their stimulant action, although most people are unaware of any stimulation. The degree to which an individual is stimulated by given amount of caffeine varies from individual to individual.



  
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### Conclusion:-

The caffeine content of various tea brands varies from one tea sample to the next and depends on how the tea is brewed. Caffeine can also be measured in terms of milligrams of caffeine per grams of dry tea. A teaspoon of dry tea leaves tends to weigh around 2.5 grams the amount usually used to make a single cup, although this varies by the type of tea. This study reveals that Green tea is better in comparison to other tea brands. Red label tea has highest caffeine content (1.2g) whereas other brands have a range of 0.38 to 0.96g per 50g sample.



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**M.Sc.**  
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**“ FATTY MATERIAL OF  
DIFFERENT SOAP SAMPLES IN THE MARKET ”**

**A Project Report**

Submitted to the

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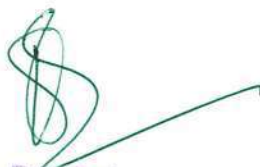
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## ACKNOWLEDGMENTS

I would like to thank sincerely to my supervisor **Dr. Satish S. Kola and Dr. Naresh D. Bansod** Asst. Professor P.G. Department of Chemistry **M.G. Arts Science and Late. N.P. Commerce College Armori** they not only guided me in my project but also unlimited help provided to me in this constructive project work.

I express my special thanks Principal of college **Dr. Lalsingh Khalsa** and Head of Department of chemistry **Prof. S.M. Sontakke** for constant support and providing necessary facilities.

I am so much thankful to the non-teaching staff for their valuable help in day to day work. I also like to thank my family to support me in every decision about study. I also take this opportunity to convey my gratitude to my friends of M.Sc. group for giving me support in each and every step who provided the physical and moral support without support this project work would not have been materialized.

Lastly, my sincere gratitude towards my all well-wishers.

**Miss. Kajal V. Meshram**

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## Types of soaps

Since they are salts of fatty acids, soaps have the general formula  $(\text{RCO}_2^-)_n\text{M}^{n+}$  (Where R is an alkyl, M is a metal and n is the charge of the cation). The major classification of soaps is determined by the identity of  $\text{M}^{n+}$ . When M is Na or K, the soaps are called toilet soaps, used for handwashing. Many metal dications ( $\text{Mg}_2^+$ ,  $\text{Ca}_2^+$ , and others) give metallic soap. When M is Li, the result is lithium soap (e.g., lithium stearate), which is used in high-performance greases. A cation from an organic base such as ammonium can be used instead of a metal; ammonium nonanoate is an ammonium-based soap that is used as an herbicide.

Before the advent of soap, the primary cleansing agent in ancient India was taken from soap nuts also known as soap berries (from the plant *Sapindus saponaria*). The literal translation of *Sapindus* is sap = soap and indus = India. In other words, soap from India!

The nut was used in ancient China as well and its usage spread from India to Middle Asia and then Europe. Soap nuts are boiled to soften them up, and then crushed to filter out the essence which contains the all-important cleansing chemicals. It lathers but in small quantities. Ancient India also used shikai or shikakai (a variant of the acacia plant) as a hair and body cleanser.





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## CONCLUSION

### REFERENCE

Soap contain alkali matter, which affects our skin and even skin may crack. To maintain the oily and moisture balance on our skin, fatty material required in soap. In general the fatty matter in soap is approximately 70% to 80% fatty matter below 70% made our skin dry, rough and skin may crack where as highest percentage [%] of fatty matter above 80% made the soap sticky and oily and washing become very difficult. From the table it is clear that the Lux international is the best soap for bathing purpose because it contain large amount of TFM or maximum percentage[%] of TFM.



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**M.Sc.**  
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**Project Work**

*A PROJECT REPORT  
ON*

**"Assessment of Ground Water Quality of the First Industrial - Residential  
Confluence Area of Desaiganj (Wadsa)"**

*A Project Report*

*Submitted to the*

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## Assessment of Ground Water Quality of the first industrial-residential confluence area of Desaiganj (Wadsa).

### Introduction

Juni Wadsa in (latitude 20°62'N and longitude 79°96'E) and its surrounding areas in Desaiganj (Wadsa) are situated on reclaimed marshy land. This area is the confluence point of industrial and residential belts of Desaiganj (Wadsa). It is located in close proximity to several industrial establishments including Desaiganj (Wadsa). Also several BPL residential colonies namely Juni Wadsa colony, Bhagasingh Ward, Nainpur Ward, and Nainpur Ward exist in and around this locality. There is a Government School. This college, being a non-profit oriented missionary institution with low fee structure, draws 20 to 30% of its students from this area and its neighbourhood. This area also forms the terminal point of city sewage disposal. Fresh water nalas / storm water outlets once, flow in close proximity to this area. Juni Wadsa area has rich groundwater abundance (Groundwater Table is shallow and perennial - open and tube wells never dry up) but its quality is doubtful. Despite rich ground water supply people in these areas almost entirely depend on Municipal Corporation supplied water not only for their drinking needs but for their domestic chores as well. Women folk waiting in long serpentine queues for their turn to collect municipal corporation supplied water is a common sight here.

### **Ground water tribulations**

On enquiry it emerged that groundwater in Juni Wadsa and its neighbourhood is 1. foul smelling, 2. foaming, 3. unfit for bathing and washing (as it forms no lather with soap) 4. scale forming and 5. harmful to health (can lead to gastroenteritis and skin diseases).

  
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### Significance of the proposed study

Several investigators have studied groundwater quality parameters in selected points of rural, sub urban and urban areas of Gadchiroli district. But **none have exclusively studied the confluence zone**. In this backdrop the investigator of this project has proposed to undertake this study **with UGC support** which is locally relevant and has lab to land orientation as well . Since the levels of certain physico -chemical parameters like pH, alkalinity , BOD , COD , total hardness(Ca,Mg,Chlorides, $\text{HCO}_3^-$ , $\text{CO}_3^{2-}$ ),  $\text{NO}_3^-$ ,  $\text{PO}_4^{3-}$ , Na, K and total dissolved solids found in ground water determine its behaviour as well as quality, it has been proposed to analyse ground water in the five slum areas separately so as to find reasons for the ground water problems in the said area.

### Methodology: Materials & Methods for Analysis

#### Sample Collection and Preservation

Sample collection was done in the pre-monsoon, monsoon and post-monsoon periods in the two year study period. Manual sampling with a plastic container in compliance with established standard norms was adopted. Labels were used to prevent sample misidentification. Sample preservation was done in tune with Ground Water Board guidelines with minimum possible time lapse between collection and analysis.

#### .Details of Sampling Locations

Sampling stations are situated in and around Juni Wadsa. Their details are given below.

**Table: 1-** Details of Sample Sources

Sample No.	Sample Station	Type of Source	Depth in feet	Latitude N	Longitude E
1	Nainpur	Open Well	28	20 <sup>0</sup> 71 <sup>1</sup>	79 <sup>0</sup> 295 <sup>1</sup>
2	AmbedkarWard	Bore Well	65	20 <sup>0</sup> 70 <sup>1</sup>	79 <sup>0</sup> 295 <sup>1</sup>
3	Bhg. Ward	Bore Well	68	20 <sup>0</sup> 69 <sup>1</sup>	79 <sup>0</sup> 289 <sup>1</sup>

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4	Wadsa Jr.	Open Well	32	20°719 <sup>1</sup>	79°289 <sup>1</sup>
5	Mata Nagar	Bore Well	68	20°718 <sup>1</sup>	79°287 <sup>1</sup>
6	Bypass Street	Open Well	31	20°722 <sup>1</sup>	79°286 <sup>1</sup>
7	Port Main Rd.	Open Well	35	20°718 <sup>1</sup>	79°283 <sup>1</sup>
8	Sebastian Clny.	Open Well	34	20°718 <sup>1</sup>	79°283 <sup>1</sup>
9	MG Road	Bore Well	65	20°725 <sup>1</sup>	79°285 <sup>1</sup>
10	HRD City	Open Well	27	20°729 <sup>1</sup>	79°281 <sup>1</sup>
11	MSN Colony	Bore Well	69	20°724 <sup>1</sup>	79°286 <sup>1</sup>
12	SJCW(A)	Open Well	30	20°721 <sup>1</sup>	79°291 <sup>1</sup>

### Analysis of Samples

Analysis of the collected ground water samples was done in accordance with the procedures suggested in the Standard Analytical Procedure Manual for water samples which is based on 'Standard Methods for the Examination of Water and Wastewater' 19<sup>th</sup> edition, APHA, AWWA, wef 1995 (alkalinity-titrimetrically, pH-potentiometrically,  $\text{HCO}_3^- + \text{CO}_3^{2-}$ -calculation from pH and alkalinity, DO-Iodometrically, BOD- bottle incubation for 5days at 20°C, COD-open reflux, Ca and total hardness-EDTA titrimetric, Mg- calculation from total hardness and Ca,  $\text{NO}_3^-$  &  $\text{PO}_4^{3-}$ -spectrophotometric,  $\text{Cl}^-$ -argentometric titrimetric, total dissolved solids- calculation from conductivity).

**Table: 2-** Methods of Analysis


S.NO.	Parameter	Method	Instrument/Equipment
1	Temperature	Laboratory method	0.1°c scale thermometer
2	pH	Electrometric	pH meter
3	Conductivity	Electrometric	Conductivity meter
4	DO, BOD	Iodometric (Titrimetric)	
5	Hardness, Ca	Titration with EDTA	
8	Alkalinity	Titration with Sulphuric acid	

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## Results and Discussion:

- Maximum temperature was recorded in May and minimum temperature was recorded in December, but the variation was never more than 4 to 5 degrees for any sample during the study period. Temperature was found to increase with the depth of the source. Open well water had lower temperature than bore well water. Also temperature was found to be less in post monsoon than during monsoon(1).
- The pH values for all the samples were almost uniform at all times except for an occasional variation in one or two cases. This may be attributed to the carbonate-bicarbonate buffer abundantly found in the soil(10). pH of all the samples was found to be within the BIS range of 6.5 to 8.5(2). Samples were mostly alkaline. The pH was very rarely found to be around 7.0. The pH limit for drinking water is 7.5 to 9.0. Majority of the samples most of the time showed less than 7.5 pH.
- Electrical Conductivity(EC) of water is determined by the concentration of ions present in it. The more the concentration of ions in the sample the more is its conductivity. All the samples had greater than 1000 $\mu$ S conductance although 500 $\mu$ S is the permissible value recommended by Central Ground Water Board(3). Higher EC is the reason behind the problem of scale formation in the study area.

  
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- Chloride is a dominant ion found in seawater - carbonates and bicarbonates are abundant in groundwater. Therefore  $Cl^{-}/(CO_3^{2-} + HCO_3^{-})$  ratio was considered to be an indicator.  $Cl^{-}/(CO_3^{2-} + HCO_3^{-})$  was always found to be less than 0.5 in all the samples which ruled out salt water contamination in the groundwater being examined(23).
- **Total alkalinity(TA)/Total hardness(TH)** ratio was always found to be  $> 1$ . Since groundwater is rich in bicarbonates and sea water is very rich in chlorides and sulphates of calcium and magnesium (that impart hardness to water) an excess of TA over TH ruled out contamination from sea water intrusion(7).
- Groundwater is normally rich in calcium whereas sea water is rich in magnesium. Therefore **Ca/Mg** ratio is also indicative of seawater contamination. Ca/Mg ratio was always found to be  $> 1$ . This also ruled out contamination from sea water intrusion(7) in the groundwater aquifers.

### Conclusions & Recommendations :-


From the foregoing discussion it can be concluded that the groundwater in the study area is **not palatable**. It is

1. foul smelling and foaming - because of contamination from sewage and high levels of TDS.
2. Unfit for bathing and washing (as it forms no lather with soap) - because total hardness is  $> 180\text{mg/l}$  and the water can be considered as very hard water.
3. Scale forming - because of high levels of TDS, total hardness and alkalinity.

4. Harmful to health (can lead to gastroenteritis and skin diseases) - because of contamination from sewage, presence of harmful microbes(BOD), high nitrate and potassium levels.

**Remedies and control measures:** Prevention is better than cure. Since purification of contaminated groundwater is an expensive and time taking process, it is better to try and collectively work together to avoid groundwater contamination at source stage itself. Since this study has identified contamination from sewage as the main cause for groundwater contamination in the study area - all steps to curtail it and prevent further deterioration should be taken up immediately. Suggestive measures to control sewage infiltration are mentioned below.

- ✓ open defecation and urination should be avoided
- ✓ septic tank leaks should be plugged immediately
- ✓ sewage seepage can be avoided by properly cementing the conduits and not allowing them to overflow
- ✓ domestic sewage should be properly channelized through a well structured and maintained drainage system
- ✓ UGD system should be properly maintained-manholes should not be allowed to overflow
- ✓ at source segregation and collection of solid waste should be practised
- ✓ bathing, washing clothes, utensils and animals near open and tube wells should be avoided
- ✓ people should be educated in the art of healthy living
- ✓ residents should impress upon the local corporator to prevail on the municipal corporation authorities for taking up desilting works on Juni Wadsa and Souraunded Area immediately

  
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**M.Sc.**  
**Chemistry**  
**Project Work**

***“Content of Cold Drinks Available in the  
Market ”***

**A Project Report**

Submitted to the  
**Gondwana University Gadchiroli**

For the degree of  
Master of Science (Chemistry)

By

**Mr. Mohit D. Shende**

M.Sc. Chemistry Final Year

**Under the Supervision of**

**Dr. Satish S. Kola**

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2020-21**





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**CERTIFICATE**



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Date: 04-08-2021

  
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## INTRODUCTION

The origins of soft drinks lie in the development of fruit-flavored drinks. In the medieval Middle East, a variety of fruit-flavored soft drinks were widely drunk, such as sharbat, and were often sweetened with ingredients such as sugar, syrup and honey. Other common ingredients included lemon, apple, pomegranate, tamarind, jujube, sumac, musk, mint and ice. Middle Eastern drinks later became popular in medieval Europe, where the word "syrup" was derived from Arabic.

In Tudor England, 'water imperial' was widely drunk; it was a sweetened drink with lemon flavor and containing cream of tartar. 'Manays Cryste' was a sweetened cordial flavored with rosewater, violets or cinnamon.

Another early type of soft drink was lemonade, made of water and lemon juice sweetened with honey, but without carbonated water. The Compagnie des Limonadiers of Paris was granted a monopoly for the sale of lemonade soft drinks in 1676. Vendors carried tanks of lemonade on their backs and

soft drinks in 1676. Vendors carried tanks of lemonade on their backs and dispensed cups of the soft drink.

A **soft drink** (see § Terminology for other names) is a drink that usually contains water (often carbonated), a sweetener, and a natural and/or artificial flavoring. The sweetener may be a sugar, high-fructose corn syrup, fruit juice, a sugar substitute (in the case of *diet drinks*), or some combination of these. Soft drinks may also contain caffeine, colorings, preservatives, and/or other ingredients.

Soft drinks are called "soft" in contrast with "hard" alcoholic drinks. Small amounts of alcohol may be present in a soft drink, but the alcohol content must be less than 0.5% of the total volume of the drink in many countries and localities<sup>[1][2]</sup> if the drink is to be considered non-alcoholic.<sup>[3]</sup> Fruit punch, tea (even kombucha), and other such non-alcoholic drinks are technically soft drinks by this definition, but are not generally referred to as such.

Soft drinks may be served cold, over ice cubes, or at room temperature. They are available in many container formats, including cans, glass bottles, and plastic bottles. Containers come in a variety of

  
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## INTRODUCTION

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## Carbonated drinks




Bubbles of carbon dioxide float to the surface of a carbonated soft drink.

Carbonated drinks or fizzy drinks are beverages that contain dissolved carbon dioxide. The dissolution of  $\text{CO}_2$  in a liquid, gives rise to fizz or effervescence. The process usually involves carbon dioxide under high pressure. When the pressure is removed, the carbon dioxide is released from the solution as small bubbles, which causes the solution to become effervescent, or fizzy. A common example is the dissolving of carbon dioxide in water, resulting in carbonated water. Carbon dioxide is only weakly soluble in water, therefore it separates into a gas when the pressure is released.

Carbonated beverages are prepared by mixing the flavored syrup with carbonated water, both chilled. Carbonation levels range up to 5 volumes of  $\text{CO}_2$  per liquid volume. Ginger ale, colas, and related drinks are carbonated with 3.5 volumes. Other drinks, often fruity ones, are carbonated less.

In the late 18th century, scientists made important progress in replicating naturally carbonated mineral waters. In 1767, Englishman Joseph Priestley first discovered a method of infusing water with carbon dioxide to make carbonated water when he suspended a bowl of distilled water above a beer vat at a local brewery in Leeds, England. His invention of carbonated water (also known as soda water) is the major and defining component of most soft drinks.

  
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## CONCLUSION

### DISADVANTAGES OF COLD DRINKS

1. Soft drinks are little more harmful than sugar solution. As they contain sugar in large amount which cause "diabetes".
2. Soft drinks can cause weight gain as they interfere with the body's natural ability to suppress hunger feeling.
3. Soft drinks have ability to dissolve the calcium so they are also harmful for our bones.
4. Soft drinks contain "phosphoric acid" which has a pH of 2.8. So they can dissolve a nail in about 4 days.
5. For transportation of soft drinks syrup the commercial truck must use the hazardous matter place cards reserved for highly consive material.
6. Soft drinks have also ability to remove blood so they are very harmful to our body.

### USES OF COLD DRINKS

1. Cold drinks can be used as toilet cleaners.
2. They can remove rust spots from chrome car humpers.
3. They clean corrosion from car battery terminals.
4. Soft drinks are used as an excellent 'detergent' to remove grease from clothes.
5. They can loose a rusted bolt.



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**M.Sc.**  
**Chemistry**  
**Project Work**



***“Soil Analysis of Different Regions of Gadchiroli”***

**A Project Report**

Submitted to the  
**Gondwana University Gadchiroli**

For the degree of  
Master of Science (Chemistry)

By

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M.Sc. Chem. Sem. - IV Student

Under the **Supervision** of

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Asst. Professor

**Dr. Naresh D. Bansod**

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**2020-21**



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**Place:- Armori**

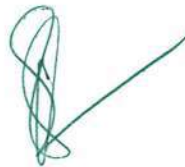
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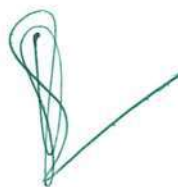


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## List of Abbreviations

Symbol	Abbreviations
UV	Ultraviolet
Ph	Phenyl
Ar	Aromatic
Et	Ethyl
Ac	Acetyl
mp	Melting point
°C	Degrees Celsius
h	Hour(s)
mL	Milliliter(s)
µg	Microgram
mmol	Millimole(s)
conc.	Concentrated
THF	Tetrahydrofuran
DMF	Dimethylformamide
DMSO	Dimethyl Sulphoxide



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## Introduction

Soil test commonly refers to the analysis of a soil sample to determine nutrients content, composition & other characteristics such as the acidity or pH level. A soil test can determine fertility or the expected growth potential of the soil which indicates nutrients deficiencies, potential toxicities for excessive fertility and inhibitions from the presence of non essential trace minerals. The test is used to the function of roots to assimilate minerals. The expected rate of growth is modelled by the law of maximum.

Composite sampling can be performed by combining soil from several locations prior to analysis. This is a common procedure, but should be used judiciously to avoid skewing results. This procedure must be done so that government sampling requirements are met. A reference map should be created to record the location and quantity of field samples in order to properly interpret test results.

Soil testing is often performed by commercial labs that offer a variety of tests, targeting groups of compounds and minerals. The advantage associated with local lab is that they are familiar with the chemistry of the soil in the area where the sample was taken. This enables technicians to recommend the test that are most likely to reveal useful information.

**STANDARD SOIL TESTS :-** Laboratory tests often check for plant nutrients in three

- categories :-
- Major nutrients: nitrogen (N), phosphorus (P), and potassium (K).
  - Secondary nutrients: sulphur, calcium, magnesium.
  - Minor nutrients: iron, manganese, copper, zinc, boron, chlorine.

## Review of Literature

Gadchiroli district, is an administrative district in the state of maharashtra in India.the gateway to Maharashtra from North- eastern India. Gadchiroli district is situated on North-Eastern side of Maharashtra state having state borders of Telangana and Chhattisgarh .

The district is part of Nagpur Division.The Gadchiroli District is divided into 6 Sub-Divisions, That is Aheri, Desaijanj, Kurkheda, Chamorshi & Ettapalli which are further divided into 12 tahsils.

The district occupies an area of 14,412sq km.

The district headquarters is located at Gadchiroli. For administrative convenience,

According to the 2011 census at Gadchiroli district has a population of 1,072,942 roughly at Gadchiroli is very close to the state of Chhattisgarh and Telangana and is considered panchayats (village councils), 12 panchayat samitis and 1688 revenue villages.

The district also includes of 557 grampanchayats

This gives ranking of 424th in india (out of the total of 640 . The distict has a population density of 74 inhabitant per square kilometre (190/sq mi). Its population growth rate during males, And a literacy rate of 74.4%

The soil is important in sequestering atmospheric CO<sub>2</sub> and in emitting trace gases (e.g. CO<sub>2</sub>, CEL and N<sub>2</sub>O) that are radiatively active and enhance the „greenhouse“ effect. Land use change and predicted global warming, Through their effect on net primary productivity, the plant community and soil condition, may have important effect o the size of the organic matter pool in the soil and directly affect the atmospheric concentration of these and quality of the C: N ratio is a good indicator of the degree of decomposition and quality of the organic matter held in the soil. However, ratios are prone to considerable variation resulting from errors in determining both variable. At present, Changes from forest to grassland and agriculture especially have a marked effect on the oxidation of superficial

## **Discussion & Conclusion**

In a broad sense, soil testing is any chemical or physical measurement made on a soil. Soil testing may, therefore, be defined as a tool for rapid soil chemical analysis to assess the available nutrients status & tilth of soil. Interpretation of soil test result & making fertilizer recommendations are based on crop responses & economic consideration

### **Phase of soil testing:-**

- Collection of soil sample from field
- Extraction & determination available nutrients
- Interpretation of analytical result, &
- Making fertilizer recommendation

### **Fertilizer recommendation from soil test crop response studies:-**

The research support to soil advisory service comes from soil test crop response correlation studies conductivity in different soil-agro-climate regions. System studies on these lines were initiated under the all India co- ordinate soil test crop response correlation project of Indian council of agriculture research, new Delhi from 1968 at mahatma phule krishi vidyapeeth, rahuri

### **Objectives of soil test crop response program:-**

- To establish significant relationship between soil test for available N, P, & K, yield responses of important crop of the region.



**M.Sc.**  
**Chemistry**  
**Project Work**

**“STERILIZATION OF WATER USING  
BLEACHING POWDER”**

**A Project Report**

Submitted to the

**Gondwana University Gadchiroli**

For the degree of

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**College Armori**

**2020-21**

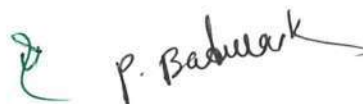


## DECLARATION

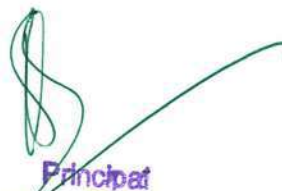
I declare that this project work of “**Sterilization of Water Using Bleaching Powder**” was done by me in **M.G. Arts Science and Late. N.P. Commerce College Armori** during the academic session 2020-21. This project work has not been submitted earlier to any University or Institution for the award of any diploma or a degree.

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**Miss. Pallavi R. Badwaik**  
(M.Sc.Chem Sem-IV Student)



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## CERTIFICATE

This is to certify that. **Miss. Pallavi R. Badwaik** has carried out his project work on the topic entitled **“Sterilization of Water Using Bleaching Powder”** during the academic session **2020-21** under my supervision in the Post Graduate Department of Chemistry, **M.G. Arts Science and Late. N.P. Commerce College Armori** This research work presented in this project is own work of the candidate.

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## INTRODUCTION

Water (chemical formula  $H_2O$ ) is an inorganic, transparent, tasteless, odorless, and nearly colorless chemical substance, which is the main constituent of Earth's hydrosphere and the fluids of all known living organisms (in which it acts as a solvent[1]). It is vital for all known forms of life, even though it provides no calories or organic nutrients. Its chemical formula  $H_2O$ , indicates that each of its molecules contains one oxygen and two hydrogen atoms, connected by covalent bonds. The hydrogen atoms are bonded to the oxygen atom at an angle of  $104.45^\circ$ . "Water" is the name of the liquid state of  $H_2O$  at standard conditions for temperature and pressure.

Three natural states of water exist. It forms precipitation in the form of rain and aerosols in the form of fog. Clouds consist of suspended droplets of water and ice, its solid state. When finely divided, crystalline ice may precipitate in the form of snow. The gaseous state of water is steam or water vapor.

Water covers approximately 70.9% of the Earth's surface, mostly in seas and oceans. Small portions of water occur as groundwater (1.7%), in the glaciers and the ice caps of Antarctica and Greenland (1.7%), in the air as vapor, clouds (consisting of ice and liquid water suspended in air), and precipitation (0.01%). Water moves continually through the water cycle of evaporation, transpiration (evapotranspiration), condensation, precipitation, and runoff, usually reaching the sea.

Water plays an important role in the world economy. Approximately 70% of the freshwater used by humans goes to agriculture. Fishing in salt and fresh water bodies is a major source of food for many parts of the world. Much of the long-distance trade of commodities (such as oil, natural gas, and manufactured products) is transported by boats through seas, rivers, lakes, and canals. Large quantities of water, ice, and steam are used for cooling and heating, in industry and homes. Water is an excellent solvent for a wide variety of substances both mineral and organic; as such it is widely used in industrial processes, and in cooking and washing. Water, ice and snow are also central to many sports and other forms of entertainment, such as swimming, pleasure boating, boat racing, surfing, sport fishing, diving, ice skating and skiing.

## Earth's water inventory

The majority of Earth's surface is covered by oceans, those oceans make up just a small fraction of the mass of the planet. The mass of Earth's oceans is estimated to be  $1.37 \times 10^{21}$  kg, which is 0.023% of the total mass of Earth,  $6.0 \times 10^{24}$  kg. An additional  $5.0 \times 10^{20}$  kg of water is estimated to exist in ice, rivers, groundwater, and atmospheric water vapor. A significant amount of water is also stored in the crust, mantle, and core. Unlike molecular H<sub>2</sub>O that is found on the surface, water in the interior is primarily in hydrated minerals or as trace amounts of hydrogen bonded to oxygen atoms in silicate minerals.

Hydrated silicates on the surface transport water into the mantle at convergent plate boundaries, where the oceanic crust is subducted underneath continental crust. While it is difficult to estimate the total water content of the mantle due to limited samples, approximately three times the mass of the Earth's oceans is estimated to be stored there. [ Similarly, the Earth's core could contain four to five oceans' worth of hydrogen



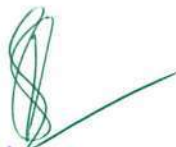
  
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## Procedure:

1. Preparation of bleaching powder solution. Weigh accurately 2.5g of the given sample of bleaching powder and transfer it to a 250ml conical flask. Add about 100-150ml of distilled water. Stopper the flask and shake it vigorously. The suspension thus obtained is filtered through glass wool and the filtrate is diluted with water (in a measuring flask) to make the volume 250ml. The solution obtained is 1% bleaching powder solution.
2. Take 20ml of bleaching powder solution in a stoppered conical flask and add it to 20ml of 10% KI solution. Stopper the flask and shake it vigorously. Titrate this solution against 0.1N  $\text{Na}_2\text{S}_2\text{O}_3$  solution taken in the burette. When the solution in the conical flask becomes light yellow in color, add about 2ml starch solution. The solution now becomes blue in color. Continue titrating till the blue color just disappears. Repeat the titration to get a set of three concordant readings.
3. Take 100ml of the water sample in a 250ml stoppered conical flask and add it to 10ml of bleaching powder solution. Then add 20ml of KI solution and stopper the flask. Shake vigorously and titrate against 0.1N  $\text{Na}_2\text{S}_2\text{O}_3$  solution using starch solution as indicator as described in step 2.
4. Repeat the step 3 with other samples of water and record the observations.



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## RESULT

Amount of the given sample of bleaching powder required to disinfect one litre of water

- Sample I - 4.05 g
- Sample II - 4.35g
- Sample III - 4.53g
- Sample IV - 4.36g



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**M.Sc.**  
**Chemistry**  
**Project Work**

***“Comparative study and Quality Analysis of  
Different Brands of Available Marketed Honey ”***

**A Project Report**

Submitted to the

**Gondwana University Gadchiroli**

For the degree of

Master of Science (**Chemistry**)

By

**Miss. Priyanka S. Burade**

M.Sc. Chemistry Final Year

**Under the Supervision of**

**Dr. Satish S. Kola**

**Dr. Naresh D. Bansod**

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This is to certify that dissertation entitled "Comparative study and Quality Analysis of Different Brands of Available Marketed Honey" is a bonafide research work done by Miss. Priyanka S. Burade under the guidance of Professor Dr. Satish S. Kola and Dr. Naresh D. Bansod



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## INTRODUCTION

The definition of honey according to Pearson (1976) is: 'Honey is the saccharine product gathered by the bees from the nectar of flowers'. This definition is in agreement with those regulations issued by the United Kingdom and the European Economic Community.

Honey is gathered by honey bees from two different sources: nectar or honeydew. Nectar is the most common source of honey worldwide, while honeydew is only common in European countries.

Nectar is a sugar solution of varying concentration secreted by flower nectar. The sugar composition in nectar, with principal sugars being fructose, glucose and sucrose, is typical from the plant species. Most nectar consists mainly of fructose and glucose. Its sugar concentration actually depends on the different climatic factors such as temperature, soil, humidity and season (Office of Complementary Medicines, 1998).

Honey is carbohydrate rich syrup. It is not only a popular sweetener but also a folk medicine used since ancient time (National Honey Board, 1996; Bodganov). The increasing demand of honey in the market nowadays leads to the phenomenon of the dishonest act of honey adulteration and production of synthetic honey. This is so because of the high profit seek by the seller, as the price of adulterated honey or synthetic honey is much lower than the cost of pure honey. Honey contains nearly two hundred compounds which can be arranged into the following major groups: carbohydrates, amino acids, proteins, minerals, vitamins, acids, esters and volatile components, hydroxyl methyl furfural, lipids, and pollen. On rare occasions toxic compounds can be present in low concentrations. Carbohydrates Glucose and Fructose constitute about 85% of the honey solids. "Honey adulteration" refers to the act of





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## 9. Conclusion

From the above performed qualitative tests, it is concluded that the natural sample of honey under investigation contain rich carbohydrate and minerals while other marketed honey brands contain only carbohydrate but no minerals. Hence, we should prefer for natural honey rather than marketed honey brands.

**M.Sc.**  
**Chemistry**  
**Project Work**

Project report entitled

**“ STUDY OF PHOTOCATALYTIC DEGRADATION OF  
RHODAMINE B AND METHYLE ORANGE DYE USING  
SNTHESIZED COPPER FERRITE NANOPARTICLE AS  
PHOTOCATALYST”**

Submitted to the

**Gondwana University, Gadchiroli**

For the degree of

Master of Science (Chemistry)

IV SEMISTER

By

**Miss. PUNAM Y. GAIKWAD**

M.Sc. Chem. Sem. - IV Student

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.....July -2021.....

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# INTRODUCTION

## CHAPTER I

Increasing urbanization is sign of growth, but the maintaining the balance of nature with it is a sign of advancement and longitivity of growth. But as correctly said by *Theodore Levitt* "Anything in excess is poison" is true in this case. As industries are increasing, the waste generated is also increasing. Due to tremendous increasing in waste effluents which are very toxic and persistent, they are entering the food chain slowly causing pollution and bioaccumulation. There is various types of effluents according to what type of industry it is. Mostly textile industries has dyes as their effluents which are hazardous to humans and animals [1-2]. Most of dyes are characterized by complicated constitution and high chemical stability, hence persist for long distances in flowing water, retards photosynthetic activity, inhibit the growth of aquatic biota by blocking out sunlight and utilizing disoced oxygen and also decrease the recreation value of stream [3].

Removal of dyes from water is thus necessity to increase safe and clean water, improving quality of all life. Some methods proposed for the removal of dyes include adsorption and photocatalytic degradation. Adsorption is cheap and easy to use, but is not reusable and will contribute to toxic waste. Photocatalytic degradation is relatively easy; although it might be a more expensive than adsorbents, it can be reused [4-5].

Metal oxides can adopt a vast number of structural geometries with an electronic structure that can exhibit metallic, semiconductor or insulator character and there for play a very important role in many areas of chemistry, physics and material science [6-7]. In particular, nanosized semiconductor particle with suitable surface areas and a variety of morphologies offer great opportunity. Compared to other potential photocatalysts, iron oxides are plentiful in nature and environmentally benign.

  
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# INTRODUCTION

## CHAPTER I

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## CONCLUSION

### CHAPTER V

---

The Copper Ferrite Nanoparticles were successfully synthesized Co-precipitation method and characterized by XR-D, FT-IR, SEM, and TGA. These new materials were found to be effective catalyst for the destruction of industrial dyes Rhoda mine (Rd) and Methyl Orange (MO) under the UV (Tungsten lamp light) irradiation. It was found that the adsorption of dye onto the catalyst accelerated the degradation process and hence the above dyes were easily degraded. The observed photocatalytic degradation in order in presence of micro spindle Y- $\text{CuFe}_2\text{O}_4$  NPs with UV (Tungsten lamp light) irradiation (Rhoda mine > Methyl orange). This was attributed to the light irradiation on the degradation efficiency of organic dye. The percent degradation for Rhoda mine was found to be 87.16% and 86.04 % in UV irradiation. In this way, the use of copper ferrites obtained by wet-chemical methods from nitrate precursors or a citric acid-aided process becomes a promising approach for the removal of organic pollutants by photocatalytic oxidation in the presence of  $\text{H}_2\text{O}_2$  and may constitute an alternative for total discoloration/degradation of the RhB and MO dye. So it was found that the synthesized micro spindle Y-  $\text{CuFe}_2\text{O}_4$  NPs can act as excellent photocatalyst in degrading the pollutants, such as dyes from various industries.

---

  
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**M.Sc.**  
**Chemistry**  
**Project Work**

**A PROJECT REPORT ON**  
**“Qualitative Phytochemical Analysis of Plant Ehretia**  
**Laevis”**

**SUBMITTED**

**TO**

**MAHATMA GANDHI ARTS, SCIENCE & LATE N. P.COMMERCE**  
**COLLEGE, ARMORI**  
**GONDWANA UNIVERSITY, GADCHIROLI**



**SUBMITTED BY**

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**( M.Sc. Chemistry Final Year)**

**UNDER THE GUIDANCE OF**

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**DR. NARESH D. BANSOD**  
**Assistant Professor**  
**Dept. of Chemistry**

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**Head of Dept. of Chemistry**

**PG DEPARTMENT OF CHEMISTRY**

**2020-2021**



## Certificate

This is to certify that Miss. Rajlaxmi Dewaji Chahande submitted the project report entitled "*Qualitative phytochemical analysis of plant Ehretia Laevis*" in requirement for the Post Graduation Degree of Master of Science in Chemistry, session 2020-2021. This is his original work and was carried out under the supervision and guidance of Dr. S. S. Kola, Dr. N. D. Bansod (Assistant Professors) & Prof. S. M. Sontakke (HOD), Mahatma Gandhi Arts, Science & Late N. P. Commerce College, Armori, Gondwana University, Gadchiroli department of Chemistry, Armori.



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Prof. S. M. Sontakke  
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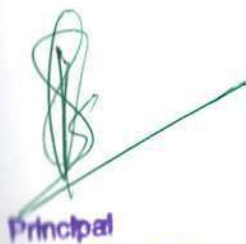


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Date:



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## Preliminary phytochemical screening of Ehretia Laevis plant.

### INTRODUCTION: -

Ehretia laevis is a small rare tree member of Baraginaceae family of indian medicinal plant. It is high value medicinal plant and becoming rare in the state of Maharashtra. In various Ethino medical survey of medicinal plant used by traditional heaters in various region with different vernacular name in india.

The leaves of Erthia Laevis which is commonly known as Khanduchakka and commonly used by tribal as well as urban people for wound management minor fractures and joint pain with surprising effect.

The aim to study extraction and isolation of component present in Erthia Laevis. Plant leaves bark were extracted with different solvent such as petroleum ether , ethanol , acetone, phytochemical screening of this plant was performed for alkaloid, terpenoid, tannis , phenolic, carbohydrate , saponin, anthraquinone, glycoside etc.

### Scientific Classification

Domain : Eukaryota

Kingdom : plantae

Order : Baraginals

Family : Baraginaccae

Genus : Ehretia

Species: E. laevis





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## Preparation of extract

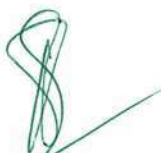
### Extraction: -

It is the process in which the plant tissues are treated with specific solvent where the medicinally active constituent are dissolved out of cell tissue and most of the inert component remain undissolved. The extract can be prepared by using Soxhlet apparatus and this apparatus made up of different parts. The extractor from the lower side can be attached to distillation flask and the mouth of extractor is fixed with condenser by the standard joint.

The crude drug powder is packed in a Soxhlet apparatus in thimble of filter paper. The diameter of thimble corresponds to internal diameter of thimble corresponds to internal diameter of Soxhlet extractor. Extraction assembly is set up by fitting condenser and distillation flask. initially for the setting of powder solvent is added in the flask and brought its boiling point. fresh activated porcelain pieces are added to the flask to avoid the bumping of solvent.

The vapours passed through the vapour tube and condensed liquid gradually increase the level of liquid in the extractor and it passes sample tube or siphon tube. Siphon is set up as the liquid reaches the point of return and contains of extraction material are transfer to the flask. the cycle of solvent evaporation and siphoning back will be continuing as many times as possible without changing the solvent so as to get maximum extraction thus the process is continued until the drug is completely extracted. After extract in the flask is the proceed the powdered plant material will be subjected to successive solvent extraction using different solvent like methanol, n-hexane, ethanol,

10 g powder used with 150 ml of various organic solvent for 12-14 hrs. Each time extracting with next solvent the residue dried. The extract obtained in each step will be concentrated solidified and used for preliminary phytochemical



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### Conclusion: -

The phytochemical analysis was performed on the acetone, ethanol, and petroleum ether of Erthia Laevis. The acetone extract of Erthia Laevis (leaf) contains tanning carotenoids and saponin & ether extract contains saponin.

The extract of Erthia Laevis (Leaf) in acetone and ethanol shows the zone of inhibition and petroleum ether extract does not show the zone of inhibition.

Acetone and ethanol extract of plant Erthia Laevis (Leaf) shows antimicrobial activity against the selected oral pathogens E. coli



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**M.Sc.**  
**Chemistry**  
**Project Work**

**Studies on physicochemical analysis of  
water reports of Bardi from Armori**

**A Project Report**

Submitted to the

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By

**Miss. Rohini Anil Juare**

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Under the **Supervision of**

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## **Abstract:**

Rivers are considered sacred by people of India for providing life sustenance to environment and ecology. Anthropogenic activities have generated important transformations in aquatic environments during the last few decades. Advancement of human civilization has put serious questions to the safe use of river water for drinking and other purposes. The river water pollution due to heavy metals is one of the major concerns in most of the metropolitan cities of developing countries. These toxic heavy metals entering the environment may lead to bioaccumulation and biomagnifications. These heavy metals are not readily degradable in nature and accumulate in the animal as well as human bodies to a very high toxic amount leading to undesirable effects beyond a certain limit. Heavy metals in riverine environment represent an abiding threat to human health. Exposure to heavy metals has been linked to developmental retardation, kidney damage, various cancers, and even death in instances of very high exposure. The following review article presents the findings of the work carried out by the various researchers in the past on the heavy metal pollution of rivers. Water is one of the most important of all natural resources known on earth. It is important to all living organisms, most ecological systems, human health, food production and economic development. The safety of drinking water is important for the health. The safety of drinking water is affected by various contaminants which included chemical and microbiological. Such contaminants cause serious health problems. Due to these contaminants quality of the Drinking Water becomes poor. Sometimes such poor quality water causes many diseases in the humans so that quality of the water must be tested for both the chemical as well as for the microbial contaminants. During the study it was found that maximum number of physical and chemical parameter were within the desirable limit, as suggested by WHO (1971) and BIS (1991). The objective of the present research is to provide information on the physicochemical characteristics & detailed ecological studies of Potable water .



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**Keywords: pH, Alkalinity, Hardness ,Dissolved oxygen, chloride content.**

Water is a compound comprising of two molecules of Hydrogen and one molecule of oxygen. A good water is water containing these molecules and little amount of other elements in trace quantity, some of such elements include chlorine, Magnesium etc. The implication of this is simple, pure water is a mere theoretical concept, as the average water contains lots of other elements in trace quantity.

Scientist especially WHO have done research on the standard qualities of a good water, and has come out with the standard amount of basic elements and its range that must be present for water to be qualified as a good water.

The main aim for this analysis was to find out whether the water of this area is worth drinking and daily use. And also to determine does this water meets the standard qualification from WHO.

In this research we are using scientific methods of research and laboratory experiments to determine if the average water in the Police nagar region is suitable for daily use.

These experiments is done using samples collected from so many locations in the Police Nagar.

Well Water , Tap Water , RO Water , Tube Well Water were collected from Police Nagar and properties like PH, Alkalinity, Hardness, Dissolved Oxygen, Determination of chloride were recorded.



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## Introduction:-

Water plays a significant role in maintaining the human health and welfare. Clean drinking water is now recognised as a fundamental right of human beings. Around 780 million people do not have access to clean and safe water and around 2.5 billion people do not have proper sanitation. As a result, around 6–8 million people die each year due to water related diseases and disasters [1]. Therefore, water quality control is a top-priority policy agenda in many parts of the world [2]. In the today world, the water use in household supplies is commonly defined as domestic water. This water is processed to be safely consumed as drinking water and other purposes. Water quality and suitability for use are determined by its taste, odor, colour, and concentration of organic and inorganic matters [3]. Contaminants in the water can affect the water quality and consequently the human health. The potential sources of water contamination are geological conditions, industrial and agricultural activities, and water treatment plants. These contaminants are further categorized as microorganisms, inorganics, organics, radionuclides, and disinfectants

The inorganic chemicals hold a greater portion as contaminants in drinking water in comparison to organic chemicals [5]. A part of inorganics are in mineral form of heavy metals. Heavy metals tend to accumulate in human organs and nervous system and interfere with their normal functions. In recent years, heavy metals such as lead (Pb), arsenic (As), magnesium (Mg), nickel (Ni), copper (Cu), and zinc (Zn) have received significant attention due to causing health problems [2]. Moreover, the cardiovascular diseases, kidney-related problems, neurocognitive diseases, and cancer are related to the traces of metals such as cadmium (Cd) and chromium (Cr) as reported in epidemiological studies [6]. The Pb is known to delay the physical and mental growth in infants, while As and mercury (Hg) can cause serious poisoning with skin pathology and cancer and further damage to kidney and liver, respectively [2, 7].



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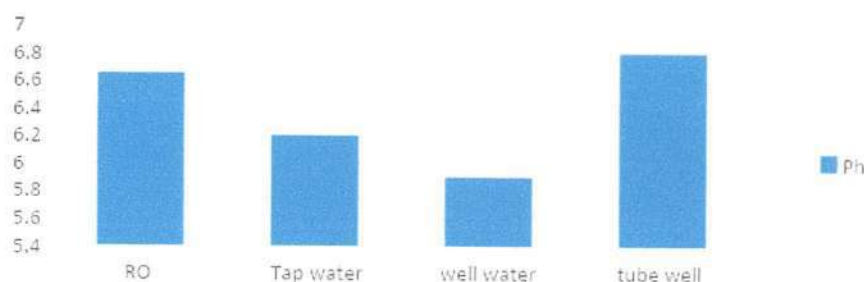


## PROCEDURE/METHODS:-

**pH** : PH of water is a measure of amount of hydrogen ions that is present in the water. It determines if the water is alkaline or acidic in nature. PH stands for potential of hydrogen . As per the world health organization(WHO),value of PH for the water is 6.5 to 8.5. The pH can be determined with the help of digital pH meter.

### ● OBSERVATION TABLE


Sr. no.	Type of water samples	pH
1)	RO Water	6.65
2)	Tap Water	6.2
3)	Well Water	5.90
4)	Tube Well Water	6.8



### ● Alkalinity :

The burette is filled with standard sulphuric acid to the zero level, following usual precautions. 20 ml of the given water sample-A is pipetted out into a conical flask. Two drops of phenolphthalein indicator is added and titrated against the standard sulphuric acid. The end point is the disappearance of pink colour. The titre value is noted. A drop of methyl orange indicator is added to the same solution after the phenolphthalein end point and the titration is continued until the solution becomes orange. The total titre value is noted. The titration is repeated to get concordant value and the titre values are noted.

The volume up to phenolphthalein end point corresponds to complete neutralization of OH ions and partial neutralization of CO<sub>3</sub><sup>2-</sup> to HCO<sub>3</sub><sup>-</sup> ions. The volume of acid up to methyl orange end point corresponds to complete neutralization. It may be summarized in following table:

  
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## OBSERVATION TABLE

### BACK TITRATION

Sr no.	Types of water samples	Volume of Water samples	Volume of AgNO <sub>3</sub>	
			I	F
1)	RO Water	25ml	0	1.5
2)	Tap Water	25ml	0	2.7
3)	Well Water	25ml	0	8.9
4)	Tube Well Water	25ml	0	1.9

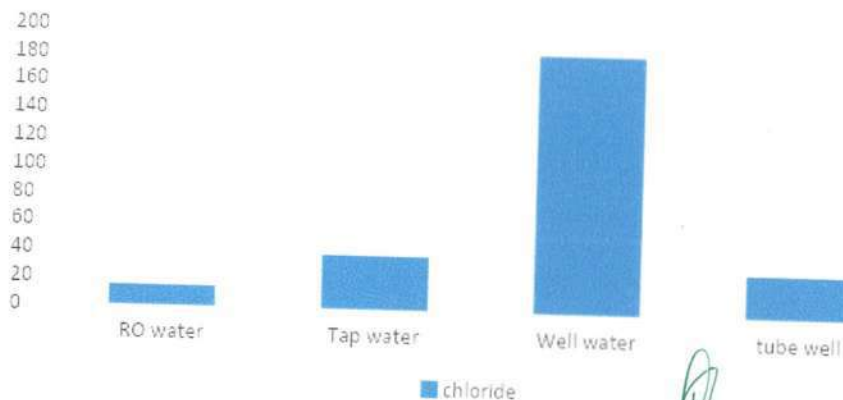
### BLANK TITRATION

Sr no.	Volume of distilled water sample	Volume of AgNO <sub>3</sub>	
		I	F
1)	25 ml	0	0.8

### • CALCULATIONS:-

**Amount of Cl = ((A-B) \* Normality \* 35.45 \* 1000) / Volume of water sample**

- 1) RO Water =  $((1.5 - 0.8) * 0.0141 * 35.35 * 1000) / 25 = 13.95 \text{ mg/L}$   
2) Tap Water =  $((2.7 - 0.8) * 0.0141 * 35.35 * 1000) / 25 = 37.88 \text{ mg/L}$   
3) Well Water =  $((8.9 - 0.8) * 0.0141 * 35.35 * 1000) / 25 = 183.42 \text{ mg/L}$   
4) Tube Well Water =  $((1.9 - 0.8) * 0.0141 * 35.35 * 1000) / 25 = 29.99 \text{ mg/L}$



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**M.Sc.**  
**Chemistry**  
**Project Work**

# **“PRESERVATION AND PROCESSING OF SOYMILK”**

**A Project Report**

Submitted to the

**Gondwana University Gadchiroli**

For the degree of

Master of Science (Chemistry)

By

**Miss. Sakshi V. Gumfalwar**

M.Sc. Chemistry Final Year

Under the **Supervision** of

**Dr. Satish S. Kola**

**Dr. Naresh D. Bansod**

**Prof. S.M. Sontakke**

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**M.G. Arts, Science & Late. N.P. Commerce**

**College Armori**

**2020-21**



## CERTIFICATE

This is to certify that. **Miss. Sakshi V. Gumfalwar** has carried out his project work on the topic entitled “**Preservation and processing of soymilk**” during the academic session **2020-21** under my supervision in the Post Graduate Department of Chemistry, **M.G. Arts Science and Late. N.P. Commerce College Armori** This research work presented in this project is own work of the candidate.

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Date: 25/07/21

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**ENDORSEMENT BY THE HOD/ PRINCIPAL/ CO-  
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This is to certify that dissertation entitled "Preservation and processing of soymilk" is a bonafide research work done by Miss. Sakshi V. Gumfalwar under the guidance of Professor Dr. Satish S. Kola and Dr. Naresh D. Bansod

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Place:- *Armori*

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## INTRODUCTION


Milk (also known in unfermented form as sweet milk) is a nutrient-rich liquid food produced by the mammary glands of mammals. It is the primary source of nutrition for young mammals, including breastfed human infants before they are able to digest solid food. Early-lactation milk is called colostrum, which contains antibodies that strengthen the immune system and thus reduces the risk of many diseases. It holds many other nutrients, including protein and lactose. Interspecies consumption of milk is not uncommon, particularly among humans, many of whom consume the milk of other mammals.

As an agricultural product, dairy milk is collected from farm animals. Dairy farms produced around 730 million tonnes (800 million short tons) of milk in 2011, from 260 million dairy cows. India is the world's largest producer of milk, and is the leading exporter of skimmed milk powder, yet it exports few other milk products.

The ever-increasing rise in domestic demand for dairy products and a large demand-supply gap could lead to India being a net importer of dairy products in the future. New Zealand, Germany and the Netherlands are the largest exporters of milk products.

China and Russia were the world's largest importers of milk and milk products until 2016 when both countries became self-sufficient, contributing to a worldwide glut of milk.

Throughout the world, more than six billion people consume milk and milk products. Between 750 and 900 million people live in dairy farming households.

  
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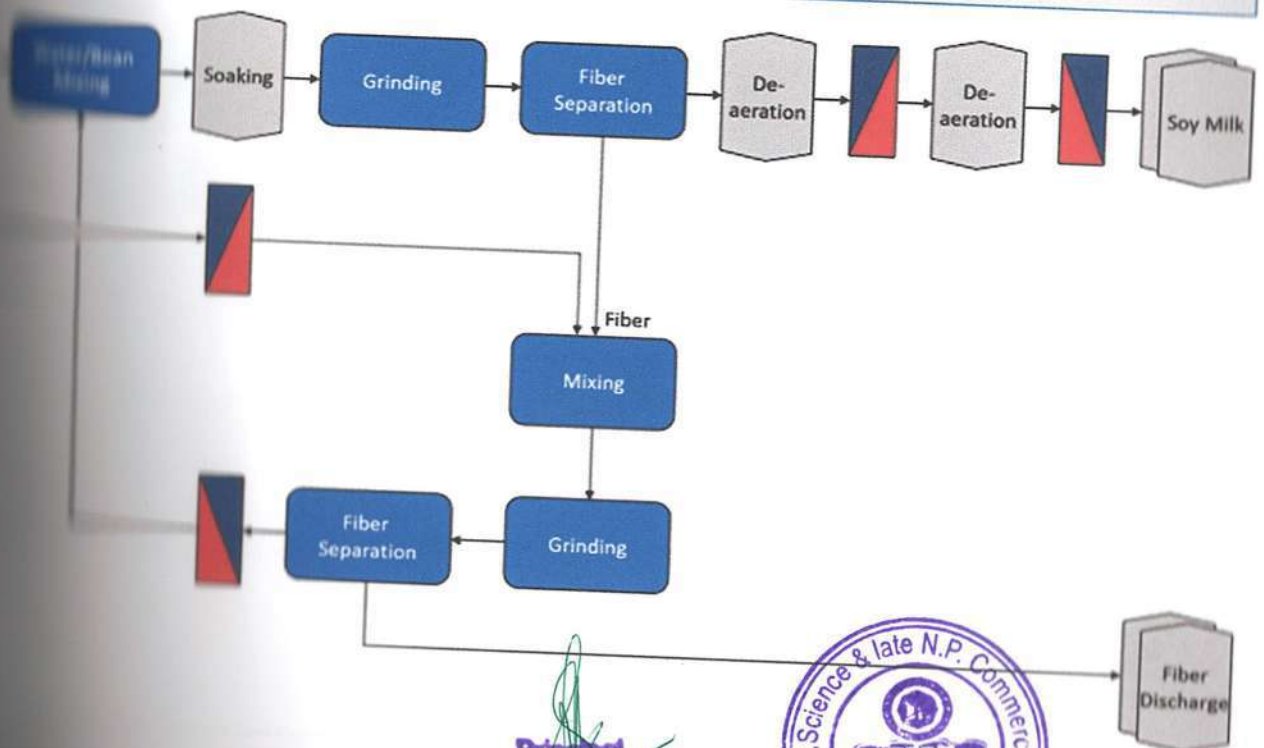




## Requirements

- Beakers
- Pestle and mortar
- Measuring cylinder
- Glass rod
- Tripod - stand
- Thermometer
- Muslin cloth
- Burner
- Soya beans
- Buffalo milk
- Fresh curd
- Distilled water

### TEC Square Technology – Soy Milk Extraction



## Conclusion

Present review concludes that soymilk is highly nutritious which contains protein, fat, carbohydrates vitamins and minerals similar to cow milk. The shelf life of soymilk can be increased by different techniques of preservation. The non-thermal methods like high pressure processing and pulse electric field processing shows better result in terms of quality of soymilk as compare to the thermal methods of preservation like heating and drying. There is minimum change in color after non thermal methods of preservation. The self life can be increased with best results in quality if stored at refrigerated condition.



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**M.Sc.**  
**Chemistry**  
**Project Work**

***“ GREEN CHEMISTRY- Bio diesel and Bio petrol also study extraction process of Bio Diesel ”***

**A Project Report**

Submitted to the  
**Gondwana University Gadchiroli**

For the degree of  
Master of Science (Chemistry)

By

**Mr. Shashikant B. Shende**

M.Sc. Chemistry Final Year

Under the Supervision of

**Dr. Satish S. Kola**

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Armori

Date: 29/07/21



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**HOD/Co-ordinator**

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**Commerce College Armori**

**M.G. Art & Science & Late N. P. Commerce College, Armori, Dist Sadchiroli**

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Date:

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## INTRODUCTION TO GREEN CHEMISTRY

### GREEN CHEMISTRY MEANS...

- Preventing pollution before it happens rather than cleaning up the mess later.

### GREEN CHEMISTRY MEANS...

- Saving companies money by using less energy and fewer/safer chemicals, thus reducing the costs of pollution control and waste disposal.

### EXAMPLES OF GREEN CHEMISTRY

- Reducing lead pollution
- Putting out fires the green way
- Safer dry cleaning



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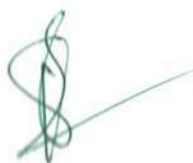




## Introduction

Bio-diesel is an eco-friendly, alternative diesel fuel prepared from domestic renewable resources i.e. vegetable oils (edible or non- edible oil) and animal fats. These natural oils and fats are made up mainly of triglycerides. These triglycerides when react with striking similarity to petroleum derived diesel and are called "Bio- diesel". As India is deficient in edible oils, non-edible oil may be material of choice for producing bio diesel . For this purpose *Jatropha curcas* considered as most potential source for it. Bio diesel is produced by transesterification of oil obtained from the plant.

*Jatropha Curcas* has been identified for India as the most suitable Tree Borne Oilseed (TBO) for production of bio-diesel both in view of the non-edible oil available from it and its presence throughout the country. The capacity of *Jatropha Curcas* to rehabilitate degraded or dry lands, from which the poor mostly derive their sustenance, by improving land's water retention capacity, makes it additionally suitable for up-gradation of land resources. Presently, in some Indian villages, farmers are extracting oil from *Jatropha* and after settling and decanting it they are mixing the filtered oil with diesel fuel. Although, so far the farmers have not observed any damage to their machinery, yet this remains to be tested and PCRA is working on it. The fact remains that this oil needs to be converted to bio-diesel through a chemical reaction - transesterification. This reaction is relatively simple and does not require any exotic material. IOC (R&D) has been using a laboratory scale plant of 100 kg/day capacity for trans-esterification; designing of larger capacity plants is in the offing. These large plants are useful for centralized production of bio-diesel. Production of bio-diesel in smaller plants of capacity e.g. 3 to 20 kg/day may also be started at decentralized level.



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**GREEN CHEMISTRY  
WORKS TOWARD  
SUSTAINABILITY BY:**

- **Designing more efficient processes that minimize the production of waste materials.**



**GREEN CHEMISTRY  
WORKS TOWARD  
SUSTAINABILITY BY:**

- **Making chemical products that do not harm either our health or the environment,**
- **Using industrial processes that reduce or eliminate hazardous chemicals, and**



**IN SUMMARY,  
GREEN CHEMISTRY IS...**

- **Scientifically sound,**
- **Cost effective, and**
- **Leads toward a sustainable civilization.**



**CONCLUSION**

\*\*

\*\*



  
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**Project Work**



**CHEMISTRY PROJECT**  
**Report On**

**Sterilisation of water using bleaching powder**

**IV<sup>th</sup> Semester Project Report**

**2020 – 2021**

**Submitted To Gondwana University, Gadchiroli**

**...Submitted by...**

**Miss. Shivani Bhupal Hemke**

**M. Sc. Part II Sem. IV**

**....GUIDED BY.....**

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CERTIFICATE

This is to certify that. Miss. Shivani Bhupal hemke has carried out his project work on the topic entitled "Sterilisation of water using bleching powder" during the academic session 2020-21 under my supervision in the Post Graduate Department of Chemistry, M.G. Arts Science and Late. N.P. Commerce College Armori This research work presented in this project is own work of the candidate.

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Date: 25/07/21



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## DECLARATION

I declare that this project work of "Sterilisation of water using bleaching powder" was done by me in M.G. Arts Science and Late. N.P. Commerce College Armori during the academic session 2020-21. This project work has not been submitted earlier to any University or Institution for the award of any diploma or a degree.

Place : Armori

Date: 25/07/21



Miss. Shivani B. Hemke

(M.Sc. Chem Sem-IV Student)



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## INTRODUCTION




### Need of Water

Water is an important and essential ingredient in our quest for survival on this planet. It is very essential for carrying out various metabolic processes in our body and also to carry out Hemoglobin throughout the body.

In order to fulfill such a huge demand of water, it needs to be purified and supplied in a orderly and systematic way.

But with the increasing world population, the demand for drinking water has also increased dramatically and therefore it is very essential to identify resources of water from which we can use water for drinking purposes. Many available resources of water do not have it in drinkable form. Either the water contains excess of Calcium or Magnesium salts or any other organic impurity or it simply contains foreign particles which make it unfit and unsafe for Drinking.



  
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## Purification of Water

There are many methods for the purification of water. Some of them are

1. Boiling

2. Filtration

3. Bleaching powder treatment

4. SODIS (Solar Water Disinfection) and the list goes on.... Boiling is perhaps the most commonly used water purification technique in use today. While in normal households it is an efficient technique it cannot be used for industrial and large scale purposes. It is because in normal households, the water to be purified is very small in quantity and hence the water loss due to evaporation is almost negligible. But in Industrial or large scale purification of water the water loss due to evaporation will be quite high and the amount of purified water obtained will be very less.

Filtration is also used for removing foreign particles from water. One major drawback of this purification process is that it cannot be used for removing foreign chemicals and impurities that are miscible with water. SODIS or Solar Water Disinfection is recommended by the United Nations for disinfection of water using soft drink bottles, sunlight, and a black surface- at least in hot nations with regularly intense sunlight. Water-filled transparent bottles placed in a horizontal position atop a flat surface in strong sunlight for around five hours will kill microbes in the water. The process is made even more safe and effective if the bottom half of the bottle or the surface it's lying on is blackened, and/or the flat surface is made of plastic or metal. It's the combination of heat and ultraviolet light which kills the organisms.

The major drawback of this purification technique is that it cannot be used in countries with cold weather. Also, the time consumed for Purification process is more and it also needs a 'blackened' surface, much like solar cookers.



A handwritten signature in green ink, consisting of several loops and a long horizontal stroke at the end.

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## CALCULATIONS

Sample I (BISLERI WATER):-

Amount of bleaching powder used to disinfect 100ml of water.

$$= (6.5 - 5.8) = 0.7 \text{ ml of } 0.1 \text{ N of } \text{Na}_2\text{S}_2\text{O}_3 \text{ solutions.}$$

1 ml of bleaching powder solution contains bleaching powder.

$$= 2.5/250 = 0.01 \text{ gm}$$

20ml of bleaching powder solution = 2.5ml of 0.1  $\text{Na}_2\text{S}_2\text{O}_3$

So, 1ml of 0.1 of 0.1 N  $\text{Na}_2\text{S}_2\text{O}_3$  solution =  $20/2.5$  ml of bleaching powder solution

Volume of bleaching powder solution required to disinfect 100ml of water sample I

$$= 0.7 * 20/6.5 \text{ ml.}$$

0.7 \*  $20/6.5$  ml bleaching powder solution

$$= ((0.7 * 20) / 6.5) * 0.01 \text{ gm of bleaching powder.}$$

Amount of bleaching powder required to disinfect 1 ltr. of water sample- I

$$= 0.7 * (20/6.5) * ((0.01 * 1000) / (100)) \text{ g} = 1.4/6.5 = 0.215 \text{ gm}$$

Sample II (RAIN WATER)

Amount of bleaching powder used to disinfect 100ml of water.

$$= (6.5 - 3.0) = 3.5 \text{ ml of } 0.1 \text{ N of } \text{Na}_2\text{S}_2\text{O}_3 \text{ Solutions.}$$

1ml of bleaching powder solution contains bleaching powder.

$$= 2.0/250 = 0.008 \text{ gm}$$

20ml of bleaching powder solution = 2.5ml of 0.1  $\text{Na}_2\text{S}_2\text{O}_3$



  
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**M.Sc.**  
**Chemistry**  
**Project Work**

# *Chemistry Project Report*

On

## **Comparative study and Qualitative Analysis of Different Fruit Juices found in Armori Area**

Submitted for partial fulfillment of requirement for the degree of

**MASTER OF SCIENCE**

**( CHEMISTRY )**

Submitted By

**Suyog Khushal Gaydhane**

Under the Guidance of

**Prof. S. M. Sontakke**

**Prof. Dr. Satish S. Kola**

**Prof. Dr. Naresh D. Bansod**



**Department of Chemistry,**

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College Armori.**

**2020-2021**





Department of Chemistry  
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Commerce College Armori

C E R T I F I C A T E

*This is to certify that the Project entitled Comparative study And Qualitative Analysis of Different Fruit Juices found in Armori Area is a bonafide work and it is submitted to the Gondwana University, Gadchiroli By Suyog Khushal Gaydhane in the partial fulfillment of the requirement for the degree of Master Of Science in Chemistry, during the academic year 2020-2021 under my guidance.*

**Dr. Satish S. Kola**  
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**Dr. Naresh D. Bansod**  
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ORDINATOR OF THE INSTITUTION**

This is to certify that dissertation entitled "Comparative study And Qualitative Analysis of Different Fruit Juices found in Armori Area" is a bonafide research work done by Mr. Suyog Khushal Gaydhane under the guidance of Professor Dr. Satish S. Kola and Dr. Naresh D. Bansod

Place:- Armori

Date :- 04.08.21

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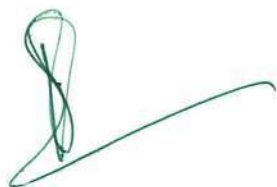
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## **INTRODUCTION**

Fruits are always a part of balanced diet. That means fruits provide our body the essential nutrients, i.e. Carbohydrates, proteins, vitamins and minerals.

Again their presence in these is being indicated by some of our general observations like -freshly cut apples become reddish black after some time. Explanation for is that iron present in apple gets oxidized to iron oxide. So, we can conclude that fruits contain complex organic compounds, e.g. anthracic, chlorophyll, esters (flavoring compounds), carbohydrates, vitamins and can be tested in any fruits by extracting out its juice and then subtracting it to various tests which are for detection of different classes of organic compounds. Detection of minerals in fruits means detection of elements other than carbon, hydrogen and oxygen A fruit juice is always a 100% product and should not be confused with soft drinks or other refreshing drinks.



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## SIGNIFICANCE OF FRUIT JUICE

### Health effects:-

Juices are often consumed for their perceived health benefits. For example, orange juice rich in vitamin C, folic acid, potassium, is an excellent source of bio is available antioxidant phytochemicals and significantly improves blood lipid profiles in people affected with hypercholesterolemia. Prune juice is associated with benefit. Cranberry juice has long been known to help prevent or even treat bladder infections and a digestive health it is now known that a substance in cranberries prevents bacteria from binding to the bladder.



Many fruit juices have a higher sugar (fructose) content than sweetened soft drinks: e.g., typical grape juice has 50% more sugar than Coca-Cola. While soft drinks (e.g. Coca-Cola) cause oxidative stress when ingested and may even lead to insulin resistance in the long term, the same thing cannot be attributed to fruit juices. On the contrary, fruit juices are actually known for their ability to raise serum antioxidant capacity and even offset the oxidative stress and

## COMPONENTS OF FRUITS

**1. CARBOHYDRATES:** - Carbohydrates are poly, hydroxyl alcohols, which have an aldehyde or ketones group. They have general formula  $C_nH_{2n}O_n$ , Carbohydrates are the main source of energy 1g of carbohydrates yield 18KJ of energy. The monosaccharide serves as building block. Glucose is also used in formation of fats and amino acids.

**2. MINERALS:-** Minerals from 1-3% of the cell contents. Any marked change in the concentration results in the mal functioning of cell and finally death some mineral present in the diet are:

**i. CALCIUM:-** It is the major component of bone and teeth. Calcium is required for blood clotting, muscle contraction, nerve impulse transmission and heart functioning.

**ii. IRON:-** Hemoglobin in our body contains iron which is the universal carrier of  $O_2$  &  $CO_2$ , deficiency of iron causes anemia or to failure of hemoglobin synthesis.

The juices are made dilute by adding distilled water to it, in order to remove colour and to make it colourless so that colour change can be easily watched and noted down.. Now test for food components are taken down with the solution.



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**M.Sc.**  
**Chemistry**  
**Project Work**

**“AN OVERVIEW OF PYRAZOLE DERIVATIVES  
SYNTHESIS AND ITS APPLICATION”**

**A Project report**

submitted to the

**GONDWANA UNIVERSITY, GADCHIROLI**

For the degree of

Master of Science (Chemistry)

By

**Mr. Vicky Anandrao Satpute**

M.Sc. Chem. Sem-IV Student

Under the Supervision of

**Dr. Satish S. Kola**

(Assi. Professor of Chemistry.)

**Dr. Naresh D. Bansod**

(Assi. Professor of Chemistry)

**Prof. S.M. Sontakke**

(Head Of Department Chemistry)

Work of Place

**P.G. Department of Chemistry**

**M.G. Arts, Science & Late. N.P. Commerce**


**College Armori**

**2020-2021**




## CERTIFICATE


This is to certify that the work presented in this project entitled "AN OVERVIEW OF PYRAZOLEDERIVATIVES SYNTHESIS AND ITS APPLICATION" is an own work of Mr. Vicky A. Satpute performed at M.G. Arts, Science & Late. N.P. Commerce College Armori for the partial fulfilment of degree of Master of Science in Chemistry in the faculty of Science under my supervision. To the best of my knowledge, this work has been not submitted earlier to any University or Institution for the award of any diploma or degree.

  
Prof. S. M. Sontakke  
Head of Department (Chemistry)


Place: Armori Department of Chemistry  
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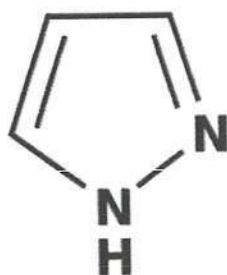


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## INTRODUCTION

The chemistry of pyrazole has been extensively investigated in the past. Pyrazoles are five membered ring heterocyclic compounds, have some structural features with two nitrogen atoms in adjacent position and are also called as azoles [1].



**Properties:-Mol. formula:- $C_3H_4N_2$  Melting Point:-66-70 °C Acidity Pka:-14.0 Boiling Point:-186-188 °C**

Pyrazoles are aromatic molecules due to their planar conjugated ring structures with delocalized electrons. Therefore many important properties of these molecules were analyzed by comparing with the properties of benzene derivatives [2]. The development of simple synthetic methods for widely used organic compounds from readily available starting materials is one of the major challenges in organic synthesis [2].

Nitrogen containing heterocyclic compounds are wide-spread in nature and their applications to biologically active pharmaceuticals, agrochemical and functional materials are becoming more and more important [3-7]. Thus the development and new efficient synthetic methods for N- heterocycles with structural diversity is one of the major interests of modern synthetic organic chemist [8-10].

Pyrazole derivatives, some members of the pyrazoles class, have presented excellent pharmacological effectiveness and biological antimicrobial, anti-inflammatory, antihistamines, antiviral, anticonvulsant and fungicidal activities [11-13].

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## AIM

**“SYNTHESIS AND APPLICATIONS OF PYRAZOLE DERIVATIVES - A REVIEW”**

## OBJECTIVES

- 1) To study the progress towards the synthesis of pyrazole derivatives.
- 2) To study the applications of pyrazole derivatives with special emphasis on biological applications.
- 3) To evaluate and suggest the best methodology from the current available methods for the synthesis of pyrazole derivatives.



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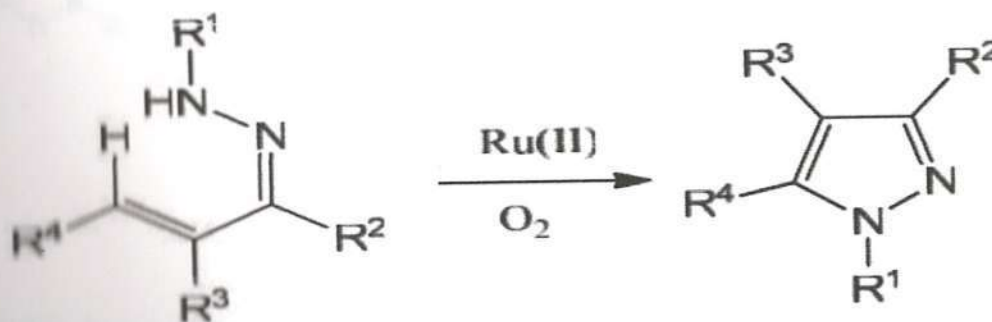
## SYNTHESIS OF PYRAZOLE DERIVATIVES

Synthesis of pyrazole may be broadly divided into two major sections i.e., Conventional method and Non Conventional methods.

a) **Conventional method:** - This methodology involves synthesis of pyrazole carried out under reflux condition, catalyst, higher acidic, grinding condition etc... few of the protocols under this method have been discussed from the available literature survey as follows

1. A novel Ru(II) - catalyzed oxidative -C - N- coupling method has been reported for the synthesis of highly diversified tri - and tetrasubstituted pyrazoles from easily accessible starting materials (Scheme - 3). Dioxygen gas is employed as the oxidant which plays an essential role in the catalytic cycle of C - H activation. This method is useful for making a variety of multisubstituted pyrazoles, most of which are difficult to access with conventional methods. The reaction demonstrates excellent reactivity, broad scope, high tolerance of functional groups and high yield. [33].

Scheme 1



2. The reaction of Baylis - Hillman adduct and phenyl hydrazine in dichloroethane at 50 - 70 °C for about 6 hrs afforded the tetrasubstituted pyrazole derivatives with very high regioselectivity of products in 89% yield (Scheme - 2) [31]. The reaction follows via the successive hydrazone formation, cyclisation and double bond isomerisation sequence under reflux conditions.

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## CONCLUSION

From current review, it was found that pyrazole moiety is a versatile molecule with broad spectrum properties. Various authors have explored it's synthesis through conventional as well as non conventional method and it has been found that the non conventional method has more advantage over conventional methods.

Current review suggests the pyrazole derivatives need more exploration and research, as they have enough potential to tackle the deadly diseases.



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**M.Sc.**  
**Chemistry**  
**Project Work**

A Project Report on

***“Studies on Saponification Values  
of Some Edible Seed Oils”***

Submitted to the



**Gondwana University, Gadchiroli**

For the degree of  
Master of Science (Chemistry)

By

**Miss. Vishakha N. Akare**

M.Sc. Chemistry  
Semester - IV

Under the **Supervision** of

**Dr. Satish S. Kola**

(Asst. Professor, Dept. of Chemistry)

**Dr. Naresh D. Bansod**

(Asst. Professor, Dept. of Chemistry)

**Prof. S.M. Sontakke**

(Head of Dept., Dept. of Chemistry)

**P. G. Department of Chemistry,  
Mahatma Gandhi Arts, Science & Late N.P. Commerce College,  
Armori, Dist. Gadchiroli.**

**2020-21**



## DECLARATION

I declare that this project work of "Studies on Saponification Values of Some Edible Seed Oils" was done by me in Mahatma Gandhi Arts Science and Late. N.P. Commerce College, Armori, Dist. Gadchiroli, during the academic session 2020-21. This project work has not been submitted earlier to any University or Institution for the award of any diploma or a degree.

Place - Armori

Date -

*Akare*

Miss. Vishakha N. Akare

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## CERTIFICATE

This is to certify that. **Miss. Vishakha N. Akare** has carried out his project work on the topic entitled “**Studies On Saponification Values Of Some Edible Seed Oils**” during the academic session **2020-21** under my supervision in the Post Graduate Department of Chemistry, **Mahatma Gandhi Arts Science and Late. N.P. Commerce College, Armori, Dist. Gadchiroli**. This research work presented in this project is own work of the candidate.

Place - Armori

Date -



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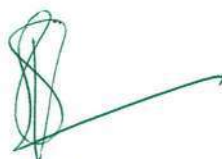
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**ENDORSEMENT BY THE HOD/ PRINCIPAL/CO-  
ORDINATOR OF THE INSTITUTION**

This is to certify that dissertation entitled “**Studies On Saponification Values Of Some Edible Seed Oils**” is a bonafide research work done by **Miss. Vishakha N. Akare** under the guidance of Professor **Dr. Satish S. Kola** and **Dr. Naresh D. Bansod**.

Place - Armori

Date -

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## LIST OF ABBREVIATIONS

Symbols	Abbreviations
UV	Ultraviolet
Ph	Phenyl
Ar	Aromatic
Et	Ethyl
Ac	Acetyl
mp	Melting point
°C	Degrees Celsius
h	Hour (s)
mL	Milliliter (s)
µg	Microgram
mmol	Millimole (s)
conc.	Concentrated
THF	Tetrahydrofuran
DMF	Dimethyl formamide
DMSO	Dimethyl Sulphoxide

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## **Conclusion**

The saponification value allows for comparison of the average fatty acid chain length. The long chain fatty acids found in fats have a low saponification value because they have a relatively fewer number of carboxylic functional groups per unit mass of the fat as compared to short chain fatty acids. The saponification values obtained provide an idea about the molecular weight, structure of fatty acids and amount of lye for soap manufacturing. The saponification values analyzed in the present study would be correlated to the chemical composition. The soap obtained from these oils would be improved by addition of other oils/fats. The hard/soft nature, cleansing action, fluffy nature of foam and most important the skin care would be controlled by these values.

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