

## CONSIDERATIONS OF ENVIRONMENT AND ECOLOGY IN THE MEDIAEVAL MARATHI POETIC WORK "DNYANESHWARI"

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**ABSTRACT:** The mediaeval Marathi saint-poet Sant Dnyaneshwar's work, *Dnyaneshwari*, is a Marathi rendition of the renowned Sanskrit scripture the 'Bhagwad Gita'. But, while enlightening the religious and philosophical meanings of the Sanskrit Shlokas in Gita, he often uses the images of nature and animals. In so doing, he points out that a true devotee of God could learn the generosity and selflessness from a tree. In the course of his explanation he goes on to comment on the violence being inflicted on nature and animals, visualises the future scarcity of natural resources like water and plants, exhorts us to see the image of God in every being - plant or animal, and prays for the welfare of all - the human and the non-human.

**Key Words:** : Marathi saint-poetry, Sant Dnyaneshwar, *Dnyaneshwari*, environment, ecology, ecocriticism.

Poetic tradition in Maharashtra is rich and diverse. Initially, this Marathi poetic tradition was nourished by a line of 'santkavis' (saint-poets) in the mediaeval times who, through their work, tried to spread public awareness as well as spiritual enlightenment. One of them, Sant Dnyaneshwar (1275-1296 A.D.), also called as Dnyanadev (spelled also as Jnaneshwar/ Jnanadev), pioneered the Naath and/or Warkari tradition in Maharashtra, and also made a seminal contribution to Marathi poetry. His most famous work, *Bhavartha Deepika* or *Dnyaneshwari*, is considered to be a milestone in Marathi Literature. Referring to his contribution to Marathi literature, Acharya Vinoba Bhave had said, 'Marathi literature minus *Dnyaneshwari* is equal to zero' (Arvikar, 6). *Dnyaneshwari* was written when Dnyaneshwar was only fifteen or sixteen. In Maharashtra, Sant Dnyaneshwar is affectionately called as 'mauli' (mother) because of the extreme tenderness of his thoughts and verse. Besides *Dnyaneshwari*, Sant dnyaneshwar has also written *Amritanubhav*, *Changdevpasashti*, *Haripath* and *Abhangas* but his best and most famous work is '*Dnyaneshwari*'. It has such an esteemed place in the Indian literature that one Hindi commentator says, "If *Dnyaneshwari*, *Gita* and *Amritanubhav* are not available in the literature of any Indian language then the Indianness of the people speaking that language may not be deemed as complete" [qtd. in Tawre, 15; (translation mine)].

Written in 1290 A. D. (Saka 1212), *Dnyaneshwari* is a commentary on *BhagwadGita*. In those days *BhagwadGita* was available only in Sanskrit which was beyond the comprehension of the common people. Even today Vedas are not accessible to a layman because of the difficult Vedic philosophy and its Sanskrit language. *Dnyaneshwari* was a reincarnation of *Gita* in Prakrit-Marathi. In *Dnyaneshwari*, Dnyaneshwar didn't merely translate *BhagwadGita* but provided a kind of explanatory commentary in Marathi for the benefit of the common people. Each Sanskrit 'Shloka' is considered thoroughly and then follows a flood of Marathi 'Ovis' (couplets) that doesn't only enlighten the reader with the meaning of the original *shloka* but also recreate the meaning in an elaborate and lucid way. That is why, perhaps, *Dnyaneshwari*'s second name is '*Bhavarthadeepika*' (flame that enlightens the meaning). Hence, *Dnyaneshwari* is an independent creation of a poet. Though, subjectwise, it is based on *Bhagwad Gita* it touches upon the other secular themes which are relevant not only to his times but also of our own.

The literary creations of Sant Dnyaneshwar were of a yogi or a saint, even then he never loses contact with the ground. Though, basically, his poetic output has a religio-philosophical context, it also has socio-scientific context. In his explanation of the *yogas* and various spiritual concepts associated with them, he uses the examples from everyday life and makes frequent use of the images of trees, forests, water, air, sun, birds, beasts etc. and stresses the purity and propriety of the natural order of things. Commenting on the qualities of a true devotee following Bhaktiyoga, as exhorted by god Krishna in *Geeta*, sant Dnyaneshwar says that a true devotee doesn't discriminate between the living and the non-living, the human and the non-human because he sees god in every being. He can-

Unidiache pahudane | nirodhache velhavane|

Zadansi sajane | chavalave ga ||64|| (Dnyaneshwari, Chapter. 12)

{- Have the feeling of sleep while awake, experience the satisfaction of senses having control over them or have the enjoyment of friendship by making friends with trees (translation mine)}.

# 1. Technological Transformation of our Environment: An American Fictional View

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## Abstract

The growing sense pollution and toxicity of the environment has begun to enter in the popular consciousness. As a result, the writers around the world have begun to lament the various aspects of environmental degradation. The American novelist Don DeLillo is one such author who gives us many appealing and awe-inspiring fictionalized scenes of technologically transformed environment, where life becomes much complicated and compromised, because of the visible pollutants as well as invisible contaminants, toxins, radiations etc.

**Keywords:** DeLillo, fiction, technology, pollution, toxicity, environmental degradation.

If we scan the daily newspapers, periodical magazines or watch the stories on electronic media, we can easily see that the growing sense pollution and toxicity of the environment has begun to enter in the popular consciousness. This concern has also been engaging the creative writers around the globe. Don DeLillo, an American novelist (1936 - ) is one such writer who has treated the theme of environmental concern with great appeal. Waste consciousness in the modern societies and an awe-inspiring concern for the techno-industrial alteration of our environment pervades his writings.

While analyzing the postmodern culture of America DeLillo attracts the readers' attention towards the ever new ways of pollution and contamination that have come in the wake of the current techno-industrial consumer culture. The growing intensity of pollution consciousness is very poignantly underlined, in his novel 'Names' (1982), when a female character named Kathryn, commenting on the surrounding industrial waste and pollution says, "What then will the "contaminants, pollutants, and noxious industrial waste" reveal about our culture" to the future generations? (qtd. from Martucci, 66).

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## Molecular Interaction of Aqueous LiOH.H<sub>2</sub>O in DMSO at Different Temperatures

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### ABSTRACT :

The thermodynamic parameters such as density ( $\rho$ ), ultrasonic velocity ( $U$ ) and viscosity ( $\eta$ ) have been measured for a ternary mixture of aqueous lithium hydroxide and Dimethyl sulfoxide for concentration range 0.0% to 100% (v/v) at different temperature. Using the experimental data, some of the acoustical parameters such as, adiabatic compressibility ( $\beta_a$ ), free length ( $L_f$ ), free volume ( $V_f$ ), internal pressure ( $\pi_i$ ), and Gibb's free energy ( $\Delta G$ ) are evaluated at different temperature. The present paper shows ion-dipole interactions between Li<sup>+</sup> of lithium hydroxide and dimethyl sulfoxide are found to be responsible for association and ion-dipole interactions between Li<sup>+</sup> of lithium hydroxide and water molecules are found to be responsible for dissociation in the liquid mixtures. The nonlinear variation of ultrasonic velocity and the thermo-acoustical parameters lead to dipole- ion interaction between dimethyl sulfoxide and 1N aqueous lithium hydroxide is stronger than dipole- ion interaction between water and aqueous lithium hydroxide. The behavior of these parameters with concentration of the mixture has been discussed in terms of molecular interaction between the components of the liquids.

**Keywords:** Ultrasonic velocity, acoustical parameters, molecular interactions, normality (1N), aqueous lithium hydroxide (aq. LiOH.H<sub>2</sub>O) and dimethyl sulfoxide (DMSO).

### Introduction

The ultrasonic study of liquid plays an important role in understanding the behavior and strength of molecular interactions<sup>1-3</sup>. The studies on the physio-chemical properties of organic liquid like dimethyl sulfoxide in aqueous solution of lithium hydroxide give useful information, which is used to understand the mechanism of molecular interaction<sup>4</sup>. The large number of studies has been made on the molecular interaction in liquid systems by various physical methods like, Raman Effect, Nuclear Magnetic Resonance, and ultra sonic method<sup>5-7</sup>. The ultrasonic velocity data for ternary liquid mixtures have been used for by many researchers<sup>8-13</sup>. In present paper we have reported the ultrasonic velocity, density, and viscosity of 1N aqueous lithium hydroxide with dimethyl sulfoxide at different temperature over the entire range of concentrations of aqueous LiOH.H<sub>2</sub>O in DMSO. From these experimental values, number of thermodynamics parameters, namely adiabatic compressibility ( $\beta_a$ ), free length ( $L_f$ ), free volume ( $V_f$ ), internal pressure ( $\pi_i$ ) and Gibb's free energy ( $\Delta G$ ) have been calculated. The variations of these parameters with concentrations were found to be useful in understanding the nature molecular interactions in the ternary liquid mixtures.

### Materials and Method

The ultrasonic velocity have been measured in the ternary mixture of aqueous lithium hydroxide and dimethyl sulfoxide using an ultrasonic Pulse overlap technique working at frequency 4 MHz with an overall accuracy of  $\pm 0.1 \text{ ms}^{-1}$ . The temperature was maintained an electronically digital operated constant temperature water bath circulate water through the double



# ULTRASONIC STUDY OF MOLECULAR INTERACTION IN THE MIXTURE OF AQUEOUS POTASSIUM HYDROXIDE WITH N, N-DIMETHYL FORAMIDE AT DIFFERENT TEMPERATURES

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## ABSTRACT

An analysis of different thermodynamic properties as a function of temperature provides valuable information about their characteristics. The concentration and temperature dependence of acoustic and volumetric properties of multi component liquid mixtures has proved to be a useful indicator of the existence of significant effect resulting from intermolecular interactions. The thermo-physical parameters such as density ( $\rho$ ), ultrasonic velocity ( $U$ ) and viscosity ( $\eta$ ) have been measured at 4 MHz frequency in the ternary mixtures of aqueous potassium hydroxide with N, N-dimethyl foramide over entire range concentration (v/v) at temperature 298K-308K using ultrasonic Pulse overlap technique. The experimental data have been used to calculate acoustical parameter namely adiabatic compressibility ( $\beta_a$ ), free length ( $L_f$ ), free volume ( $V_f$ ), internal pressure ( $\pi_i$ ), relaxation time ( $\tau$ ) and Gibb's free energy ( $\Delta G$ ). The present paper represents the nonlinear variation of ultrasonic velocity and the thermo-acoustical parameters lead to dipole-ion interaction between dimethyl foramide and 1N aqueous potassium hydroxide is stronger than dipole-ion interaction between water and aqueous potassium hydroxide.

**Keywords:** Ultrasonic velocity, acoustical parameters, molecular interactions, ternary mixtures, normality (1N), aqueous potassium hydroxide (aq. KOH) and dimethyl foramide (DMF).

## 1. Introduction

The ultrasonic study of liquid plays an important role in understanding the nature and strength of molecular interactions<sup>1-3</sup>. A large number of studies have been made on the molecular interaction in liquid systems by various physical methods like, Raman Effect, Nuclear Magnetic Resonance, Ultra Violet and ultrasonic method<sup>4-6</sup>. In recent years ultrasonic technique has become a powerful tool in providing information regarding the molecular behavior of liquids and solids, owing to its ability of characterizing physio-chemical behavior of the medium. The ultrasonic velocity data for ternary liquid mixtures have been used for by many researchers<sup>7-11</sup>. In present paper we have reported the ultrasonic velocity, density, and viscosity of 1N aqueous potassium hydroxide with N, N-dimethyl foramide at different temperature over the entire range of concentrations of aqueous KOH in DMF. From these experimental values, number of thermodynamics parameters, namely adiabatic compressibility ( $\beta_a$ ), free length ( $L_f$ ), free volume ( $V_f$ ), internal pressure ( $\pi_i$ ), relaxation time ( $\tau$ ) and Gibb's free energy ( $\Delta G$ ) have been calculated. The variations of these parameters with concentrations were found to be useful in understanding the nature molecular interactions between the components.

## 2. Experimental

The ultrasonic velocity in the liquid mixtures have been measured using a Pulse echo overlap technique working at frequency 4 MHz with an overall accuracy of  $\pm 0.1 \text{ ms}^{-1}$ , an electronically digital operated constant temperature water bath

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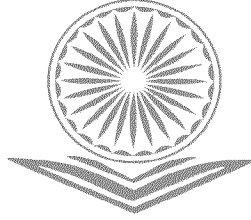
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## 18. Thermo-Acoustic Interaction of Aqueous LiOH.H<sub>2</sub>O and 1,4 Dioxane at Different Temperatures

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### ABSTRACT

The thermo-acoustic parameters such as density ( $\rho$ ), ultrasonic velocity (U) and viscosity ( $\eta$ ) have been measured for a ternary mixture of aqueous lithium hydroxide and Dimethylforamide system at 0.0% to 100% (v/v) and at different temperature. Using the experimental data, some of the acoustical parameters such as, adiabatic compressibility ( $\beta_a$ ), free length ( $L_f$ ), free volume ( $V_f$ ), internal pressure ( $\pi_i$ ), and relaxation time ( $\tau$ ) are calculated at different temperature. The behavior of these parameters with composition of the mixture has been discussed in terms of molecular interaction between the components of the liquids.

**Keywords:** Ultrasonic velocity, acoustical parameters, molecular interactions, normality (1N), aqueous lithium hydroxide (aq. LiOH.H<sub>2</sub>O) and 1,4 dioxane

### 1. Introduction

The studies on the physio-chemical properties of organic liquid like 1,4 dioxane in aqueous solution of lithium hydroxide give useful information, which is used to understand the mechanism of molecular interaction<sup>1-6</sup>. The large number of studies has been made on the molecular interaction in liquid systems by various physical methods like, Magnetic Resonance Raman Effect, Nuclear, and ultra sonic method<sup>7-11</sup>. The ultrasonic velocity data for liquid mixtures have been used for by many researchers<sup>12-22</sup>. In present paper we have reported the ultrasonic velocity, density, and viscosity of 1N aqueous lithium hydroxide with dimethyl sulfoxide at different temperature over the entire range of concentrations of aqueous LiOH.H<sub>2</sub>O in 1,4 dioxane. From these experimental values, number of thermodynamics parameters, like adiabatic compressibility ( $\beta_a$ ), free length ( $L_f$ ), free volume ( $V_f$ ), internal pressure ( $\pi_i$ ) and relaxation time ( $\tau$ ) have been evaluated. The variations of these parameters with concentrations



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प्रा.ववन वळीराम अवघडे  
मराठी विभाग प्रमुख, आनंद निकेतन कला वाणिज्य व विज्ञान महाविद्यालय, आनंदवन, वरोरा जि. चंद्रपूर - ४४२१०७.

स्त्री पुरुष निसर्गतः समान आहेत. स्त्री-पुरुष म्हणजे एकाच रथाची दोन चाक आहेत. त्यातील एक चाक मोडले तर रथ चालणार नाही. समाजाला प्रगतीच्या दिशेने न्यायवाचे असेल तर स्त्री-पुरुष दोघांचाही समान विकास होणे आवश्यक आहे. परंतु भारतासह इतर देशात इ.स. पूर्व काळापासून आजतागायत समाज व्यवस्थेने स्त्रीला नेहमीच गौण स्थान दिले. तिचे खच्चीकरण केले.

प्राचीन काळात हिंदुस्थानातील स्त्रियांचा सामाजिक दर्जा मात्र उच्च होता. बौद्धिक व सामाजिक जीवनात पुरुषांच्या बरोबरीचे स्थान स्त्रीला होते. स्वातंत्र्य समता, महत्त्व आणि आत्मविकास ही मानवी जीवनाची सर्व अंगे प्राप्त करून घेता येत होती राज्यकारभारात त्या आघाडीवर होत्या. धर्म, तत्त्वज्ञान ज्ञानविकास इ.विषयावर परखड विचार मांडत होत्या जगातील कोणत्याही देशातील स्त्रियांना जितका मान मिळत नव्हता किंबहुना त्यापेक्षा अधिक मान-सन्मान हिंदुस्थानातील स्त्रियांना मिळत होता. पण वैदिक आणि उत्तर वैदिक काळात स्त्रियांवर अनेक बंधने लादून सर्व अधिकारापासून तिला वंचित ठेवले पण बौद्ध काळात महिलांच्या स्थितीत व दर्जात वाढ झाली बुध्दाने स्त्रियांना समाजात आदरणीय स्थान दिले आणि पुरुषांच्या बरोबरीच्या पातळीवर त्यांना आणून बसविले. मात्र 'मनु' नंतर स्त्री अधोगतीला पोहचली.

'मनुस्मृतीत' मनुने स्त्रियांच्या एकंदर जीवनासंबंधी जे कायदे लिहून ठेवले ते स्त्री विकासाला पोषक न बनता न्हासात्मक ठरले पुरुषसत्ताक पध्दतीला चालना मिळाली आणि स्त्री ही पुरुषाची दासी झाली नवऱ्याची सेवा करण्यात ती स्वतःला धन्यता मानू लागली. मनुच्या स्त्रीविषयक नियमांनी तिला दुय्यम पातळीवर पोहचविले स्त्री ही मोहिनी आहे पुरुषाला वाम मार्गाला लावते चंचल निर्दयी, विरवासयातकी अशी उपाधी देऊन तिचे अवमूल्यन केले. परिणामी सामाजिक, धार्मिक, आर्थिक व सांस्कृतिक क्षेत्रात तिला दुय्यमत्वाची वागणूक मिळाली. स्वतःचे स्वातंत्र्य हरवून ती बसली चूल आणि मूल यानलिकडचा तिचा विचार थांबला ती गुलामीत राहू लागली.

अशा गुलामगिरीच्या गर्तेतून स्त्रियांना बाहेर काढण्याचा प्रयत्न अनेक समाज सुधारकांनी केला त्यात डॉ.आंबेडकरांचे स्थान उच्च दर्जाचे आहे. स्त्री सुधारणा चळवळीचा प्रारंभ एकोणिसाव्या शतकाच्या मध्यास लोकहितवादी गोपाळ हरि देशमुख यांच्यापासून सुरू झाली पण महात्मा जोतिबा फुले आणि सावित्रीबाई फुले यांच्या कार्याने या विचारप्रवाहाला कृतिशीलतेची जोड मिळाली स्त्री शूद्रांना शिक्षण देण्याच्या विरोधात असणाऱ्या परंपरागत स्थितीशील उच्चवर्णीय संस्कृतीला महात्मा फुलेंनी जबरदस्त धक्का दिला. सार्वजनिक सत्यधर्म पुस्तकात स्त्री-पुरुष जन्मतःच स्वतंत्र असून ते समान आहेत शिक्षण घेण्याचा त्यांना अधिकार असून आपले हक्क मिळवण्याचा त्यांना अधिकार आहे हे पटवून दिले स्त्रियांचे अज्ञान दूर करण्यासाठी व निर्भोडपणे समाजात उभे राहण्यासाठी शिक्षणाची आवश्यकता आहे हे ओळखून त्यांनी स्त्री शूद्रांसाठी शाळा सुरू केल्या.

इंगजी राजवटीत एकोणिसाव्या शतकाच्या दुसऱ्या दशकापासून

भारतीय समाजात उलथापालथीला प्रारंभ झाला, वाळशास्त्री जांभेकर, आचार्य दादोबा पांडुरंग राम वाळकृष्ण, लोकहितवादी, भांडारकर, न्या. म.गो. रानडे विष्णुशास्त्री पंडित, आगरकर इ. समाजसुधारकांनी स्त्री शिक्षण, बालविवाह, बाल वृद्ध विवाह, केशवपन यासारख्या स्त्रीदास्य विमोचनाच्या प्रश्नावर आपले लक्ष केंद्रीत केले त्यावर लिखान केले वर्तमानपत्रातून आवाज उठविले पण त्यांचे हे कार्य उच्चवर्णीयांपुरते सीमित राहिले आगरकरांनी निर्भोडपणे स्त्रियांचे शिक्षण, विवाह, पोषाख इ. संबंधी आधुनिक विचार मांडले महर्षी धोंडो केशव कर्वे यांनी विधवा अनाथ महिलांसाठी आश्रम, स्त्रियांसाठी शाळा महाविद्यालय आणि विद्यापीठ सुरू करून स्त्री शिक्षणाचा पाया पक्का केला पण त्यांचे हे कार्य सर्वंकष स्त्री सुधारणेच्या दृष्टिने परिणामकारक झाले नाही.

या परंपरेच्या पार्श्वभूमीवर स्त्रियांसाठी डॉ. आंबेडकरांनी केलेले कार्य हे खूप वेगळ्या व सार्वत्रिक पातळीवरचे होते. डॉ. बाबासाहेब आंबेडकरांची, त्यांच्या चळवळीच्या सुरुवातीपासून म्हणजे १९२४ पासून सामाजिक समतेसाठी, की ज्यायोगे हिंदू समाज एकात्म होईल ती धडपड आयुष्याच्या शेवटापर्यंत अव्याहत चालू होती. पण त्याच मोल त्यांच्या हयातीत लोकांना समजलेच नाही. उलट बाबासाहेबांच्या चळवळीला अस्पृश्यांची चळवळ समजून त्यांना त्रास दिला त्यांची अवहेलना केली.

१९२७ साली डॉ. आंबेडकरांनी चवदार तळ्याचा सत्याग्रह केला प्रत्येक नागरिकांला नैसर्गिक समानतेचा अधिकार मिळाला पाहिजे यासाठी पारंपारिक गुलामगिरीविरुद्ध बंड केले स्त्री शूद्र अतिशूद्र या शोषितांना क्रांतिकारी केले. हिंदू धर्मातील गुलामगिरीविरुद्ध संघर्ष करण्याचा क्रांतिकारी मार्ग डॉ. बाबासाहेब आंबेडकरांनी दिला. डॉ. आंबेडकरांचा उदय हा शोषणाविरुद्धचा उठाव आहे हे शोषण जसे अस्पृश्यांचे आहे तसे स्त्रियांचेही आहे. ब्राम्हणी धर्मांनी स्त्री, अस्पृश्य यांना गुलामीचा दर्जा दिला. शोषण केले म्हणून डॉ. आंबेडकरांनी स्त्री शूद्रावर गुलामगिरी लादणार 'मनुस्मृती' हा ग्रंथ जाळला त्यांच्या या चळवळीच्या लढ्यातून व लेखनातून स्वातंत्र्य समता या मूल्यांची पहाट उदयास आली. स्त्री मुक्तीची दिशा निश्चित झाली.

डॉ. बाबासाहेब आंबेडकर हे अस्पृश्य जातीत जन्मल्यामुळे जातीय विषमतेचे दुःख त्यांनी सोसले होते तेच दुःख स्त्रियांच्याही वाट्याला आले होते सामाजिक विषमतेचे चटके त्यांनाही बसले होते हे दुःख जसे अस्पृश्य तळागाळातील स्त्रियांचे होते तसेच ते उच्चवर्णिय स्त्रियांचे ही होते त्याही शोषित पीडित होत्या आणि या सर्वांच्या मुक्तीचा उपाय म्हणजे कायदा.

COMPARATIVE STUDY OF PHYTOPLANKTON AND ZOOPLANKTON DIVERSITY OF  
MAISDODAKA LAKE AND WAI LAKE IN DISTRICT YAVATMAL, (M.S.) INDIA

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ABSTRACT

*Phytoplankton and zooplankton are an important component of aquatic flora and fauna respectively. They serve as food for many aquatic animals especially fishes and play a key role in maintaining proper equilibrium between abiotic and biotic components of the aquatic ecosystem. In the present investigation an account of occurrence of phytoplankton and zooplankton, their nature, number and seasonal periodicity have been studied to assess the state of the nature of water. Zooplanktons are heterotrophic planktonic animals floating in water. They serve as good indicators of changes in water quality. Zooplankton dynamics have been studied extensively in lentic fresh waters (lakes and reservoirs), yet comparatively little research has focused on lotic waters (rivers).*

*The present study was undertaken to observe the seasonal changes in plankton population. The data on plankton in reservoir was collected seasonally during Feb.2017 to March.2019. In plankton flora, the green algae dominated over the other groups. The phytoplanktons identified are members of Chlorophyceae, Bacillariophyceae, Cynophyceae, Euglenophyceae, Dinophyceae respectively. The recorded groups of zooplankton belonged to Protozoa, Rotifera, Cladocera, Copepoda and Ostracoda respectively. The beautiful biodiversity of the animal fauna is represented through these diverse zooplanktonic forms. Through these qualitative studies a beautiful picture of biodiverse zooplanktonic forms of nature emerge on which the world of fishes sustain. They serve as food for many aquatic animals especially fishes and play a key role in maintaining proper equilibrium between abiotic and biotic components of the aquatic ecosystem.*

*Keywords: Zooplankton, Seasons, Population, Ecosystem.*

I. INTRODUCTION

The reservoirs have played a significant role in the India's social and economic progress during the past five decades. Without the dams and reservoirs India would have been a thirsty, hungry dark land ravaged with floods and draughts every year. These reservoirs store precious rainwater to irrigate farmlands, generate electricity, supply drinking water and save land from floods and draughts. Reservoir fishery in India is also important from socio-economic point of view as it has the potential of providing employment to about two million people and caters the food demand of millions of people. Zooplanktons are minute aquatic animals that are non-motile or are very weak swimmers. They contribute significantly to biological productivity of freshwater ecosystem. They serve as good indicator of changes in water quality, because it is strongly affected by the environmental conditions and it is quickly responded to changes in environmental quality (Gannon and Stemberger, 1978). They are not only useful as bioindicators, but also helpful for ameliorating polluted waters. Zooplankton species are cosmopolitan in nature. They consist of fresh water, brackish and marine water forms. The freshwater zooplankton comprises Protozoans, Rotifers, Cladocerans, Copepods and Ostracods.

Phytoplankton Serve as important biological indicators of an aquatic Ecosystems, as they both effect and are affected by many characteristics of a fresh water Ecosystem. Phytoplanktons are often considered powerful biological indicators of fresh water ecosystem.

Biological indicators act as important measures of the state of an Ecosystem more so when combined with chemical data (Dixit et al. 1992). Planktonic algae are an integral part of lake food chains, nutrient cycles and oxygen production.

Zooplankton and phytoplankton are essentially non-motile organism relative to water mass, but drift with it (Dicks,1976). The use of living organisms to determine the presence, amounts, changes in and effects of physical, chemical and biotic factors in the environment is termed biological monitoring (Baker, 1976). Different types of invertebrates have different tolerances to pollution and are also affected by quality of their habitat. This means we can tell how good the water and habitat quality is by the types and numbers of invertebrates living in the water body (Environment Waikato, 2006).

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INDUCTION OF GENETIC VARIABILITY IN SOYBEAN FOR YIELD AND ITS CONTRIBUTING TRAITS BY GAMMA RAYS

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ABSTRACT

The effectiveness and efficiency, yield parameters and statistical analysis for  $M_2$ ,  $M_3$  and  $M_4$  generations of Soybean cultivar TAMS-38 was studied using gamma rays treatment. Effectiveness and efficiency was recorded at increase for low concentration and decrease for high concentration level. The most of the treatment were exhibited positive and negative shift. The statistical analysis such as high phenotypic coefficient of variation (PCV) and genotypic co-efficient of variation (GCV) and low to high heritability ( $h^2$ ) and low to high genetic advance as a percentage of mean was recorded for all five characters studied i.e. plant height, number of branches plant<sup>-1</sup>, number of pod plant<sup>-1</sup>, 100 seed weight and seed yield plant<sup>-1</sup> in  $M_3$  and  $M_4$  generations. This indicated that all these traits were influenced by additive gene action operating in the expression of these traits in  $M_3$  and  $M_4$  generation and hence help as a criteria for making selection.

Keywords: Soybean, Mutation, Effectiveness, Efficiency, Frequency

INTRODUCTION

Soybean (*Glycine max* (L.) Merrill) is referred as "Golden bean" and "Miracle crop" of 21<sup>st</sup> century. It is one of the important oilseed as well as legume crop. It contributes more than 50% to the global production of edible oil. Soybean contains 20% oil and 40% protein. Soybean protein is rich in all essential amino acids vitamin A, B and D; health promoting phytochemicals like isoflavones. Hence, soybean referred as "Wonder crop" or "Golden bean". The soy protein stands unique by supplying all sixteen essential amino acids. Soybean oil is used as edible oil in Indian diet. Soybean originated in North Eastern China. It entered in India during 6<sup>th</sup> century AD. USA, Brazil, China, Argentina and India are the major soybean producing countries in the world. These countries accounts for 90% of the world production. India ranked 5<sup>th</sup> position in respect to area and production.

The concept of inducing mutation and utilizing them in plant breeding was first given by Hugo de vries (1903) for generating variability and achieving the goal of generating of new strains of cultivated crop plants. Gamma rays a ionizing physical mutagen capable of inducing mutation in plants. The present research work was, therefore, undertaken using seeds of soybean cultivar TAMS-38 subjected to treatment of different doses of gamma rays and hence improve its production.

MATERIALS AND METHODS

Dry healthy and genetically pure seeds of TAMS-38 was used in this study. Four different lots of soybean seed cultivar TAMS-38 were made. Every lot was of 500 g seed weight. The three lots of seed were sent to Bhabha Atomic Research Centre, Trombay, for irradiation with three different doses of gamma rays treatment. These seed were treated by three different doses of gamma rays i.e. 200 Gy, 250 Gy, 300 Gy ( $Co^{60}$  at BARC Trombay, Mumbai) and used for raising  $M_1$  during *kharif* 2016 and individual plant in each treatment were harvested separately. The harvested seed were used to raise  $M_2$  generation in *rabi* 2016 and (62) mutants were identified.

In *kharif* 2017, all the harvested seed from each (62) mutants of  $M_2$  generation along with 2 checks (TAMS-38 and JS-335) were sown to raise  $M_3$  generation in replicated trial using Randomized Block Design replicated thrice. In *kharif* 2018 all the harvested seed from each (104) mutants of  $M_3$  generation along with 2 checks (TAMS-38 and JS-335) were sown to raise  $M_4$  generation in replicated trial using Randomized Block Design replicated thrice.

All the parameters were recorded in mean value, phenotypic coefficient and genotypic co-efficient of variation, heritability and genetic advance as per cent of mean were used for ANOVA for RBD method.

Mutation frequency was estimated on  $M_2$  plant basis. Mutagenic effectiveness is a measure of the frequency of mutation induced by unit of mutagen, whereas mutagenic efficiency gives an indication of the proportion of mutation in relation to undesirable change like lethality and injury.

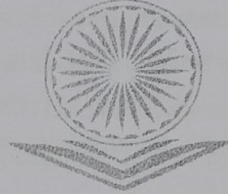
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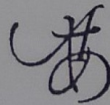
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## 20. Studies on Fish Biodiversity of Nawargaon Lake in Maregaon Taluka, District Yavatmal, (M.S.) India

S. K. Waware  
R. R. Kamdi  
D. B. Khamankar  
P. R. Patel

### Abstract

The fishes are one of the most important vertebrate, provided rich protein sources for human and several animals and important elements in the economy of many countries. Fish diversity of Nawargaon Lake essentially represents the fish faunal diversity. Nawargaon Lake conserves a rich variety of fish species, which supports the commercial fisheries in Maregaon Taluka, District Yavatmal. Keeping in the view, the diversity of fish fauna of the Nawargaon Lake in Maregaon Taluka in Yavatmal District, Maharashtra, Central India has been studied from the period Feb.2016 to March.2017. The aim of the study was to explore the fish fauna of Nawargaon Lake. In the course of investigation, four sampling spots were selected viz., SPOT-A, SPOT-B, SPOT-C and SPOT-D of Nawargaon Lake. The fish diversity is a good indicator of health of aquatic ecosystem. A good piscine diversity represents the balanced ecosystem. Taking this into consideration the fish diversity of Nawargaon Lake is studied during present investigation. The Nawargaon Lake is huge and spread over area about 2740m and catchment area is 9.663 thousand hectares.

**Keywords:** *Fish diversity, Nawargaon Lake, ecosystem.*

### Introduction

India is one of the mega biodiversity countries in the world and occupies the ninth position in terms of freshwater mega biodiversity (Mittermeier et al., 1997). In India there are 2,500 species of fishes of which 930 live in freshwater and 1,570 are marine (Kar et al., 2003). Day (1994) described 1418 species of fish under 342 genera from British India. Jayaram (1981) listed 742 freshwater species of fishes coming under 233 genera, 64 families and 16 orders from the Indian region. Talwar (1991) estimated 2546 species of fish belonging to 969 genera. 254



## FISH BIODIVERSITY OF SAIKHEDA DAM WETLAND AREA OF LINGTI VILLAGE IN KELAPUR TALUKA, DIST.-YAVATMAL (M.S.), INDIA.

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### ABSTRACT:

The Saikheda dam Wetland area is situated in lingti village Taluka Kelapur of Yavatmal district in Maharashtra. Which is 20 km off Pandharkawada towards south east of Pandharakawada on Pandharakwada Yavatmal road this dam was constructed in 1972 on the river Khuni. This river Khuni originated near Mohada in Ghatanji taluka of Yavatmal district towards West north of the dam with located know. The Study area harbour's varying in shape. & Size, in a rainy season a good habitat to various fish species. To assess the status and distribution of fishes, trips were conducted in the intensive study area. The fishes were classified based on their habitat and their presence was visually observed. A total of 19 fish species in upstream habitat. The status of fish fauna and management of Saikheda dam Wetland ecosystem has been discuss in this paper. Biodiversity is essential for balancing ecosystem and facing varied problems to environment. Globally nature as well as animal diversity are affected due to increase in unwise anthropogenic activities. Aquatic ecosystem is also adversely affected due to release of wastes in it. In the field of Ichthyology there is valuable contribution by many workers. As far as economic importance is concerned, the scope of fish and fisheries in Maharashtra is of prime interest. The current review deals with the freshwater fish recorded and confirmed by various species belonging to 07 orders, 09 families and 15 genera in Maharashtra during 2017 to 2018 and will be useful for fishermen, consumers, fish industry producers and researchers. Saikheda Project and Dam's Official Designation is "Saikheda , D -0 1247" . Saikheda Dam was constructed as part of irrigation projects by Government of Maharashtra in the year 1972. Nearest city to dam is Pandharkawada and the Dam is situated in Kelapur Taluka of Yavatmal District of Maharashtra. It is built on and impounds Khuni River. The dam is an Earth-fill Dam .Purpose of the dam is for irrigation .The length of dam is 1740 m ( 5708.66 Feet ) , while the height of the dam above lowest foundation is 23.77 ( 77.98 Feet ) . Detailed information about project spillway is not available. Project has a Spillway of Other type. Length of the spillway is not known . However measured length of the spillway is approximately 253 m (765 Feet). The Spillway is Ungated..Dam's catchment area is not known. Maximum / Gross storage capacity is 38.511 MCM. Live storage capacity is 27.184 MCM. Now days almost all the water bodies make for good picnic spots. Saikheda lake is also a popular Tourist attraction for its scenic beauty.

**Keywords:** Fish fauna, biodiversity, wetland and ecosystem.

### INTRODUCTION:

Maharashtra is rich in freshwater (rivers, irrigation canals, dams, and lakes) reservoirs and its fish diversity. Therefore, Maharashtra is one of the important states for fish production and natural water resources and there is great scope for developing fisheries in this state. Fish diversity is declining rapidly each day due to unending anthropogenic stress. This diversity is not only the wealth of our world but it also has some serious implications on fishery. Thus there is an urgent need for proper investigation and documentation of this fish diversity in order to develop a fresh water fish diversity information system having both bioinformatics and georeferenced databases of fish and fish habitat. In the present review documentation of the fish fauna of fresh water

reservoirs in the Maharashtra state for 2017 to 2018 is done.

Wetland ecosystem play a vital role in distribution of flora for aquatic, semi-aquatic and submerged floral association. The study of changed ecosystem is important for future planning which will help in conservation of natural flora, fauna and ecosystem for its future use and management when a natural ecosystem is destroyed obviously stability of system is also reduced. In Saikhada Wetland area large extent of tree were felled in catchment of this area is customarg to dress up the bare area contor trenched and afforested to pervert the reserivior from silting up the flora on dam stream bank and afforestation on command areas of Wetland help in conservation of natural habitats.



## 15. The Study of Non-Covalent Interactions of Myo-Inositol with Water at Different Temperatures

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### Abstract

Densities ( $\rho$ ) and viscosities ( $\eta$ ) of myo-inositol have been measured in concentrate aqueous solution, concentration range 0.1-0.9 M at different temperatures. From the density, the apparent molar volume ( $\Phi_v$ ) and partial molar volume ( $\Phi_v^\circ$ ) were calculated. The viscosity  $B$  and  $A$  coefficient constants and Stauding constant ( $kn$ ) were calculated from the viscosity data using Jones-Dole and Stauding equation at all the studied temperatures. From viscosity coefficient constant  $B$  and partial molar volume, association numbers ( $B/\Phi_v^\circ$ ) of solute were calculated. From these parameters, results were correlated with solute-solute, solvation of solute and solute-solvent interactions. The conclusion was drawn from viscosity  $B$ - coefficient, ratio  $B/\Phi_v^\circ$ , experimental slope  $S_v$  and  $dB/dT$  that myo-inositol revealed structure making ability with water.

**Keywords:** Apparent molar volume; Partial molar volume, Jones-Dole equation; myo-inositol; association number

### Introduction

Hydration is one of the most important interactions which are responsible for the secondary structure of biomolecules and other physicochemical properties of these molecules [1]. Sugars and polyols are used as ingredients in industrial products such as foods, cosmetics, health care products and pharmaceuticals due to their unique functional characteristic (stabilizing, thickening and gelling emulsion, surface activity) [2]. The ability of solute to change the properties of solvent or cosolvent in solution depends on their molecular characteristics such as size, shape, conformation and configuration [3]. Intracellular and extracellular environment of



# UNDERSTANDING STRUCTURE OF WATER BY ULTRASONIC MEASUREMENTS IN AQUEOUS AND 10% ETHANOL-WATER SOLUTIONS OF FRUCTOSE AT THREE DIFFERENT TEMPERATURES

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## ABSTRACT

Ultrasonic velocity (U) and density have been measured experimentally for aqueous solution of fructose and 10% ethanol-water solutions at concentration range (0.1M-0.9M) and at temperatures (298, 303 and 308K). The acoustic parameter such as adiabatic compressibility ( $\beta$ ) has been worked out. The results are correlated in terms of structure of water described to the cage like structures of water and secondary molecular interaction between the solute and solvent molecules of the medium

**Keywords:** Ultrasonic velocity, Adiabatic compressibility, fructose, Ethanol-water

interactions in pure liquids and binary and ternary mixtures<sup>7-9</sup>. Carbohydrates displayed on the surface of cells play critical roles in cell-cell recognition, adhesion, signaling between cells, and as markers for disease progression. Neural cells use carbohydrates to facilitate development and regeneration<sup>10</sup>. Viruses identify carbohydrates to get entry into host cells<sup>11</sup>; and bacteria attach to carbohydrates for host cell adhesion<sup>12</sup>. Recognition of the specific saccharides involved in these processes is important to better understand cell-cell recognition at the molecular level and to assist the design of therapeutic and diagnostic tools.

## 2. Experimental

The solutions of fructose were prepared by dilution method. All the chemicals are of AR grades of 99.99 % purity. Composition range of Fructose is from 0.1 M to 0.9M in aqueous and in 10% ethanol-water solvent systems. The ultrasonic velocity in the liquid mixtures have been measured by means of ultrasonic interferometer (Mittal type: Model: M-83) functioning at frequency 3MHz with an overall accuracy of  $\pm 0.1$  m/s, an electronically digital operate constant temperature water bath has been used to flow water through the double walled measuring cell, made up of a steel containing the experimental solution at the preferred temperature. For weighing, an electronic digital balance with an accuracy of  $\pm 0.1$  mg was used. Densities were measured

## 1. Introduction

Ultrasonic velocity of pure liquids and liquid mixtures are basically correlated to the secondary forces (hydrogen bonding, Vander Waal's forces and dispersion forces) between molecules and atoms<sup>1</sup>. Ultrasound analysis provides extensive applications in characterizing thermodynamic and physiochemical behavior of liquid mixture<sup>2</sup>. The study of the carbohydrates or saccharides has become a subject of growing curiosity because of multidimensional, physical, biochemical and scientifically used molecule<sup>3-6</sup>. The ultrasonic velocity in a liquid is basically related to the binding forces between the atoms or molecules and has been effectively employed in understanding the nature of molecular



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