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Science fundamentally is the systematic study of the structure and behavior of the natural and physical world through observations and experiments. Study of science evolved with the civilization of human beings. Technology is an art, skill or ability, which is used to create and develop products and acquire knowledge. Scientists used their knowledge to develop science & technology, so, because of this reason science & technology is an integrated term in today's world.

Science and technology study is an interdisciplinary area that examines the creation, development and impact of science and technology in their historical, cultural and social contexts. Technology is the application of scientific knowledge to the practical aims of human life or as it is sometimes phrased to the change and manipulation of the human environment. Scientific knowledge is used to create new technologies which often allow scientists to explore nature in different ways and make new discoveries. Science is involved in cooking, eating, breathing, driving, playing, etc and all daily activities of human beings. Life is unimaginable without science and technology as it become a necessity.

About College & Town

The Kohinoor Shikshan Sanstha Aurangabad was established in 1992. The Kohinoor College was established in 2000 with Arts faculty. In a short span of time Dr Mazhar Khan with his untired and fruitful efforts brought up and developed the mega campus of the minority college now known as M K Education Campus at Badlabai, Sulibhanjan, Khultabad Dist Aurangabad with different streams. Khultabad is a historical place having historical and heritage sites like Dargahs of Hazrat Muntajibuddin Zar Zari Zar Baksh (Rh.), Hazrat Burhanuddin Garib (Rh.), Hazrat Zainuddin Shirazi (Rh.), Tomb of Aurangzeb Alamgir (Rh.) & famous Bhadra Maruti Temple. World famous Ellora Caves, Shri Grishneshwar Jyotirlinga Temple and Deogiri Fort at Daulatabad are very near from Khultabad town.

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Life Sciences: Basic and applied aspects of Biodiversity, Genetics, Biotechnology, Agriculture, Ecology, Evolution, Reproduction, Cellular & Molecular biology, Pathology, Bioinformatics, Microbiology, Food Technology, Environmental Sciences, Bioprospecting, Physiology, Entomology, Fishery Science, Botany, Zoology, Medical Biochemistry, Bioinformatics and Biophysics, etc.

Physical Sciences: Analytical Chemistry, Physical Chemistry, Inorganic Chemistry, Industrial Chemistry, Synthetic & Organic Chemistry, Medicinal Chemistry, Polymers and Natural Products, Biochemistry, Nanoscience & Nanotechnology, Pharmaceuticals & Drug Chemistry, Solid State Physics, Optics & Non-Linear Physics, Instrumentation & Techniques, Material Sciences, Smart Molecules and all branches of Engineering & Technology.

Earth Sciences:, Geology, Hydrogeology, Meteorology, Minerology, Astronomy, Remote Sensing

Mathematical & Computer Sciences: Computer Science, Internet of Things, Applied Mathematics, Algebra & its Application, Geometry & its Application, Modelling & Simulation, Scientific Computation.

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Atomic Structure and Nonlinear Optical Properties of Benzene by Using Density Functional Theory

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ABSTRACT

This work reports electronic structure calculations and nonlinear optical (NLO) properties of benzene using density functional theory (DFT). The static hyperpolarizabilities of benzene are determined by density functional theory (DFT). The Finite-Field approach has been used to obtain the static first and second hyperpolarizability components (β and γ) by applying field either in X, Y or Z direction. The geometries of benzene are optimized using DFT method with different exchange and correlation functionals and split valence triple zeta basis set with and without diffuse and polarization functions. The geometrical parameters and vibrational frequencies obtained at B3LP/6-311++G** level are in excellent agreement with the experimental determinations.

Keywords: Benzene, hyperpolarizabilities, density functional theory, finite field method

I. INTRODUCTION

There is currently a growing interest in the nonlinear optical (NLO) properties of organic materials. [1-2]. It is now recognized that organic and polymeric materials with large NLO coefficients and ultrafast response time can be used in a number of optoelectronic and photonic devices. As a result, considerable experimental and theoretical efforts have been made in recent years to design new organic compounds with optimal NLO properties [1]. Such efforts, however, have met only with limited success due to a lack of clear understanding of various mechanisms contributing to optical nonlinearity of organic and polymeric materials. Of particular importance in this respect is the dispersion (frequency dependence) of NLO properties, which determines the application/limitation of a material to photonic devices. Experimental information about the dispersion of NLO properties is limited to only a few organic compounds [3-4] and also to a few effects, such as the second harmonic generation (SHG) or &-electric field-induced second harmonic (EFISH) generation. It is possible to gain information on the structural dependence and the dispersion effects of NLO properties of organic molecules from ab initio quantum chemical calculations [5].

Nonlinear optical (NLO) materials with large NLO responses have been a challenge for materials scientists and chemists. Recently, organic polymers have received attention regarding their NLO properties. Organic NLO materials have potential applications in areas such as electrooptics and photonics. There is a continuing interest in development of optical materials which would be suitable for manufacturing

of photonic switches and other devices. The molecular materials with quadratic nonlinear optical (NLO) response to electromagnetic field have been studied over the last two decades [6–21].

NLO properties of π-conjugated molecules such as benzene and substituted benzene are of great interest to understand the phenomenon associated with the designing and construction of photonic devices. The molecular structure of benzene has been determined by electron diffraction [22-24]. Soscún et. al. have calculated linear dipole polarizability and nonlinear second dipole hyperpolarizability of benzene using ab-initio SCF-MO restricted Hartree-Fock (HF) method [25]. Zhu et. al. have studied the effect of the field, basis set, functionals and cavity size on molecular polarizabilities and hyperpolarizabilities of substituted benzene in different solvents [26].

This work reports here on a systematic computational investigation of the electronic structure calculations and nonlinear optical properties (NLO) properties of benzene using density functional theory (DFT).

II. Computational details

Here benzene molecule was first optimized to study the geometries at different levels to obtain the lowest energy structure. Here, also used HF and DFT method with different exchange and correlation functionals viz. B3LYP, B3PW91 and PBEPBE with split valence triple zeta basis set with and without diffuse and polarization functions. It is found that the benzene molecule shows the lowest energy at B3LYP/6-311++G** level among different levels of theories used here.

Finite field method has been used earlier to obtain NLO properties of various organic molecules with and without donor-acceptor moieties. To calculate the parameters i have used several field strengths to avoid numerical errors. After obtaining the numerical stability using these fields, i adopted numerical stable range for computing β and γ using different methods and basis sets. All the calculations are performed using Gaussian suit of program [27].

III. RESULTS AND DISCUSSION

We first optimized the geometries of benzene molecule at different levels to obtain the lowest energy structure. We have used DFT method with different exchange and correlation functionals. It is found that the benzene molecule shows the lowest energy at B3LYP/6-311++G** level among different levels of theories used here. Table I represents bond lengths and angles for benzene at different levels used here alongwith the experimental determinations [22].

As can be seen from Table 1, bond lengths and angles for benzene molecule from this work are in excellent agreement with the respective experimental values. Total energy of a benzene is -231.31133367 Hartrees at B3LYP/6-311++G** level.

TABLE 1. Geometrical parameters for benzene obtained using different methods with 6-311++G** basis set alongwith experimental values. Bond lengths in Å and angles in degree.

BOND LENGTH/ANGLE	B3LYP	B3PW91	PBEPBE	HF	EXPT.*
C-C	1.395	1.392	1.400	1.386	1.397 A
C-H	1.084	1.085	1.092	1.075	1.102 A
<C-C-C	120	120	120	120	----
<C-C-H	120	120	120	120	----

[a] Experimental values from ref. [18].

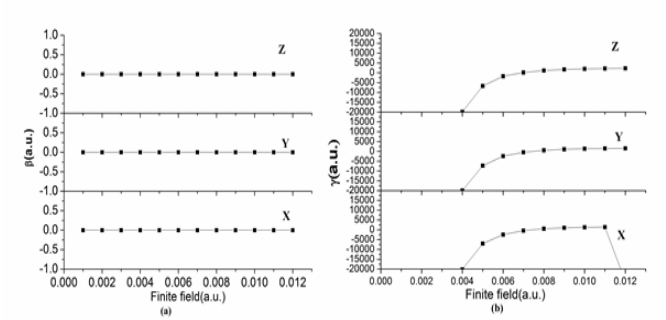

Figure 1. Variation of β and γ for benzene with field strength at B3LYP/6-311++G** level.

The β values are zero irrespective of the level of theory and direction in the applied field. However γ values are nonzero for benzene as can be seen from Fig. 2. Figure 2 shows the variation of γ of benzene obtained using different methods and basis sets with field strength of 0.006 a.u. applied either in X, Y or Z direction.

Nonlinear Optical Properties

We have also used here various basis sets viz. 6-311G, 6-311+G, 6-311+G*, 6-311++G*, 6-311++G** with different methods to obtain NLO properties of benzene. We have applied Finite-Field of different strength either in X, Y or Z direction for the benzene molecule to decide the suitable field strength in order to obtain the numerical stable hyperporizabilities. The geometries of benzene optimized at B3LYP/6-311++G** level have been used here since at this level of theory benzene molecule shows the lowest energy among different levels used here.

Once the suitable field strength is decided to prevent the numerical instability, then obtained hyperporizabilities of benzene using different methods and basis sets. Figure 1(a) and 1(b) shows the variation of β and γ respectively of benzene with field strengths applied either in X, Y or Z direction using the Finite-

Field method. In Fig. 1, the hyperpolarizability values after certain field strength are the large negative values which are not shown in Fig. 1. Here only positive values are shown in Fig. 1.

Figure 1 shows that the necessity of applying different field strengths in order to avoid the numerical instability. From Figure 1, it can be said that benzene molecule shows numerical stable hyperporizabilities at a certain range of field strength applied either in X, Y or Z direction. Therefore we have chosen field strength of 0.006 a.u. to calculate the hyperporizabilities of benzene using different methods and basis sets.

We have obtained hyperporizabilities using different levels of theory in addition to B3LYP/6-311++G** level with field strength of 0.006 a.u. applied either in X, Y or Z direction. We can consider hyperporizabilities obtained at B3LYP/6-311++G** level as the reference since at this level of theory the benzene molecule show the lowest energy, geometrical parameters and vibrational frequencies are in excellent agreement with the experimental determinations.

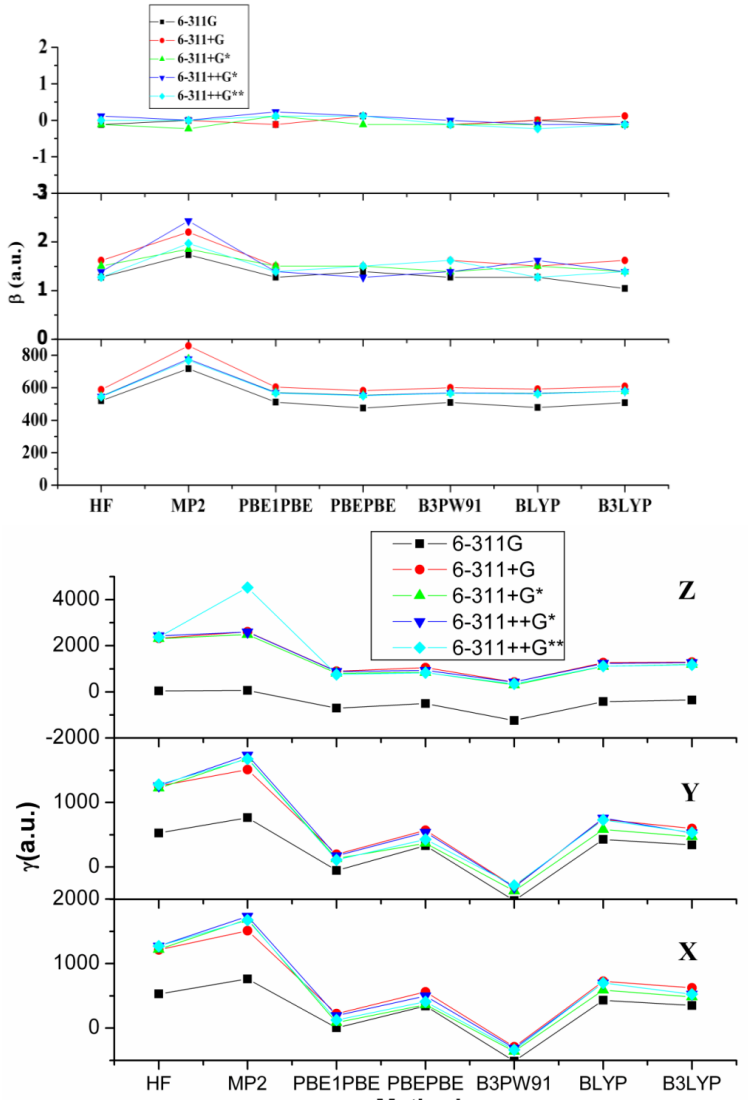

Figure 2. Variation in β and γ for benzene obtained using various methods and basis sets using field strength of 0.006 a.u..

IV.CONCLUSION

In this work NLO properties of benzene molecule have been studied. The field is applied either in X, Y or Z direction. Benzene shows zero β values irrespective of the applied field direction. There is no large change in β values of benzene. However a significant increase in β values is obtained for the field applied in X direction. Large γ values are also obtained for the benzene. Among different levels of theory used here for obtaining the hyperpolarizabilities, MP2 level shows higher β and γ values than the DFT method with different exchange and correlation functionals. The optimized geometries obtained at B3LYP/6-311++G** level of theory are in excellent agreement with the experimental determinations.

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Seasonal Variation of Tapeworms of Some Freshwater Fishes from Jafrabad Area

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ABSTRACT
Tapeworms are the gastro-intestinal parasites and infect fishes, domestic and wild animals, birds and human beings. They modify morphological and physiologically to live successfully ina specific host. Parasite diversity of a host species varies widely from host to host and species to species and also season to season.The present investigation deals with the seasonal variation of some tapeworms of fresh water fishes during months of April 2017 to March 2019 .Infection of caryophyllidean parasites from major carps Catla,Labeo and Clarius were observed.The infected parasites are examined were Senga,Lytocestuscircamonchobothrium were observed. The incidence of infection, intensitydensity,index of infection was studied seasonally.
KEY WORDS: Tapeworms, Caryophyllidean Parasites, Infection, Intensity Density, Index of Infection.

I. INTRODUCTION

The fishes are important components of ecosystem which are highlly important from economical point of view.which are used as delicious and nutritious food by human beings. Fishes are aquatic organisms which are easily available in water body like rivers ponds reservoirs etc. tapeworms are the gastro-intestinal parasites and infect fishes,domestic and wild animals and human beings also.theymodifiy morphologically to live successfullyin specific host .parasite diversity of a host species various widely from host to host and species to species .parasite appear periodically in the same host in specific habit but infection of such parasite reduces food values and increase mortality of host . effectivlly disturb ecologically balance of ecosystem.the mode of infection and intensity of infection is also variable in fishes the availability of water condition vary seasonally which influences the life of fishes and also the inhances the mode of infection to some fishes tapeworms on the host particular fish have been studied.

II. MATERIALS AND METHODS

The survey was carried out for two annual cycles from April 2017 to March 2019 by collecting the host from fish markets identified with the help of literature.the host fishes from the revers,dams and resirviors were collected from the fisherman throught the year in all month from different selected places of jafrabadtaluka

with more or less regular periodicity.the fishes collected from the intestine of the host and the data were recorded carefully .the collected parasite were washed with saline solution fixed in 10% formalin solution and preserved in 4% formalin .also recorded the infected and non infected host, number of parasites were collected from each fish species for study.some parasites were processed and stained in alcoholic stain like Borax Carmine,Acetocarimine,xylene and Mounted in DPX The identification were carried out with the help of "SystemaHelminthum" Vol-II Cestodes of vertebrates by Yamaguti s (1961) and other literature .

The data obtained throught the two year (2017-2018 &2018-2019) was processed,scrutinized and analyzed to derive the incidence intensity,density and index of infection by using following formula.

The % of incidence of infection = infected host X100 / Total hosts examined

Intensity of infection = No. of parasites collected / No.of hosts infected

Density of infection = No.of parasite collected / Total hosts examined

Index of infection = No of host infected x no of parasite collected / Total hosts examined

III. RESULT AND DISCUSSION

The present investigation is based on recorded data for two years from April 2017 to March 2019 .During the investigation in all three seasons i.e. summer,mansoon and winter the fishes as a host of the parasites are collected form ten different areas of jafrabadtaluka on periodical basis on every visit to that places fishes are collected from the fisherman randomly between twenty to twenty two in numberof three variety of fishes namely *CatlaCatla,Labeorohita and clariusbaterchus*.out of three two fishes belongs to family cyprinidae (Catla and Labeo) and one belongs to family Claridae. The habitat and habit of all four fishes are different in freshwater resources.in the year i.e (April 2017to March 2018) 102 Labeorohita ,CatlaCatla and 90Clarius out of the above three species not single cestode parasite were recorded from Catla and Labeo but from Calrius 15 fishes found infected with parasites. The data clearly represents that the incidence,intensity,density and index of infection are variable in there fishes.the said value are also variable seasonably During summer period the incidence of infection,intensity,density,index of infection is higher in winter period moderate and in mansoon period is less.During the April2017 to March 2018 the fishes as a host cestod parasites were collected from different villages of jafrabadtaluka .which are located near the bank of Purana river during this period fishes dissected and examineted for parasitic infection were Catla (90) Labeorohita (92) and Clarius (81) at every visit randomly fishes were collected between minimum four to maximum eight

After examination throughout the year at was observed that there is no incidence of infection were recorded from Catla and Labeorohita but in Clarius incidence of infection were observed. As per the data and graphical repersentaion it is observed that the incidence of infection during monsoon period is very less , modrerate in winter perioed and higher is summer perioed .the parasites were reported from the Claries were lytocestusspp and Senga spp.as per the data it is observed that though there is seasonal variability of incidences of infection in the fishes but there were host parasite specificity were observed .Morphologically parasites of Clarius (Lytocestus spp.) are much variable. These parasites were safely lodged in the gastro-intestinal parts of the

body and well suited in there environment Catla and Rohuare living in the surface and column area of water body and there are herbivorous in feeding habit .The length of intestine is too much longer but the lumen of intestine is too narrow as compared to the length. Thefeeding habit and habitat may play a key role in keeping them free from cestodepathologenecity the cestode parasite are long tape like elongated many segmented worms which may not well suited in the intestine of there fishes. Hence there were no incidence of infection of tape worms in any season.Calerius are bottom living carniverus or omnivorous fishes .The length of intestine ismoderate but the lumen of intestine is wiender comparatively . Therefore the parasites are well accommodate in the intestine .As it is observed that two tapeworms (Senga spp.) were reported from the fish only one tapeworm (Lytocystus spp.) were reported from *Calriusbatrichus* during the two years periods,at a time minimum one to maximum three parasites were observed. Hence the clerly show the host – parasite species specificity.

The seasonally variation is also observed in the parasitic infection therefore the values of incidence, intencity ,dencity and index of infection are variable. In summer incidences of infection are more, in winter moderate and in monsoon particularly during August and September they are very low or negligible in number .The above explained data of two years(April 2017 to March 2019) Shows that the occurrences of infection were host –parasite specific because the morphological physiological and ecological factor influences the host-parasits specificity.The ecological factor means distribution and environment of host and physiological factors means the food and feeding habit.

IV. CONCLUSION

As per the observation and data analysis for two years period, it comes to the conclusion that the infection of Clarius are monsoon season.*Labeorohita* and catla are free from cestode pathogenicity the result indicates that food feeding habit environmental change and lifecycle of parasites are influencing the seasonality of parasitic infection either directly or indirectly.

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Detection Of Peoples Opinion from Unstructured Data On Uttar Pradesh Assembly Election-2022 Using Sentiment Analysis Techniques

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ABSTRACT
Social Media Sentiment analysis is popular and efficient way for election analysis and election predictions. In Uttar Pradesh total assembly seats 403 in seven phases election is going on Phase-I (58 ACs), Phase-II (55 ACs), Phase-III (59 ACs), Phase-IV (59 ACs), Phase-V (61 ACs), Phase-VI (57 ACs), Phase-VII (54 ACs) in February and March 2022. During the Election and Covid-19 situation taking elections is big challenge. All Election Campaigns of all the Contestants Parties in Uttar Pradesh assembly Election they wants to reach to every voter in their area but due to Lockdown situations. In this paper, we introduce an enhanced applications of Sentiment analysis Score based with the aim of capturing people's opinions through tweets for election prediction using Lexicons techniques. Dataset are collected using twitter. All the respective Contestant parties are used social media for campaigning purpose for that they created their hash tags on twitter like BJP4UP, SP4UP, Congress4UP, etc, various parties and then perform the preprocessing on all the data acquired for data standardization and normalization. Perform the Polarity detection using Score Based Lexicon Sentiment Analysis. Here we detected the sentiment analysis of respective party hash tags and peoples are given their key opinion through twitter. From Group-I Bhartiya Janata Party (BJP) is party having more positive opinions and Bahujan Samaj Party having more Negative Opinions. From Group-II All India Majlis-e-Ittehadul Muslimeen is party having more positive opinions and Aam Aadmi Party having more negative. As per our Twitter Sentiment Analysis there is no clear people's opinion to particular contestant party in Uttar Pradesh assembly election in 2022 for forming new government. The more Neutral Opinions are compare with every party is also having the impact and also no any election party having the majority to expected seats that are sufficient to build the new government in Uttar Pradesh assembly-2022.

Keywords: Score, Lexicons, Sentiment Analysis, Natural Language Processing.

I. INTRODUCTION

In recent years, social media data, especially Twitter data, has been used to track and predict elections. Twitter has become a popular communication channel between the leaders of the competing parties and voters. During election campaigns and elections, both parties and voters express their opinions on social

networks, which generate a huge amount of unstructured data. This data is valuable to candidate parties and voters, one important use of this data is election predictions. As social media data can accurately represent public emotions and voter intentions, more sophisticated text mining techniques for election prediction need to be developed. Our sentiment analysis approach is more refined compared to sentence-level sentiment classification, which usually relies on lexical sentiment extraction. In sentence (tweet) level sentiment classification, a tweet is labeled or classified using its limited length or number of expressions. Whereas our approach uses a rich corpus to find topics using word co-occurrences (bi-terms), after which tweets are classified as positive, negative or neutral according to the sentiment and proportions of its constituent topics. To capture recent public opinion, we chose to collect data immediately before and during the election. We used different keywords (hash tags and usernames)[1] to collect tweets.

Natural language processing (NLP) can be divided into opinion mining and text mining. It is used in separating the opinions of people's posts with respect to different social media applications like Facebook, Twitter, etc. Text or sentiment mining is also useful in various situations like analyzing people's feelings about a movie, product, song, etc. and distinguishing between positive, neutral and negative reviews. It can be used in places like stock market, e-commerce websites, song recommendations, etc. for better predictions and recommendations[2]. Big data includes social networking websites including Twitter as a popular social media microblogging platform for political campaigning. Explosive data from Twitter in response to a political campaign can be used to predict presidential elections, as has been done to predict political elections in several countries such as the US, UK, Spain and France. The authors use tweets from Indonesian presidential candidates (Jokowi and Prabowo) and tweets from relevant hashtags for sentiment analysis collected from March to July 2018 to predict the outcome of the Indonesian presidential election. The experimental result is created using the R language and shows that Jokowi leads the current election forecast [3]. Sentiment analysis, also called opinion mining, is a field that analyzes people's opinions, sentiment, ratings, evaluations, attitudes, and emotions toward entities such as a product, service, organization, individual, issue, event, topic, and their attributes. [3].

II. LITERATURE REVIEW

Twitter sentiment analysis is a quick and effective way to monitor elections and predict elections. Most existing methods for predicting elections using Twitter are based on explicitly extracting meaningful sentiment from text

The author works on a collection of more than 300,000 geo-tagged tweets for four different contending parties in an attempt to predict the 2017 election results, the U.P. They proposed a new methodology: HTBSA, which considers word relationships and co-occurrences as opposed to sentiment classification at the level of simple sentences. First, we generated topics in four different datasets using BTM, which is known to work well with short texts such as tweets16. The number of most coherent topics (k), Sentiwordnet was used to calculate the sentiment polarity and score for each topic, where each topic has a weighted list of words.

Themes are displayed with corresponding sentiments and weights for each data set. Topic names for the five most prevalent topics in each corpus [1].

Authorships in real human languages provide many problems for natural language processing (NLP), such as ambiguity, anaphora, and vagueness. The authors use the R language and many libraries such as sentiment, which is designed to quickly compute sentence-level text polarity sentiment and optionally aggregate by row or grouping variables. The latest developments in social media such as Twitter and Instagram typically use Open Authorization (OAuth) to access Twitter, and we can access data from R using an API [3].

III. METHODOLOGY

Determining the source of data is the first challenge of any research. Based on popularity and generating huge amount of twitter data. Debates and news, moods associated with elections change rapidly. To process this data of a temporary nature, the Twitter API is used for streaming tweets, and a library called twitteR allows R to use this API. In this research paper, do data acquisition using Twitter API BJP4UP, SP4UP, Congress4UP, BSP4UP, AIMIM4UP, AAPUttarPradesh. For this research work, we created Twitter Development Application account after twitter provide access key, secret key, access token and Authentication ID application this credential used to retrieve data from twitter account.

After tweet acquisition, data preprocessing is needed because in the proposed work, raw data with 16 attributes of twitter datasets is obtained and then used for preprocessing to remove favorite, favoriteCount, replyToSN, created, truncated, replyToSID, id, replyToUID, statusSource, screenName, retweetCount , isRetweet , retweeted , longitude , latitude , and text attributes additional preprocessing is required for the text attribute. Preprocessing steps include removing the URL and avoiding typos. You avoid typos by replacing repeated characters of 2 occurrences. Slang words add greatly to the emotion of a tweet, Remove RT, Remove Hashtags, Remove Controls and Special Characters, Remove Controls and Special Characters, Remove Punctuation, Remove Leading Spaces, Remove Trailing Spaces, Remove Redundant Spaces.

Bing Liu's emotional lexicons. In the Sentiment Lexicon method, the proposed work used the Bing Liu dataset containing 2,006 positive words and 4,783 negative words in this dataset around 6,789 words. The opinion is adapted to social media content, as it also contains many buzz words that are often used in the language of social media. In this work, he calculated positive and negative scores for each tweet based on the occurrence of positive and negative words in them. For example, if a tweet contains the word "love" from the list of positive words, the positive score is increased by one.

The most important part of sentiment analysis to generate a score for each tweet is the score. The Sentiment ( ) function is used to iterate over the input text. Removes punctuation and control characters from each line using the R Programming platform's regular expression replacement feature and compares against each list of words to find a match. Score. The Sentiment ( ) function assigns a score to tweets using a formula like

Sentiment Score = sum (pos. matches) - sum (neg. matches)

Get the score file with

If the score > 0, it means the tweet has 'Positive Sentiment'

A score < 0 means the tweet has "negative sentiment"
If the score = 0, it means that the tweet has "neutral sentiment"

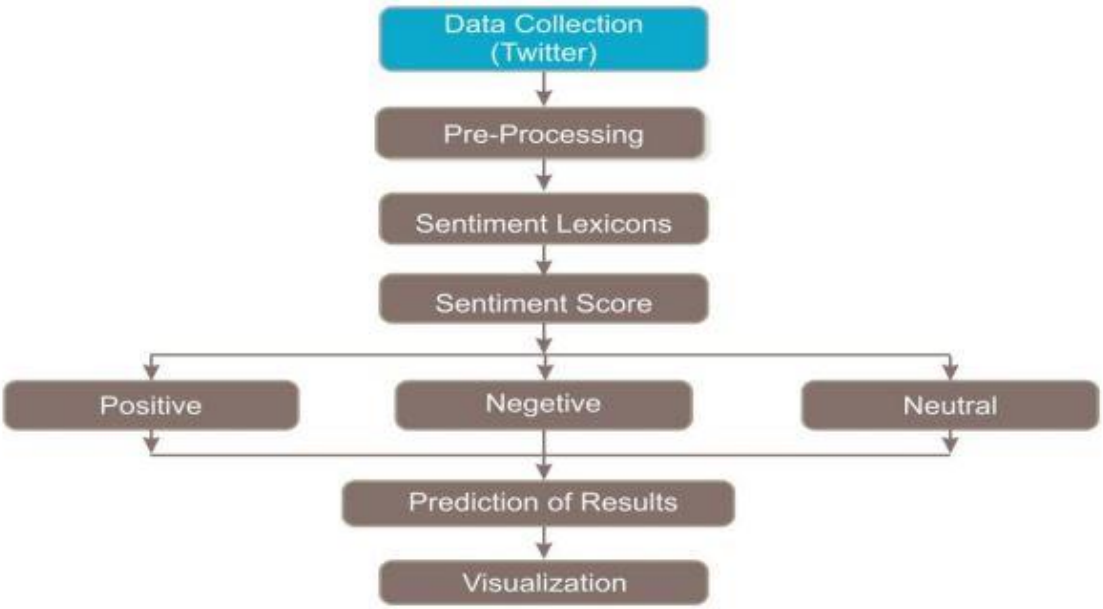

Figure 1. Methodology

IV. EXPERIMENTAL RESULTS

Sentiment Analysis for Uttar Pradesh Assembly Elections -2022. Here he predicted people's opinion of each side of the contestants. The datasets are created and apply Lexicon-based sentiment analysis techniques. Using sentiment analysis score generation methods, it generates a score for each tweet sentence, and the score is classified into three polarity types. The most important part of sentiment analysis to generate a score for each tweet is the score. The Sentiment ( ) function is used to iterate over the input text.

Table 1. Peoples Opinion on Twitter

Dataset	Positive	Negative	Neutral	Total
Group-I				
BJP4UP	1699	262	3039	5000
Congress4UP	870	530	3600	5000
BSP4UP	1459	580	2961	5000
Group-II				
AAP4UP	338	1657	785	2780
SP4UP	482	320	967	1769
AIMIM4UP	476	158	711	1345

In the above table Peoples Opinion on Twitter for Uttar Pradesh Election 2022. In this sentiment analysis experiment here they analyzed and predicted the real time opinion of people on Uttar Pradesh Assembly

Election 2022. For more accurate prediction we created two groups and named them as group data sets I. having tweets from 1 to 5000 and Gropu-II dataset having tweets from 1 to 2800. According to group types in Group-I Bhartiya Janata Party, BahujanSamaj Party, Indian National Congress. In Group II AamAadmi Party, Samajwadi Party and All India Majlis-e-IttehadulMuslimeen. From twitter hashtags of different parties ie BJP4UP,Congress4UP, BSP4UP,AAP4UP,SP4UP,AIMIM4UP. A sentiment analysis on the hashtag BJP4UP is processed with a total of 5000 tweets in which 1699 tweets are classified as positive and the remaining 2339 are classified as negative. tweets. A total of 5000 tweets are processed by Congress4UP in which 870 tweets are classified as positive, 530 as negative and the remaining 3600 are classified as neutral tweets, a total of 5000 tweets are processed by BSP4UP in which 1459 tweets are classified as positive, 580 as negative and the remaining 296 they are classified as neutral tweets. A total of 2780 tweets are processed by AAP4UP in which 338 tweets are classified as positive, 1657 as negative and the remaining 785 are classified as neutral tweets. A total of 1769 tweets are processed by SP4UP, in which 482 tweets are classified as positive, 320 as negative, and the remaining 96 are classified as neutral tweets. A total of 1345 tweets are processed by AIMIM4UP, of which 476 tweets are classified as positive, 158 as negative, and the remaining 711 are classified as neutral tweets.

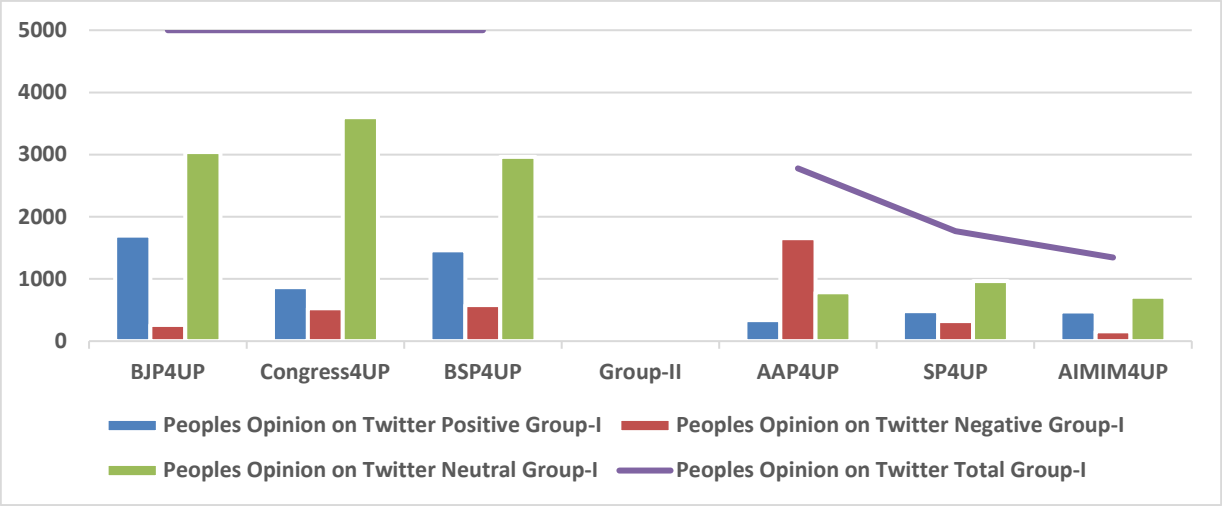

Figure 2.Peoples Opinion on Twitter

Table 2.Comparative % of Peoples Opinion on Twitter

Dataset	Positive	Negative	Neutral
Group-I			
BJP4UP	33.98	5.24	60.78
Congress4UP	17.4	10.6	72
BSP4UP	29.18	11.6	59.22
Group-II			
AAP4UP	12.15	59.6	28.23
SP4UP	27.24	18.08	54.66
AIMIM4UP	35.39	11.74	52.86

In the above comparative analysis of Uttar Pradesh election 2022. Here two groups were selected for prediction, one group from 1 to 5000 tweets and another group selected from 1 to 2800 tweets. From Group I Bhartiya Janata Party, Indian National Congress, BahujanSamaj Party in that BJP4UP33.98% tweets are categorized as most positive and in BSP4UP tweets are most negative with 11.6%. In group II we find meaningful analysis regarding each party like All India Majlis-e-IttehadulMuslimeen, AamAadmiParty and Samajwadi Party. In that AIMIM4UP 35.39% tweets are categorized as most positive and in AAP4UP 59.6% tweets are most negative. Three polarities of sentence-based sentiment analysis i.e. positive, negative and neutral are detected in the overall election analysis, but our analysis focuses on positive and negative data. Positive and negative opinion are key points for analyzing and predicting election results.

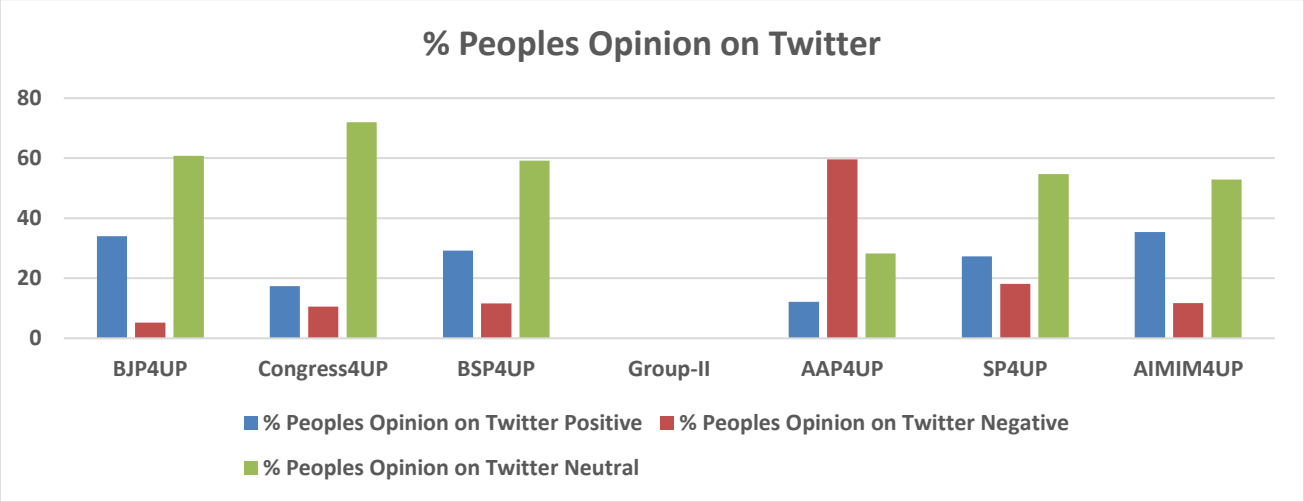

Figure 3.Comparative % of Peoples Opinion on Twitter

V. CONCLUSIONS

A new way of predicting and comparative study of future government in Uttar Pradesh Assembly Election 2022. Twitter is a popular social media application that is used by many people and openly shares their views. In this paper, tweets are used to find positive, negative and neutral opinions of people about a political party contesting in Uttar Pradesh2022 assembly elections. The article implemented and showed data analysis and prediction of Uttar Pradesh Assembly Election 2022. It can be seen that doing sentiment analysis on Twitter to get opinions can be used to predict election results. Here we are predicting the new government in Uttar Pradesh assembly election 2022 as per our twitter Data analysis two sets of data sets were generated, analyzed and meaningful predictions were found. From Group-IBJP4UP, 33.98% of tweets are categorized as most positive and in BSP4UP, tweets are most negative with 11.6%. and from group-IIAIMIM4UP 35.39% tweets are categorized as most positive and in AAP4UP 59.6% tweets are most negative. According to our sentiment analysis on Twitter, there is no clear opinion of the people about a particular candidate party in the Uttar Pradesh Assembly Elections 2022 to form a new government. The more neutral views compared to each party also has an impact and also none of the contesting parties have a majority over the expected seats that would be enough to form a new government in the Uttar Pradesh Assembly-2022.

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Effect of Isolation Media Composition on Sporulation of Colletotrichum Gloeosporioides Penz and Sacc.Causing Post-Harvest Anthracnose Disease in Mango

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ABSTRACT
Colletotrichum gloeosporioides Penz and Sacc. is one of the most important causal pathogens for anthracnose disease of mango.various culture media on growth of the fungus as well as sporulation and colony characteristics of the fungus needed to be developed for suitable management strategies of the disease and may help in taxonomical and physiological study of the fungus. In Isolation of Colletotrichum gloeosporioides modified method are used by Kinkel and Andrews, 1988, C.V. Chudhary, 2006, G. Sharma and R. R. Pandey,2010. Pathogen were isolated from infected mango fruit partson Potato Dextrose Agar (PDA) medium. Results showed that composition of media with 1% dextrose for isolation of fungi, Colletotrichum gloeosporioides Penz and Sacc. influenced growth, heavy sporulation and dry weight of mycelium on 8th day inoculation at 27±2 °C temperature.

Keyword: Colletotrichum gloeosporioides Penz and Sacc, Potato Dextrose Agar (PDA), Sugar sources, Sporulation and dry weight mycelium growth in mg etc.

I. INTRODUCTION

Fungi require different nutrient source for their growth and reproduction development and critical knowledge of nutritional patterns and factors influencing the growth of fungi is a prerequisite for any study leading to the understanding of host-pathogen relationship. Not much attention has been given on the culture and growth media parameters of the pathogen. Hence, thorough knowledge on the influence of various culture media on growth of the fungus as well as sporulation and colony characteristics of the fungus needed to be developed for suitable management strategies of the disease and may help in taxonomical and physiological study of the fungus. A wide range of media are used for isolation of different groups of fungi that influence the vegetative growth and colony morphology, pigmentation and sporulation depending upon the composition of specific culture medium, pH, temperature, light, water availability and surrounding atmospheric gas mixture (Northolt and Bullerman, 1982; Kuhn and Ghannoum, 2003; Kumara and Rawal, 2008). However, the requirements for fungal growth are generally less stringent than for the sporulation.

therefore, present investigation on Mango (*Mangifera indica*L.) belonging to Family *Anacardiaceae* is the most important commercially grown fruit crop of the country. It is called the king of fruits. India has the richest collection of mango cultivars. Cultivation of mango is believed to have originated in South East Asia. Mango is being cultivated in southern Asia for nearly six thousand years. The fruit is very popular with the masses due to its wide range of adaptability, high nutritive value, richness in variety, different cultivar of mango varieties contains 20% of total soluble sugars. The acid content of ripe desert fruit varies from 0.2 to 0.5 % and protein content is about 1 % it's totally defended upon the quality of fruit. But other mango producing countries in the world major production losses due to different pest attacks and diseases. *Colletotrichum gloeosporioides* Penz and Sacc. is one of the most important causal pathogens for disease of mango. About 25 to 30% loses of total mango production has been reported due to anthracnose and stem end rot which can spread with rain drops. Several pre-harvest and post-harvest management approaches has been used to control this anthracnose disease of mango fruits including chemical treatments. Introduction have been reported in Bangladesh. Anthracnose disease of mango is one of the major pre- and post-harvest disease of mango fruit throughout the world and also in Bangladesh which is caused by Colletotrichum gloeosporioides (Ploetz RC,2003).

Anthracnose attacks flowers, young fruits, leaves and twigs, even this disease can also appear in the storage of mature fruits (Chowdhury MNA and MA Rahim,2009). Disease symptoms appear as slightly, black, sunken irregular shape lesions, which gradually enlarge and developed, leaf spotting, blossom blight, fruit staining and rot. So, present study focused on isolation of *Colletotrichum gloeosporioides*Penz and Sacc. from infected mango fruit in different sugar sources in isolation media and this work are helpful in taxonomical and physiological studies of fungi and also, help in use any single culture medium a combination of two or more media will be more appropriate for routine cultural and morphological characterization of fungi to observe different colony features (G. Sharma and R. R. Pandey,2010).

II. MATERIAL AND METHODS

The present experiment conducted *In Vitro* at Department of Botany, Maulana Azad College for Women, Navkhanda, Aurangabad, Maharashtra, India. During this experiment, sample were collected from infected mango fruit are collected from local market of mango infected by Anthracnose disease caused by *Colletotrichum gloeosporioides* Penz and Sacc. fungi in growing track of Marathwada region.

In Isolation of *Colletotrichum gloeosporioides* modified method are used by Kinkel and Andrews, 1988, C.V. Chudhary, 2006, G. Sharma and R. R. Pandey,2010. Pathogen was isolated from infected mango fruit parts on Potato Dextrose Agar (PDA) medium. Diseased parts were cut into small pieces with the help of sterilized blade. Pieces were washed with sterilized distilled water and disinfected with 70% ethanol for 1 min, then transferred with 1 per cent $HgCl_2$ solution for 10 seconds. Thus, obtained disinfected tissues were immediately washed thrice with sterilized distilled water and aseptically transferred on PDA plates. Inoculated Petri plates were incubated at room temperature (27±2 °C). *Colletotrichum gloeosporioides* Penz

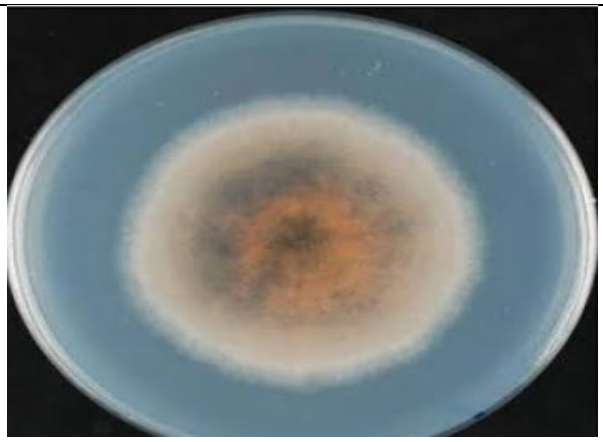
and Sacc. were identified according to Sutton's key (Sutton, 1992). The obtained culture was purified by using hyphal tip culture method, and maintained on same medium for the further investigations.

Inoculation of Pathogen on Various Sugar sources were incorporated molecular weight in Richard.s broth. The quantity of nitrogen required in each case were determined on the basis of their so as to provide equivalent amount of Sugar as that of potassium nitrate present in the basal medium. The Sugar sources were Mannose, Dextrose, Sucrose, Fructose, D-xylose, Galactose, Mannitol, Lactose, Arabinose and control (no sugar) C.D.AT 0.05&0.01 All the above Sugar sources were mixed thoroughly and the pH of medium was adjusted to seven by using 0.1 N sodium hydroxideor 0.1 N hydrochloric acid. The growth of fungus was studied as described under studies of carbon sources. 30 ml of each of the medium was taken in 100 ml flasks, sterilized and then inoculated with 5 mm discs taken from 9 days old culture of *Colletotrichum gloeosporioides* Penz and Sacc. incubated at 27±1°C for 8 days. Three replications were maintained for each treatment. According to H. S. Nagaraj Rao *et al.*, 1964to Dry weights of the mycelium were estimated after filtering, washing and drying of the harvested mats. (K. T. Arunakumara *et al.*, 2015).

III. RESULTS AND DISCUSSION

Isolated fungi *Colletotrichum gloeosporioides* Penz and Sacc dense, white aerial mycelium with pink, white, grayish colony colour which carry oil globule pale grey in centre these shows on Potato Dextrose Agar (PDA) medium.

Anthracnosesymptoms caused by Colletotrichum gloeosporioides Penz. on Mango Fruit.



*Colletotrichum gloeosporioides*Penz and Sacc.

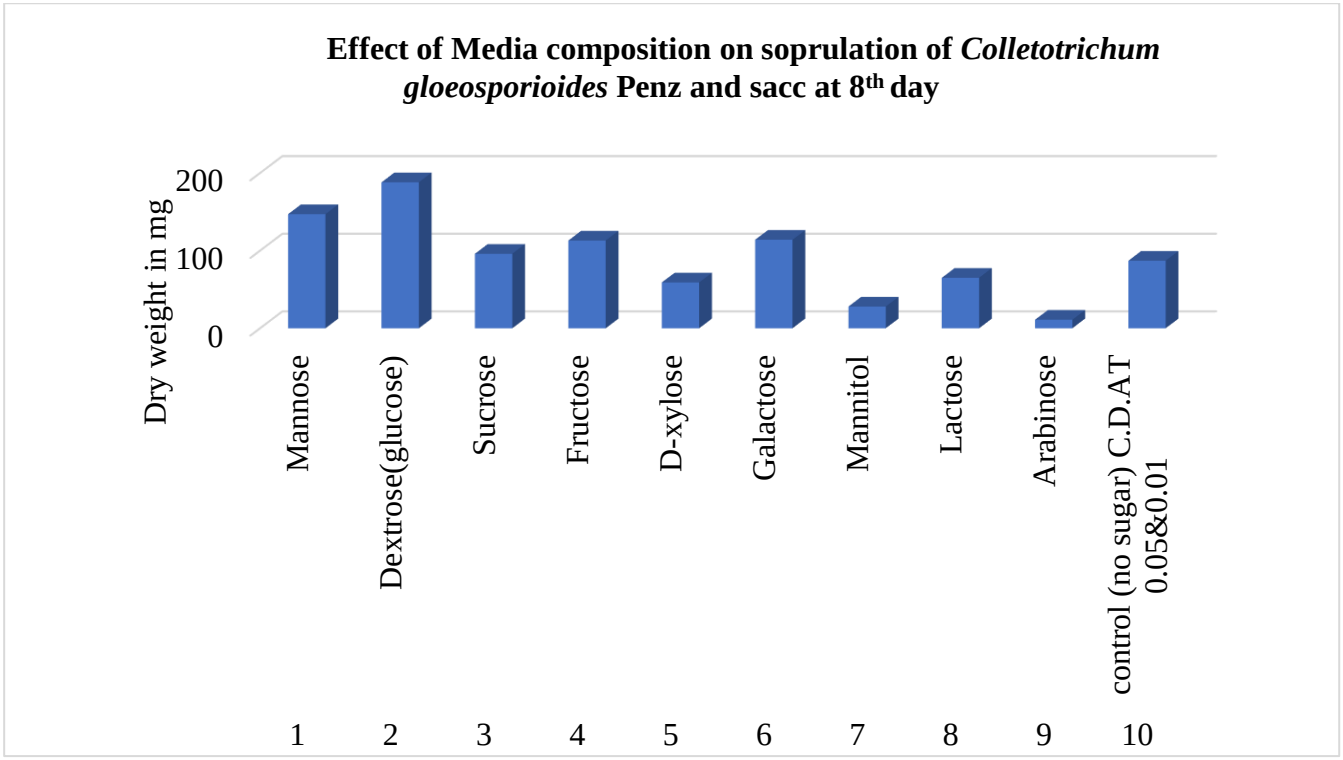
Effect of isolation media composition on sporulation of *Colletotrichum gloeosporioides* Penz and Sacc. On 8th day of inoculation period.

Effect of isolation media composition on sporulation formation of *Colletotrichum gloeosporioides* Penz and Sacc. On 8th day of inoculation period basically were use different sources of sugar Mannose, Dextrose, Sucrose, Fructose, D-Xylose, Galactose, Mannitol, Lactose, Arabinose and Control Containing only Culture media among Dextrose source of sugar were maximum utilization by fungi and produce maximum

sporulation because maximum utilization of carbon and energy source for growth and reproduction then next were Fructose, Mannose And Galactose utilized source of sugar for production of mycelium of fungi and followed by Sucrose, Mannitol And Least In Control And Arabinose Was Poor Sugar Sources For the growth *Colletotrichum gloeosporioides* Penz and Sacc, All Results Summerized In below Table. The Results Indicates That Dextrose Was Significant Effect on Growth of *Colletotrichum gloeosporioides* Penz and Sacc. Generally, for isolation of fungi use Potato dextrose agar culture because it is easy for preparation and formulation and good formulation help in growth of fungi, according to Maheshwari *et al.*, 1999; Saha*et al.*, 2008 PDA media suitable for isolation fungi but most fungi grow on PDA and produce maximum sporulation or mycelium. According to G. Sharma and R. R. Pandey in 2010 rich nutrient can affect on sporulation of fungi but in present study showed that 1% of sugar Dextrose in isolation media given maximum sporulation and dry weight of mycelium. Also, author find out effect of sugar sources On Growth of *Alternaria Solani* the Utilization of Sugars as Carbon Sources Has Been Investigated in Several Ectomycorrhizal Fungi (Martin *et al.*, 1998; Deveau*et al.*, 2008). Effect of nitrogen and carbon sources on the mycelia growth depends on species, culture media, and growth conditions supported by work of (Lin and Yang ,2006) who also reported similar findings. All the six species studied showed better mycelial growth (measured as dry mass) when nitrogen was supplied in the ammonical form instead as nitrate. Ammonium is generally recognized as 395 the most readily utilizable N source for the most of ECM fungi (Rangel-Castro *et al.* 2002).

Effect of isolation media composition on sporulation of *Colletotrichum gloeosporioides* Penz and Sacc. On 8th day of inoculation period.

Sr. no.	Sugar /concentration 1%	Dry weight in mg
1	Mannose	147
2	Dextrose(glucose)	188
3	Sucrose	96
4	Fructose	113
5	D-xylose	59
6	Galactose	114
7	Mannitol	28
8	Lactose	65
9	Arabinose	11
10	control (no sugar) C.D.AT 0.05&0.01	87



IV. CONCLUSION

Results showed that composition of media with 1% dextrose for isolation of fungi, *Colletotrichum gloeosporioides* Penz and Sacc. influenced growth, heavy sporulation and dry weight of mycelium on 8th day inoculation at 27±2 ℃ temperature and also found that visible colony character so, it is concluded that the media composition with appropriate concentration of sugar source will be suitable for daily practices in culture preparation for isolation of causal organism of disease by plant pathologist.

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Role of Library and Information Science Research

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ABSTRACT
In this paper highlight the research is primary purpose is to help teach the skills necessary for a librarian to conduct, basic research, the methods, techniques and basic research are relevant for applied research. The librarians wishing to carry out a cost study evaluate the performance of his or her library.
Keywords: Library and information science, Research, Basic research.

I. INTRODUCTION

There are many ways of defining a profession all agree that it should form paid occupation, General acceptance that research statist these requirements only come in the decades around medicine is a typical example of a profession some of its practionners were famous research long before that time , similarly, surveying was a well regarded profession in North America fro the early days pr European settlement, and some of its members contributed to early American research the different German states competed to obtain the nineteenth century . This student needed some certificate of their research ability and so grew up the process of awarding PhD.

II. BASIC RESEARCH

Research is best conceived as the process of arriving at dependable solutions to problems through the planned and systematic collection analysis, and interpretation of data.Quantities research methods involve a problem solving approach that is highly structured in nature and that relies on the qualification of concepts, where possible, for purposes of measurement that evaluations.
In other words, it well be necessity to decide that methodology and data collection techniques, among other procedures, to utilize in the investigation. The librarian could elect to conduct an experiment during which a particular type of library instruction would be given, and after which the student's library skills would be post tested. This activity is particularly crucial during the data collection and analysis. **Mouly (p.15)**

Library and Information Science: Growth of Basic Research
One of the major purposes of basic research to create new knowledge. It is purposes of science (Scientific Research) to go experience and common sense, which frequently are quite limited.

Kunge (special Library Association 2001)

Learning to master theoretically and practical application, the ground rules of research creates the best foundation for continuing growth in the profession. Profession is the ability of its members to give advice to clientele derived from a body of generalized and systematic knowledge that comprises it's the oretice. The statement identifies ways that special librarians, researchers, and SLA can work together to contribute to the library and Information profession and to build a foundation for evidence- based practice.

The Future of Library Research:

Clear conceptions of the goal, objective and methodologies of library science research are only now beginning to be solidly formulated. Necessary to use the methodology of other disciple those of sociology , psychology, economic, linguistic history and more generally applicable methodology in order to study the many problems facing librarian today.

ALA"S Committee on Research and statistics is charged with promoting research to answer question regarding library services. Research statement calls for evidence-based practices, which is decision making based on the strongest evidence. Role of library information professionals and the widespread accessibility of information resources to be based on research findings (putting our knowledge to work special library Association)

Mission and vision, ASIS & T: The information society for the information Age:

The vision of society includes "Advancing knowledge about information in creation properties, and use providing analysis of ideas, practices and technologies valuing theory research, application and service nurturing new perspectives, interests, and ideas and increasing public awareness of the information sciences and technology. Studies addressing the impacts and use of digital resources and technologies are currently represented in the literature and will likely continue to interest in researchers and practionners as the resources and technologies evolve and library users become more sophisticated in their demands for and use of these resources.

III. CONCLUSION

Research is endless process there is mounting evidence that the quality if you the quantity, of library and information science research is improving that the results of research in a board spectrum of effort extending well beyond librarianship will in large measure.

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Role and Influence : Nature of Mathematics

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ABSTRACT

Perceptions of the nature and role of mathematics held by our society have a major influence on the development of school mathematics curriculum, instruction, and research. The understanding of different conceptions of mathematics is as important to the development and successful implementation of programs in school mathematics as it is to the conduct and interpretation of research studies. The literature of the reform movement in mathematics and science education (American Association for the Advancement of Science, 1989; Mathematical Sciences Education Board, 1989, 1990; National Council of Teachers of Mathematics, 1989) portrays mathematics as a dynamic, growing field of study Other conceptions of the subject define mathematics as a static discipline, with a known set of concepts, principles, and skills (Fisher, 1990).The rapid growth of mathematics and its applications over the past 50 years has led to a number of scholarly essays that examine its nature and its importance (Consortium for Mathematics and Its Applications, 1988; Committee on Support of Research in the Mathematical Sciences, 1969; Courant & Robbins, 1941; Davis &Hersh, 1980, 1986; Hardy, 1940, Hilton, 1984, Saaty&Weyl, 1969; Steen, 1978; Stewart, 1987, Wilder, 1968). Mathematicians, in contrast, see their field as a rapidly growing rain forest, nourished and shaped by forces outside mathematics while contributing to human civilization a rich and ever-changing variety of intellectual flora and fauna. Some see mathematics as a static discipline developed abstractly othersseemathematics as a dynamic discipline, constantly changing as a result of new discoveries from experimentation and application (Crosswhite et al. 1986). These contrasting views of the nature and source of mathematical knowledge have provided a continuum for conceptions of mathematics since the age of the Greeks. The lack of a common philosophy of mathematics has serious ramifications for both the practice and teaching of mathematics. This lack of consensus, some argue, is the reason that differing philosophies are not even discussed. Others conjecture that these views are transmitted to students and help shape their ideas about the nature of mathematics (Brown. Cooney, & Jones, 1990, Cooney, 1987). What follows is an overview of these conceptions of mathematics and their current and potential impact on the nature and course of mathematics education.

KEYWORDS: - experimental, influence, ramifications, shape, nature etc.,

I. INTRODUCTION

CONCEPTIONS OF MATHEMATICS

HISTORICAL

Discussions about the nature of mathematics date back to the fourth century BC. Among the first major contributors to the dialogue were Plato and his student Aristotle. Plato took the position that the objects of mathematics have their own existence, outside the mind, in the external world. At the same time, Plato made a clear distinction between the thoughts of the mind and their representations perceived in the world by the senses. This caused Plato to distinguish between arithmetic – the theory of numbers – and logistics – the computational techniques required by traders. In the Republic (1952a). Plato argued that the study of arithmetic has a positive effect on individuals, forcing them to think about abstract numbers. Plato consistently held to this view and expressed indignation at the way technicians use physical arguments to "prove" results in applied settings.

This affirmation of the role of the senses as a source for abstracting ideas related to mathematics differed from the view of his teacher Plato. Aristotle's view of mathematics was not based on the theory of an external, independent, unobservable body of knowledge. Rather, it was based on experienced reality, where knowledge is gained from experimentation, observation, and abstraction. This view supports the idea that a person constructs the relationships specific to a given mathematical situation. In Aristotle's view, the construction of a mathematical idea comes through the idealizations that the mathematician makes as a result of experience with objects. Propositions in applied mathematics are therefore approximations of theorems in pure mathematics (Körner, 1960). Aristotle was tempted to understand mathematical relationships through the collection and classification of empirical results derived from experiments and observations, and then to explain the inherent relationships in the data by deducing the system. The works and ideas of Plato and Aristotle thus formed two of the main contrasting themes concerning the nature of mathematics.

In the Middle Ages, Aristotle's work became known for its contributions to logic and its use in substantiating scientific claims. Although this did not contradict the way in which Aristotle used his methods of logical reasoning, those who applied his principles often used them to argue against deriving evidence from empirical research. Aristotle drew clear boundaries between the ideal forms envisioned by Plato and their empirical realizations in mundane objects.

Descartes sought to move mathematics back to the path of deduction from accepted axioms. Although Descartes himself experimented in biological matters, he rejected input from experimentation and the senses in mathematical matters because it might possibly deceive the perceiver. Descartes's thinking on mathematics sought to separate it from the senses.

For from the name 'Mathematics' means exactly the same as 'scientific study, we see that almost anyone who has had the slightest education can easily distinguish what belongs to mathematics in any question from what belongs to other sciences. Consequently, I saw that there must be some general science to explain this element as a whole, which raises problems of order and limited measurement, since it is no particular subject.

I notice that it is called "universal mathematics, it is not a very far-fetched designation, but it has a long tradition that has passed into modern use, because in this science is contained everything that makes others called parts of mathematics. (1952, p7).

The existence of consistent non-Euclidean geometries demonstrated the power of the human mind to construct new mathematical structures, freed from the boundaries of an externally existing, controlling world (Eves, 1981, Kline, 1972, 1985, Körner, 1960). This discovery, exciting because it brought with it a new notion of "truth," buried in the acceptance of an axiom or set of axioms defining a model for a field of inquiry. Mathematicians immediately began to apply this new freedom and axiomatic method to the study of mathematics.

Formalism was based on attempts to characterize mathematical ideas in terms of formal axiomatic systems. This attempt to free mathematics from contradiction was built on the construction of a set of axioms for a branch of mathematics that allowed discussion of the topic in a first-order language. Considerable progress was made in several areas under the auspices of formalism before its demise as a result of Kurt Gödel's landmark paper in 1951. Gödel (1931) showed that in axiomatic systems of the type Hilbert proposed, it is not possible to formally prove that the system is contradiction-free. Godel also showed that it is impossible to establish the consistency of a system using conventional logic and number theory if one uses only the main concepts and methods from traditional number theory. These findings ended the attempt at such a formalization of all mathematics, although the formalist school continues to have a strong impact on the development of mathematics (Benacerral& Putnam. 1964, van Heijenoort, 1967, Snapper, 1979a. 1979b).

Three major schools of thought developed in the early 20th century to deal with the paradoxes discovered in the late 19th century advanced the debate about the nature of mathematics, but none provided a widely accepted basis for the nature of mathematics.

MODERN VIEWS

The use of product orientation to characterize the nature of mathematics is not a settled issue among mathematicians. They tend to carry strong Platonic views about the existence of mathematical concepts outside of the human mind. When forced to clarify their ideas about mathematics, most retreat to a formalist or an Aristotelian.

This shift requires fundamental change. Mathematics must be accepted as a human activity, an activity not strictly governed by any school of thought (logician, formalist or constructivist). Such an approach would answer the question of what mathematics isMathematics deals with ideas. Not pencil or chalk marks, not physical triangles or physical sets, but ideas (which can be represented or implied by physical objects). What are the main characteristics of mathematical activity or mathematical knowledge as we all know it from everyday experience?

1. Mathematical objects are invented or created by humans
2. They do not arise arbitrarily, but result from activity with already existing mathematical objects and from the needs of science and everyday life.

3. Mathematical objects, once created, have properties that are well specified, which we may have great difficulty discovering, but which we have independently of our knowledge of them. (Hersh, 1986, p. 22)

The development and adoption of a philosophy of mathematics brings with it challenges for mathematics and mathematics teaching. Philosophy should require experiences that help the mathematician, teacher, and student experience the invention of mathematics. It should require experiences that enable the mathematization or modeling of ideas and events. The development of a new philosophy of mathematics requires the discussion and communication of alternative views of mathematics in order to determine a valid and applicable characterization of the field.

TEACHERS' CONCEPTIONS OF MATHEMATICS

A teacher's conception of mathematics may have a lot to do with the way in which mathematics was taught in the classroom. The subtle messages given to children about mathematics and its mass nature in turn influence the way they come to view mathematics and its role in their world.

Cooney (1987) argued that substantial changes in mathematics instruction, such as those suggested by the NCTM (1989) standards, will be slow in coming and difficult to achieve because of teachers' underlying beliefs about the nature of mathematics. She notes that the most common verb used by preschool teachers to describe their teaching is present. This concept of teaching embodies the notion of authority in that there is a lecturer with a fixed message to deliver. Such a position presupposes the external existence of a body of knowledge to be imparted to students, and is thus more Platonic than Aristotelian. Extending this concept of how mathematics relates to education and its practice is an important koe A teacher's view of how teaching should be done in the classroom is strongly based on the teacher's understanding of the nature of mathematics, not on what they believe. is the best way to teach (Hersh, 1986). To change the attitude, it is necessary to construct alternative ways of conceptualizing the nature of mathematics and the consequences of such a conception for mathematics education.

Basic use – At this level, the curriculum is developed from a constructive point of view. This approach applies to both content and pedagogy in mathematics.

In many classes, the mechanical instrumental model predominates. Modern reform documents (NCTM, 1989) advocate a situation that is closer to the realist-fundamentalist. The vast distance between these two models indicates the large role that the teacher's conception of the nature of mathematics can play in the teaching and learning process as it relates to school mathematics.

Kesler (1985) and McGalliard (1983) conducted studies of secondary school algebra and geometry teachers' conceptions of mathematics using classroom instruction analysis. Kesler found that algebra teachers varied widely in their orientation. Some performed at the dualistic or multiplist level of the hierarchy, while others showed signs of multiplist relativistic behavior. McGalliard's study of geometry teachers showed that their view of mathematics was marked by dualism. These teachers saw their task as introducing mathematics to students. The main concern of the teachers was that their students would learn to easily complete the tasks that their homework and tests required. Learning mathematics was thus reduced to knowing how, rather than knowing why. The fact that fewer geometry teachers went beyond the dualistic level may reflect their

lack of geometric experience. Cooney (1987) considers the predominance and implications of the presentation or broadcast mode for teaching Presentation inherently involves authority Such an orientation is not compatible with a style of classroom management and the use of resources that would support student attention. from a range of perspectives on mathematics, its nature and use. These ideas, plus the results of Owens's (1987) collaboration with middle school teachers, indicate the great distance that must be covered in order to bring mathematics classroom thinking closer to the basic and realistic combination envisioned by Goffree.

Owens' work and that of Bush (1982) further suggested that the dualistic or pluralistic views of many preservice teachers were reinforced by their experiences in upper division mathematics courses at the university level. There they were exposed to teaching that strongly reflected a formalist view of mathematics as an externally developed axiom system. This influence only reinforces the notion that mathematics exists externally. Through direct intervention, Myerson (1977) was able to get some students to view mathematics at a somewhat higher level. However, many still thought that there were specific, set methods to address each question in the classroom, reflecting the strong dualistic-multiplistic orientation of pre-service teachers.

Student response is a powerful factor that influences the teacher's portrayal of the nature of mathematics in the classroom. Brown (1985) and Cooney (1985) studied first-year teacher classroom responses. The teacher entered the classroom with an orientation that reflected both pluralistic and relativistic characteristics. He tried to initiate a classroom style of lots of problem solving and student activities aimed at providing a strong foundation for student learning. Students found these approaches threatening and their reaction led to his eventual return to presentation mode. Cooney (1987) concludes, “I suspect that students gravitate toward a mechanistic curriculum and appreciate teachers whose interpretations of the text are quite predictable. If you think otherwise, listen carefully to the interactions that take place between the students and the teacher when exam time comes.”

THE RELEVANCE OF CONCEPTIONS OF MATHEMATICS-TO-MATHEMATICS EDUCATION RESEARCH

The focus on mathematics education and the growth of research in mathematics education in the late 1970s and 1980s reflects a renewed interest in the philosophy of mathematics and its relationship to learning and teaching. At least five conceptions of mathematics can be identified in the mathematics education literature (J. Sowder, 1989). These concepts include two groups of studies from the external (Platonic) view of mathematics. The remaining three groups of studies take a rather internal (Aristotelian) view.

EXTERIOR CONCEPT

The work of two groups of researchers treats mathematics as an externally existing, established set of concepts and facts. Principles and skills available in the curriculum and learning materials. The work of the first group of researchers taking an outside perspective focuses on helping teachers and schools to be more successful in imparting this knowledge to children. Their work takes a relatively fixed, static view of mathematics.

Shavelson, Webb, Stasz, and McArthur (1988) provide reflections on the nature of findings from research based on the external conception perspective. First, the findings paint a picture of the current situation, not a picture of what could be achieved under dramatically changed guidelines. Second, the findings reflect the type of performance that was originally used to categorize teachers, that is, when teachers were selected as experts based on specific criteria, the results reflect instructional patterns related to those criteria. The conduct of studies and external conceptions of applied mathematics tend to drive the type of research questions asked and not asked. This research must include teachers with a wide range of styles if findings generalizable to all teachers or all classrooms are desired.

A second group of outside-in researchers takes a more dynamic view of mathematics, but focuses on adapting the curriculum to reflect this growth in the discipline and to see students acquire knowledge of related content and skills. However, the basic emphasis is still placed on the student's mastery of the subject matter or on the application of the latest technological or educational technologies to the teaching of mathematics.

Wearne and Hiebert took the concepts and skills related to fractions as given and looked at ways students can understand and work with decimal fractions and apply this knowledge to situations requiring the transfer of understanding to procedural skills. Each of these studies assumes mathematics as given, but also allows it to take on new meanings over time. At the heart of the problem is how to improve teachers' teaching or students' understanding through research. The focus here is not on the creation of new content, but on the growth of individual knowledge of the existing part of mathematics.

INTERIOR CONCEPT

The remaining three conceptions of mathematics found in mathematics education research focus on mathematics as a personally constructed or internal body of knowledge. In the first one, mathematics is understood as a process. Knowing math is the same as doing math. Research in this tradition focuses on examining the features of a given context that support “doing. Almost everyone involved in the teaching and learning of mathematics holds the view that learning mathematics is a personal affair in which students develop their own personalized ideas about mathematics as a result of the activities involved Ernst von Glaserfeld (1987). concept of learning and teaching

As we come to see knowledge and competence as products of the individual's individual conceptual organization of experience, the teacher's role will no longer be to provide "truth" but rather to assist and guide the student in the conceptual organization of certain areas of experience. . To do this, two things are required of the teacher: on the one hand, a reasonable idea of where the student is, and on the other hand, a reasonable idea of the destination. Neither is open to direct observation What a student says and does can be interpreted in terms of a hypothetical model—and this is one area of educational research that every good teacher since Socrates has done intuitively Today we are much closer to providing the teacher with a set of relatively reliable diagnostic tools.

There is another frequently expressed (and closely related) opinion: The best way to learn anything is to discover it yourself Lichtenberg adds an interesting point What you were obliged to discover yourself leaves a path in your mind that you can use again when needed will arise. (Polya, 1965, pp. 102-103)

The second personal, or internal, conceptualization of mathematics is based on the description of mathematical activities in terms of psychological models using cognitive processes and schemas. Larkin (1989) describes this approach in the following statement

A central technique of cognitive science is modeling problem-solving behavior in the following way. A problem is considered a data structure that includes any available information about the problem. problem solving. Because we want to have a model that explains human performance, we require that the model add information to the data structure in an order consistent with the order in which people are observed to add information p 120)

This cognitive science approach to the study of mathematics can be found in the works and recommendations of Bransford et al. (1988), Campione, Brown and Connell (1988), Carpenter (1988), Chaiklin (1989), Hiebert (1986), Larkin (1989), Mar Should (1988), Nesher (1988); Ohlsson (1988), Peterson (1988) Resnick (1987); and Weare and Hiebert (1988). The diversity of this research using a cognitive modeling approach shows its apparent acceptance as a model for viewing the structure of mathematics learning. Its basic principles are the identification of representations of mathematical knowledge, the operations that individuals perform with that knowledge, and the way in which the human mind stores, transforms, and connects this knowledge.

A third internal conception of mathematics that emerges in mathematics education research is one that views mathematics knowledge as the result of social interactions. Learning mathematics here is the acquisition of relevant facts, concepts, principles and skills as a result of social interactions that are highly context dependent. Research describing this view (Bauersfeld, 1980; Bishop, 1985, 1988; Kieren, 1988; Lave, Smith, & Butler, 1988; Schoenfeld, 1988, 1989) focuses on the construction of mathematical knowledge from apprenticeship learning. Drawing from both content and context.

II. CONCLUSION

A review of the literature shows that conceptions of mathematics fall on an externally-internally developed continuum. Comments by Hersh (1986) along with others (Tymoczko, 1986) suggest that mathematicians behave as constructors until challenged. Such conceptions are strongly flavored with dualistic or multiplistic notions of mathematics, allowing few teachers to reject authoritarian teaching styles. Yet leaders and professional organizations in mathematics education promote a conception of mathematics that reflects a decidedly relativistic view of mathematics (Ernest, 1989). Steps to close the gaps between the philosophical underpinnings of current mathematics teaching are important steps to address in the development and study of mathematics education at all levels.

The emergence of a process view of mathematics enshrined in the NCTM standards (1989) and in the works of modern philosophers of mathematics (Tymoczko, 1986) presents many new and important challenges Teacher educators and curriculum designers must be aware of the properties and implications. about internal and external concepts and their consequences for curriculum development and teachers' activities Furthermore, all those involved in the application of mathematical pedagogical research must recognize the important effects of each concept of mathematics both on the cited findings and on the interpretation and

application of these findings. Mathematics teachers need to focus on the nature of mathematics in developing research, curriculum, teacher training, teaching and assessment as they seek to understand its impact on mathematics learning and teaching.

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GC-MS Analysis of Phyla Nodiflora(L.) Greene

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ABSTRACT

Phyla nodiflora, belongs to familyVerbenaceae native of south of America. GC MS analysis of methanolic extract results revealed that the presence of 2Furancarboxaldehyde,5-(hydroxymethyl) 2,7-dioxatricyclo [4.3.1.0(3,8)] decan-4-one, Cyclobuta-[1,2,3,4]-dicycloctene, hexadecahydro, 1,6dihydro-5-(2-hydroxyethyl)-4-methyl-6-oxopyrimidine, octopamine.

KEY WORDS: Phyla nodiflora, verbenaceae, Cyclobuta-[1,2,3,4]-dicycloctene.

I. INTRODUCTION

Phyla nodiflora, plant in the family verbenaceae native of south of America. Commonly known as frog friut . It is a small perennial creeping herb found commonly in grassy places along of irrigation channels,wet sandy canal edges and river banks almost found all part of India and up to 900 m on the hills.vernacular name is in English- *Frog Fruit, Turkey tangle*, Hindi-*Jalbuti, Jalpapli,*Marathi –*JalapimpaliT*amil –*Podutalei,* Malayalam – *Nirtippali,* Telugu –*Bokkena,*Kannada-*Nelahippali,* Konkani -*Adali*. The aerial parts are used as antibacterial, diuretic,emmenogogue, parasiticide, refrigerant, febrifuge and cooling (Agrawal,1997), the plant is acrid, hot and diuretic, maturant, useful in feversand cold, astringent to bowels, stomachic, used in lack of bowelmovements, pain in knee joints and in lithiasis (Kirtikar and Basu,1935: Nadkarni, 1954: Anonymous, 1962). It shows antispasmodic property (Bhakuni*et al.,*1969). It is Hair afflictions (Panniachamy*et al.*,1989), antioxidant (Durairaj*et al.*, 2008). Infusion of leaves and tender stalks are used inindigestion in children and also after delivery in women. It is also usedin lithiasis. (Akhtar, 1993).

II. DESCRIPTION

Prostrate, perennial herbs; stem much- branched, sub quadrangular creeping, glabrous, rooting at the nodes. Leaves opposite subsessile, spathulate, 1.5-3.5 × 1-2 cm, cuneate at base, margin deeply serrate,obtuse at apex, appressed pubescent on both the surface. Flowers minute, sessile, packed in long peduncle axillar spike; peduncles 4-6 cm long; bracts elliptic, 2.4 mm long, mucronate, glabrous. Calyx spathaceous, 1.5 mm long,

bilobed, pubescent. Corolla white or pink, 23 mm long, bilipped. stamensdidynamous, 4. Ovary superior. Fruits small, globose, 1.5 mm long, flat, splitting into 2, seedespyrenes.**Soil type**: Wet soil.**Flowers and fruits**: Almost throughout the year.**Locality** : In all districts.

III. MATERIALS AND METHOD

Preparation of Extract

25 gram of powder drug was extracted with methanol solvent using soxhlet extractor for 18 hours at 65 ºC. The extracts were filtered through a Whatman filter paper no. 42 (125 mm) and concentrated at 40 ºC by using an evaporator and stored in amber color bottle at 4 ºC. These extracts were send to *Sophisticated Analytical Instrumentation Facility, Indian Institute of Technology Bombay, Powai Mumbai, India.* For GC-MS (Gas chromatography mass spectroscopy) for detection of phytochemicals and same extracts were used for antibacterial screening.

GC-MS Analysis

For each sample the analytical method is same while the oven temperature is variable, Injection port temperature is 250, Carrier gas is Helium 1ml /sec. Inter face temperature is 250, Ion source is at 200, Analysis was done by using E+ ionization with 70ev, The MS is AccuTOF GCV, Column through the sample passes is HP-5. The MS detection was completed in 36 minutes. The detection employed the NIST Ver. 2.0-year 2005 library.

IV. RESULTS AND DISCUSSION

The results pertaining to GC-MS analysis led to the identification of number of compounds from the GC fractions of the methanolic extract of *Phyla nodiflora*(L.) Greene. These compounds were identified through mass spectrometry attached with GC. The results of the present study were tabulated in Table 1 .

The compound prediction is based on Dr. Duke's Phytochemical and Ethnobotanical Databases. The results revealed that the presence of 2Furancarboxaldehyde,5-(hydroxymethyl) 2,7-dioxatricyclo[4.3.1.0(3,8)] decan-4-one, Cyclobuta-[1,2,3,4]-dicycloctene, hexadecahydro, 1,6dihydro-5-(2-hydroxyethyl)-4-methyl-6-oxopyrimidine, octopamine. The spectrum profile of GC-MS confirmed the presence of eight major components with the retention time 3.8, 7.2, 8.8, 11.9, 13.1, 16.6, 19.8, 22.2 respectively (Figure 17A). The individual fragmentation patterns of the components were illustrated in Figure 1B-F. The mass spectrum of the compound with retention time 8.8 (Hit 1) gave 8 major peaks (m/z) at 53, 69, 81, 95, 97, 109, 123, 126 (Figure 17B). The mass spectrum of the compound with retention time 11.8 (Hit 1) gave 7 major peaks (m/z) at 55, 68, 82, 98, 110, 136, 154 (Figure 17C). The mass spectrum of the compound with retention time 11.8 (Hit 2) gave 7 major peaks (m/z) at 54, 67, 82, 95, 110, 192, 220 (Figure 17D). The mass spectrum of the compound with retention time 16.6 (Hit 1) gave 8 major peaks (m/z) at 55, 68, 79, 96, 106, 124, 136, 154 (Figure 17E). The mass spectrum of the compound with retention time 22.1 (Hit 2) gave 10 major peaks (m/z) at 51, 60, 67, 77, 91, 95, 107, 123, 136, 154 (Figure 17F).

In the present study we characterized the chemical profile of *Phyla nodiflora*(L.) Greene using GC- MS. The gas chromatogram shows the relative concentrations of various compounds getting eluted as a function of retention time. The heights of the peak indicate the relative concentrations of the components present in the plant. The mass spectrometer analyzes the compounds eluted at different times to identify the nature and structure of the compounds. The large compound fragments into small compounds giving rise to appearance of peaks at different m/z ratios. These mass spectra are fingerprint of that compound which can be identified from the data library. This report is the first of its kind to analyze the chemical constituents of *Phyla nodiflora*(L.) Greene using GC-MS. In addition to this, the results of the GC-MS profile can be used as pharmacognostical tool for the identification of the plant. GC-MS analysis showed the existence of various compounds with different chemical structures. The presence of various bioactive compounds confirms the application of *Phyla nodiflora*(L.) Greene for various ailments by traditional practitioners. However, isolation of individual phytochemical constituents may proceed to find a novel drug.

V. CONCLUSION

In the present investigation various standardization parameters such asmorphology, phytochemical study could be help in authentication of plant drug of *Phylanodiflora*the result of present study will also serve as reference material in preparation ofmonograph. However isolation of detectedphytoconstituent may proceed to find a novel drug.

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PHOTOGRAPH

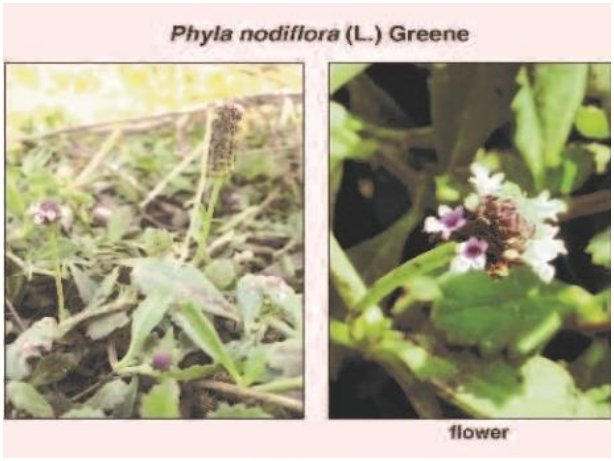
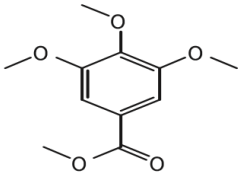
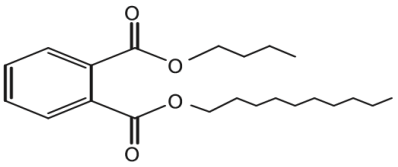
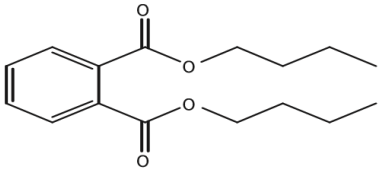
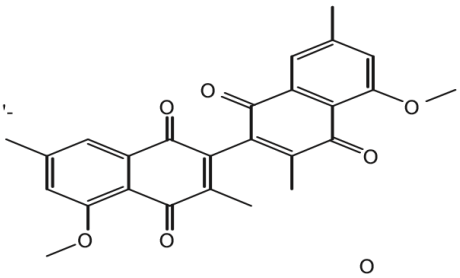
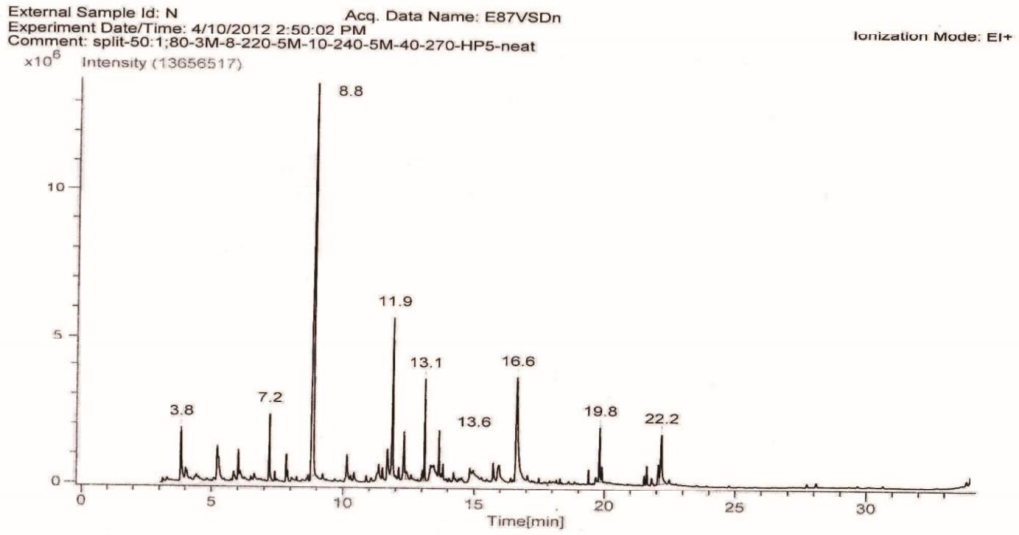


Table-1

Name of compound	Structure of compound	Retention time	Molecular formula	Molecular weight
3,4,5-Trimethoxy-benzoic acid methyl ester		16.8	$C_{11}H_{14}O_5$	226.23
Phthalic acid 1-butyl ester 2-decyl ester		19.9	$C_{22}H_{34}O_4$	362.50
Phthalic acid dibutyl ester		19.9	$C_{16}H_{22}O_4$	278.34
5,5'-Dimethoxy-3,7,3',7'-tetramethyl-[2,2'] binaphthalenyl-1,4,1',4'-tetraone		31.3	$C_{26}H_{22}O_6$	430.45

***Phyla nodiflora* L.**



Peak Numb	Time [min]	Type	Peak Width([min]	Area [Intens. * se	Height	Description	Start Point Time[min]	Start Point Height	End Point Time[min]	End Point Height
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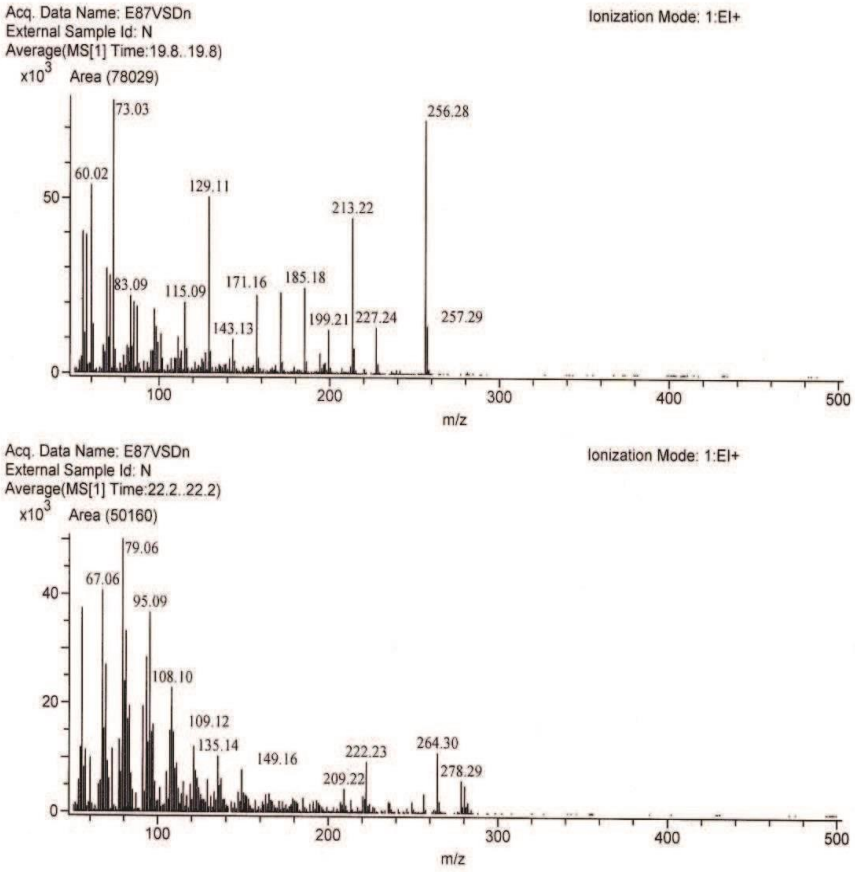
2	7.2	BB	0.0347	5648623.17	2265959.84		7.1	85296	7.3	103537
3	8.8	BB	0.0675	53382058.8	13373852.7		8.7	170978	8.9	368052
4	11.9	BB	0.0382	13815096.6	5383168.00		11.8	369024	12.0	269936
5	12.3	BV	0.0454	5254086.71	1609580.76		12.2	199250	12.4	199035
6	12.4	VB	0.0842	1207326.79	264015.34		12.4	199035	12.5	198828
7	13.0	BV	0.0393	1067292.09	364865.63		12.9	137380	13.1	149821
8	13.1	VB	0.0281	6317614.05	3446397.37		13.1	149821	13.2	162257
9	13.6	BB	0.0313	3160697.13	1551358.09		13.6	318497	13.7	290400
10	16.5	BV	0.0351	166069.44	71778.44		16.5	140055	16.5	171312
11	16.6	VB	0.0804	20202465.7	3471621.84		16.5	171312	16.9	304196
12	19.8	BB	0.0303	4898041.92	1826372.25		19.7	195798	19.9	176603
13	22.1	BV	0.0497	2098212.70	673292.42		21.9	84783	22.1	113777
14	22.2	VB	0.0610	7566176.95	1663447.92		22.1	113777	22.4	162101

Fig 17 A

N-1

N-3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60.02
129.11
213.22
83.09
115.09
171.16
185.18
143.13
199.21
227.24
257.29
m/z
Acq. Data Name: E87VSDn
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67.06
95.09
108.10
109.12
135.14
149.16
222.23
264.30
209.22
278.29
m/z

N-H

** Search Report Page 1 of 1 **

Unknown: MDT[CTR[30.0000..30.0000,10,Center,80,0.0,Area];SMT[SA,3]] E87VSD.7fl\E87VSDn.7rw 8·8m
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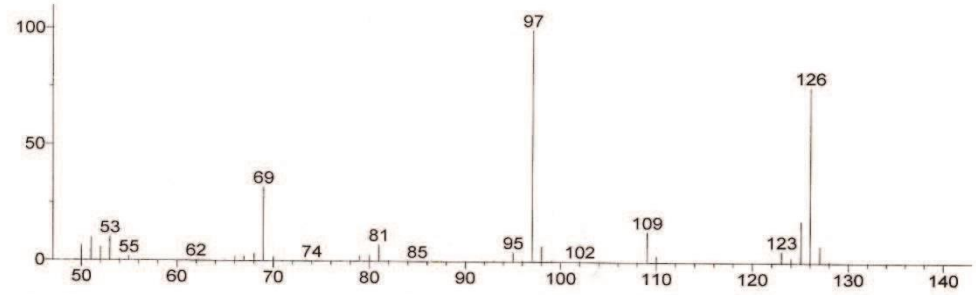

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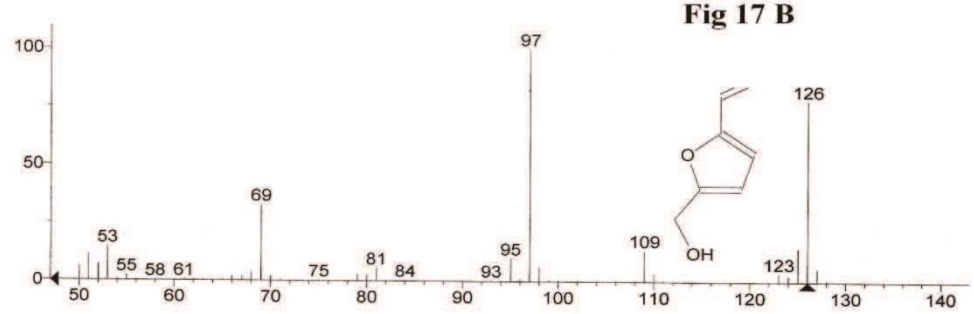
Fig 17 B



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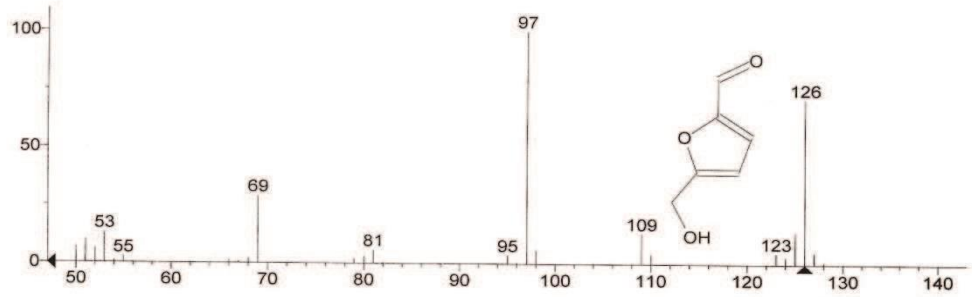

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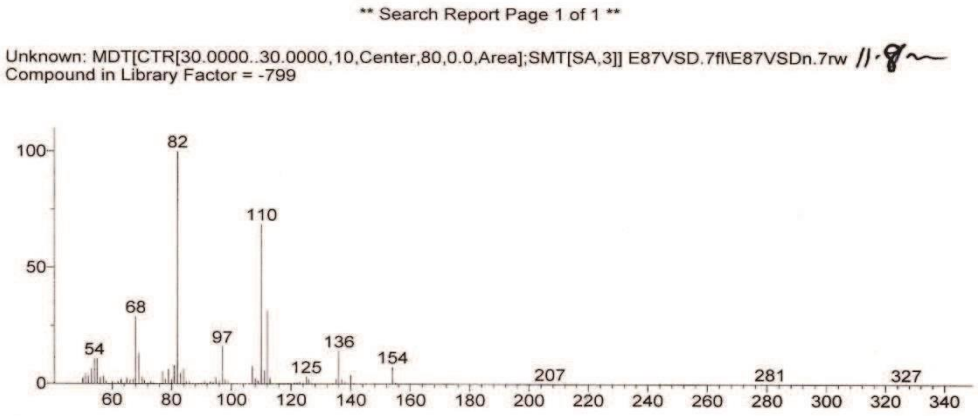

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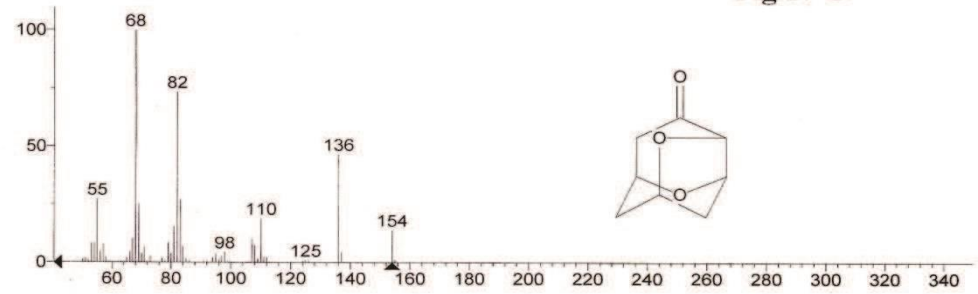
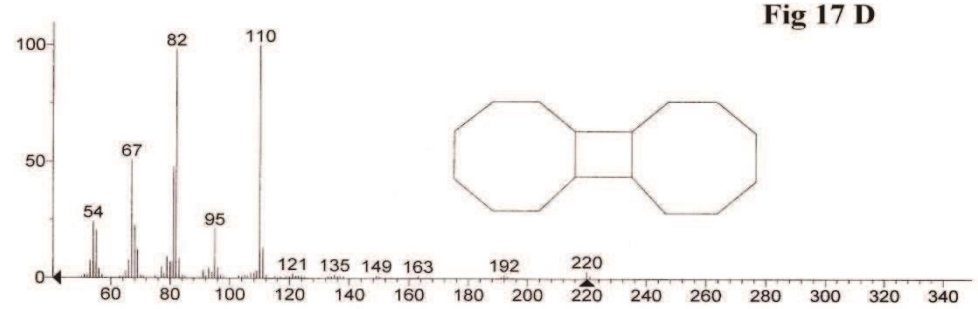


Fig 17 D



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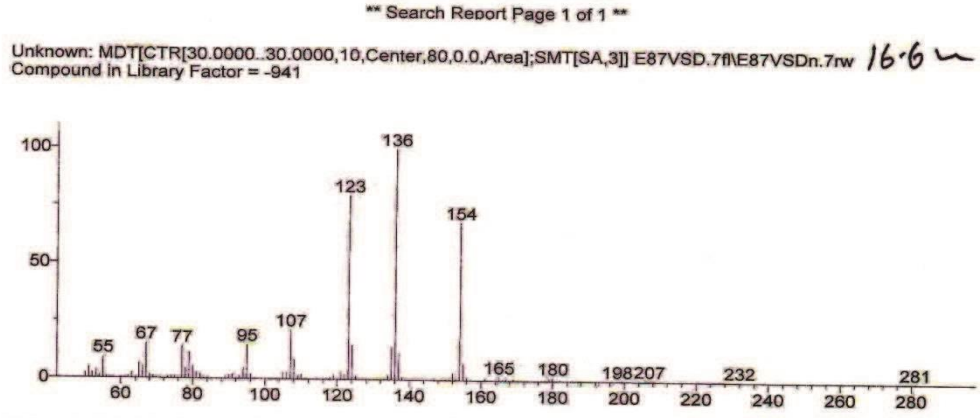


Fig 17 E

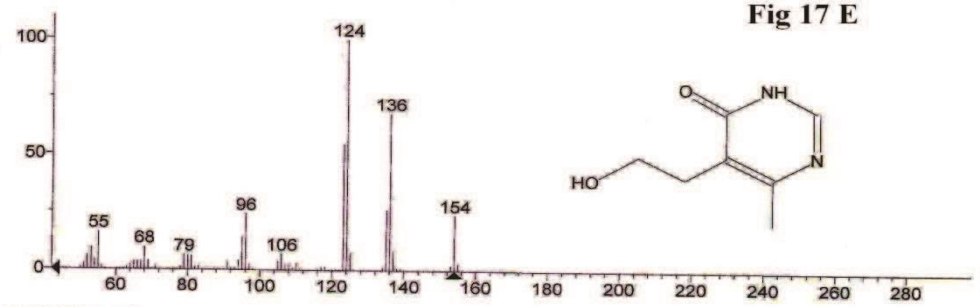
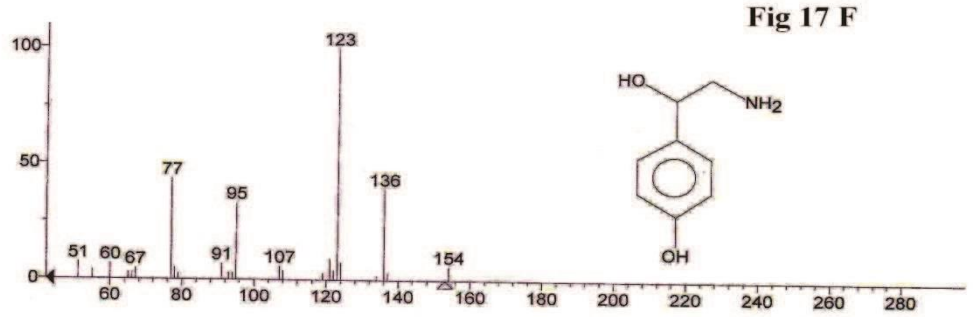


Fig 17 F



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Agro-Morphological Diversity in Rice (Oryza Sativa L.) Landraces from Chandoli Region of Western Ghats

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ABSTRACT
Rice (Oryza sativa L.) is a staple food all over the world and belongs to the family Poaceae. Now a day the fulfillment of the required quantity of rice is a challenge for plant breeders. The objective of this investigation was to study 12 qualitative and 6 quantitative characters from 6 landraces which will help in crop improvement. The study of 12 qualitative characters shows the high-frequency distribution in auricle color, culm: underlying node color culm: underlying internode color, and culm: lodging resistance. The coefficient of variation and Pearson correlation were analyzed to study 6 quantitative characters. The coefficient of variation ranged from 4.87% (Penultimate leaf length) to 19.80% (Penultimate leaf width), this higher variation of characters was effective. The Pearson's correlation analysis shows the highest correlation corresponded to Flag leaf width and Penultimate Leaf width (r=0.985). Plant height showed a positive significant correlation with flag leaf length (r=0.755) and penultimate leaf length (r=0.649). Landraces having these different characters are better choices for plant breeding programs. Thus the present agro-morphological study can be utilized for the basic evaluation of crop improvement programs and for assessing genetic diversity among morphologically different rice landraces.
Keywords: Landraces, Agro-morphological, Pearson correlation, Coefficient of variation.

I. INTRODUCTION

Rice is one of the most grown cereal crops and important staple food all over the world. India is the second largest rice-producing country in the world. Chandoli region is a hilly region of the Western Ghats in Sangli district and is well known for rice cultivation. About 45 rice landraces are cultivated in this region, from which most of the landraces are disappearing fast.

A genetic improvement Program was carried out to increase the production of rice. However, the importance of landraces Can never be defined in the agriculture system because the desirable gene for crop improvement are existing in these landraces only, and provides a valuable gene pool for Future breeding programs. Assessment of genetic diversity is very important in rice breeding for the appointment and conservation of different landraces of rice. Therefore evaluation and Characterization of existing landraces of rice are very important for the breeding program.

The main objective of the present investigation was to Characterize 6 Landraces of rice in the Chandoli region of the Western Ghats using agro-morphological Characters to provide useful information to facilitate the choice of plant breeders for the plant breeding program.

II. MATERIALS AND METHODS

Agro-morphological Survey was conducted in a village Chinchewadi of BattisShirala district Chandoli region. Different 6 landraces were collected (Chandoli region) and cultivated in the Similar climate and altitude of research site Chinchewadi between 17o10' north latitude and 73095' East longitude during June 2022. This research site is located in a hilly region that has continuous rainfall. The Seeds of the selected 6 cultivars were sown in the field in different 6 blocks. Further, each cultivar was transplanted in 6 rows. After 20 days of sowing. The Crop is cultivated in a good supply of fertilizer in the required quantity. Agro-morphological characters were studied and 12 qualitative and 6 quantitative characters were recorded. These data were recorded from five random plants from each row. The mean of this data was used for various statistical analyses of 6 landraces. Frequency distribution for 12 qualitative characters and 6 quantitative characters were studied by Pearson's Correlation and Coefficient of variation.

Table 1: List of landraces and collection location

Sr.No.	Name of landraces	Site of collection
1	Jondhala	Charan
2	Blue rice	Pimpalgaonjoga
3	Wada kolam	Palghar
4	Indrayani	Chinchewadi
5	Bhogawati	Chinchewadi
6	Sonam	Chinchewadi

III. RESULTS & DISCUSSIONS

I. Qualitative characters:

Qualitative characters are the most important characters to identify a specific plant variety and these are mostly genetically controlled. Therefore these characters are less independent of the environmental responses. Qualitative characters are very useful for plant description and are influenced by natural selection. The frequency distribution of 12 qualitative characters is recorded in Table. The leaf blade: Anthocyanin coloration and ligule shape showed no variation.83% of the landraces had green basal leaf sheath color and 17% had basal leaf sheath green with a purple line. 50% of the leaf sheath showed medium anthocyanine coloration and the remaining 50% had no anthocyanine coloration. The frequency of pubescent leaf blade was found to be 67% whereas 33% had intermediate pubescence.67%landraces were found to have whitish ligule color followed by 17% whitish green and 17% of purple ligule color. Most landraces showed no

anthocyanine coloration on nodes of Culm. The frequency of whitish auricle color was found to be 50% whereas 33% purple and 17% of yellowish green auricle color. The Culm: Underlying node color was found to be 67% light green, 17% green, and 17% purple in color. Most of the Culm: underlying internode colors were light gold (83%) and green with purple flee (17%). The culm lodging resistance of collected landraces was found to be very strong (33%), very weak (17%), Strong (33%), and intermediate (17%).

Table 2: Frequency distribution of 12 qualitative traits of collected 6 landraces

Characters	Description	Frequency	Frequency%
Basal leaf sheath color	Green	5	83
	Green with purple line	1	17
Leaf sheath: Anthocyanine	Absent	3	50
	Medium	3	50
Leaf blade: Anthocyanine	Absent	6	100
	Medium	0	0
Leaf blade pubescence	Intermediate	2	33
	Pubescent	4	67
	Glabrous	0	0
Ligule color	Whitish	4	67
	Yellowish green	1	17
	Purple	1	17
Ligule shape	Two cleft	6	100
	Truncate	0	0
Collar color	Light green	5	83
	Purple	1	17
Auricle color	Yellowish green	1	17
	Purple	2	33
	Whitish	3	50
Culm:Anthocyanine coloration on nodes	Absent	5	83
	Present	1	17
Culm:Underlying node color	Green	1	17
	Light gold	4	67
	Purple	1	17
Culm:Underlyning internode color	Light gold	5	83
	Green with purple line	1	17
Culm:Lodging resistance	Very weak	1	17
	Strong	2	33
	Intermediate	1	17
	Very strong	2	33

II. Quantitative characters:

Coefficient of variation:

Basic statistics of quantitative characters for plant height (PH), Flag leaf length (FLL), Flag leaf width (FLW), Penultimate leaf length (PLL), Penultimate leaf width (PLW), Total tillers (TT) are presented in Table. The CV value for these 6 quantitative characters ranges from 4.87 % to 19.8%. Penultimate leaf width, plant height, and total tillers have more CV values indicating that the selection of landraces for further crop improvement is expected to be significant

Table 3: Coefficient of variation for 6 quantitative characters among 6 landraces

Characters	Mean	Standard Deviation	CV%
Plant height	110.9	14.11085	7.859202
Flag leaf length	52.43333	7.996416	6.557104
Flag leaf width	1.57	0.237908	6.599202
Penultimate leaf length	41.66667	8.553518	4.87129
Penultimate leaf width	1.453333	0.073394	19.80182
Total tillers	6.433333	0.861781	7.465159

Pearson's Correlation analysis:

Correlation analysis of these selected quantitative characters is a measure of the strength of association between the two characters. Association and correlation between characters are represented in Table. Pearson's correlation analysis shows the highest correlation was correspond to the flag leaf width to penultimate leaf width (r=0.985). Plant height is positively significant with flag leaf length (r=0.755) and

penultimate leaf length (r=0.649). Flag leaf length showed a positive significant correlation with plant leaf width (r=0.985). Penultimate leaf width showed a positive correlation with total tiller(r=0.004).

Plant height had registered negative significant correlation with total tillers (r= -0.435) and negative correlation with flag leaf width (r= -0.237) and penultimate leaf width (r= -0.135). It directs that the tallness of the rice plant decreases the number of tillers. Flag leaf length was negatively significant correlated with flag leaf width (r= -0.490) and penultimate leaf width (r=- 0.377). Also, flag leaf length was negatively correlated with total tillers (r = -0.051). Flag leaf width showed negatively significant correlation with penultimate leaf length (r = -0.675) and negative correlation with total tillers (r= -0.053). Penultimate leaf length was negatively significant correlated with penultimate leaf width (r= -0.582) and negatively correlated with total tillers (r= -0.014). Such a negative correlation comes out mostly due to competition for a nutrient supply. A negative correlation among traits shows an increase in one particular trait may lead to a decrease in the other.

Table 4: Pearson correlation among 6 quantitative characters for 6 rice landraces

	PH	FLL	FLW	PLL	PLW	TT
PH	1					
FLL	0.755	1				
FLW	-0.237	-0.490	1			
PLL	0.649	0.970	-0.675	1		
PLW	-0.135	-0.377	0.985	-0.582	1	
TT	-0.435	-0.051	-0.053	-0.014	0.004	1

IV. CONCLUSION

The frequency distribution of 12 different qualitative characters was studied in which auricle color, culm: underlying node color culm: underlying internode color, and culm: lodging resistance showed high variation. The coefficient of variation is high in penultimate leaf width; therefore it is the most significant character in plant breeding programs. Flag leaf length showed a positively significant relation with penultimate leaf length and flag leaf width with penultimate leaf width. Plant height was also found positively significant correlation with flag leaf length and penultimate leaf length. The vegetative growth shows a direct proportion to the reproductive growth and crop yield. Therefore these characteristics having landraces are most promising in crop improvement. Overall this study provides basic information for the selection of landraces in plant breeding programs.

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A Brief Review on Recent Environmental Movements in India

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ABSTRACT

Environmental preservation and protection are major concerns in all nations, developed and developing alike, in the twenty-first century. The future will only be able to tell how far the measures India has already taken in this regard are still relevant, but there is no denying that environmental management rules and prescriptions have existed since antiquity.The environmental movements throughout India are the subject of the current investigation. Save the Sundarbans, Save the Aarey, Save Dehing-Patkai, Right to Breathe Protest, and Climate Action Strike are a few movements. Therefore, the current study addresses the topic of Environmental movements in India as part of the theoretical conceptual foundation. It seems that protecting land, water, livelihoods, and cultures is becoming more brutal with each passing year. This article seeks to analyse other overt and covert manifestations of violence in contrast to the rising number of killings of environmental activists or environmental defenders, which is the easiest way to identify violence.

Keywords: Environmental Movements, Sundarbans, Aarey, Dehing-Patkai, Protest

I. INTRODUCTION

"Social movements that encompass a variety of people, groups, and coalitions that see a shared interest in environmental protection and act to bring about changes in environmental policies and practises" are one sort of environmental movement[1].

Environmental movements are an example of social movements, according to Tong, Yanki (2005). Social movements begin and grow as a result of the dynamic interaction of three sets of elements[2].

First, the political opportunities and limitations that are specific to the country context in which social movements originate affect those movements. The institutional framework and unofficial power structures of a nation's political system play a role in these opportunities and constraints. These factors include the degree of institutionalised political system openness or closure, the stability of the elite alliances supporting the polity, the existence or absence of elite allies for a given social movement, and the state's capacity and propensity for repression.

Second, there must be informal and formal organisational resources available to organise people into collective action and maintain a social movement. Along with organisations founded by the movement itself,

resources may also include pre-existing groups including informal networks, non-profit organisations, and religious institutions. Different social movements may require various organisational structures. The types of social movement in a given society can also be influenced by its organisational culture[3].

Third, communal activity is given meaning and worth by the collective process of interpretation, attribution, and social construction. People who are dissatisfied with some element of their lives can become more optimistic that, by acting collaboratively, they can resolve their issue by bringing shared meanings and definitions to their circumstance. Even when given the chance, it is exceedingly improbable that individuals will mobilise without the right framing[4].

DEFINITIONS OF ENVIRONMENTAL MOVEMENTS:

CHRISTOPHER, ROOTES (1999) STATED THE FOLLOWING

The environmental movements are seen as vast networks of people and organisations working together for the good of the environment. Environmental movements are thought to be incredibly diverse and complex, with organisational structures ranging from highly organised and formally institutionalised to radically informal, a spatial scope that ranges from local to almost global, and concerns that range from a single issue to the full spectrum of global environmental concerns[5]. Such a broad definition allows us to think about the connections between the various levels and manifestations of what activists refer to as "the environmental movement," and it is consistent with how environmental activists themselves use the term.[6].

ALMEIDA, PAUL, AND LINDA BREWSTER STEARNS (1998) STATE THE FOLLOWING

Collective action can be divided into three levels: local grassroots movements, societal movements, and protest cycles. A Local Grassroots Environmental Movement (LGEM) is a group that works to combat specific forms of pollution in a given area. Local grassroots environmental movements only have a small number of objectives that are connected to particular pollution issues. A formal organisation or a confederation of loosely connected networks may be a part of a social movement, which is a larger conflict. Diverse objectives of social movements are aimed at fundamental social and political reform. Last but not least, a cycle of protest refers to a period of very intense protest encompassing a number of social movements distributed over several geographic regions and societal sectors. Understanding the political climate in which a local grassroots environmental movement operates depends on being able to identify each level of movement activity[7].

II. ENVIRONMENTAL MOVEMENTS IN INDIA

A. RIGHT TO BREATHE PROTEST

As the Air Quality Index (AQI) fell to 494, a serious environmental crisis erupted in the nation's capital. The city was engulfed in toxic fog, and just breathing in Delhi was hazardous to one's health. On November 5, more than 1,500 people gathered at Amar Jawan Jyoti, India Gate, for the protest, which was organised as a result of different social media campaigns. Leonardo DiCaprio emphasised how effective these protests were

at spurring the government to take action on climate change. The Supreme Court ordered the state governments to solve the crop and waste burning issue, a special panel was established to address the problem, and the Centre committed to spend the green fund to fight hazardous air pollution, but the air quality remained appalling[8].

After the lockdown, Delhi's air quality was "clean," but it gradually deteriorated. In spite of government initiatives like the Odd-Even Scheme, New Delhi has been the most polluted city in the world for the previous two years. It only serves to highlight how serious the threat posed by global warming is. To address air pollution and protect its population, the government must enact greater policy measures.[9].

It seems pointless to even consider that the threat is unfounded as the condition of the Earth deteriorates due to unprecedented cyclones, bushfires, deforestation, skyrocketing pollution, increasing sea levels, habitat loss, and the disappearance of islands. While the wealthy and elite can adopt a zero-waste lifestyle or switch entirely to pricey organic goods, what about the most at-risk communities?

One example is the recent storm Amphan and its effects on the Sundarbans' native populations. When natural disasters occur, they are nearly often the ones that suffer the most. The marginalised are always first in line. The government must therefore act and create green policies in a way that considers how caste, class, race, and religion intertwine. It is time for us to more rigorously enforce climate action for everyone's benefit.

B. Climate Action Strike

Greta Thunberg, a 16-year-old Swedish climate activist, expressed her anger and rage toward world leaders on September 23 at the UN Climate Action Summit 2019. Students and young people in India took to the streets in the days before and after Greta's scathing speech, joining their counterparts in 2000 cities around the globe.[10].

As they protest the lack of action taken to address the global climate change catastrophe, their aim is to be heard. Students from major cities, including Delhi, Mumbai, Bengaluru, Kolkata, and Chennai, staged peaceful protests at significant city centres during the third week of September 2019 in response to Greta Thunberg's call for widespread protests to pressure governments to take decisive action on the issue of Climate Change.

The majority of the participants were young people, who made it a point to emphasise the urgency of global warming through catchy slogans. The purpose was to raise awareness of the potential effects of a 2-degree shift on the globe. Participants included environmentalists like Bittu KR, who emphasised the need for the government to pay attention to specific policy issues and go beyond symbolic afforestation in order to demonstrate its commitment to the environment. It was a component of a global show of support for the battle for climate justice and a recognition of its significance.[11].

C. Save the Sundarbans

The Sundarbans, the world's biggest mangrove forest, are situated in the Ganges and Brahmaputra River deltas. Among other animals, the region is home to saltwater crocodiles and Bengal tigers. Bangladesh and India together make up 60% of it. It covers an area of more than 10,000 square kilometres and is home to many different plant and animal species, including the Royal Bengal Tiger. However, the world's largest

intact mangrove forest is rapidly shrinking as a result of rising sea levels and cyclones, which are occurring more frequently as a result of climate change.[12].

The Sundarbans were devastated by the latest hurricane Amphan, which struck in May 2020 and was the worst cyclone since 1737. Thousands of people are now totally dependent on relief camps after livelihoods were destroyed, people were relocated, and embankments were breached. A more noticeable sea level rise than anyplace else puts the mangrove forests at significant risk and could eventually cause the local communities to experience a severe migratory problem. Online, the hashtag #SavetheSundarbans was created. Concerned folks turned to giving donations to local organisations working on the ground, starting conversations about this gem like the Australian Bush or the Amazon, and creating art to raise awareness under the

D. Save Aarey

Aarey, a biotope that is home to newly found species of scorpions and tarantulas as well as a wealth of birds, butterflies, amphibians, and mammals, including the leopard, is a bioregion in the western suburb of Mumbai called Goregaon.[13]

The deciduous forest that formerly covered most of the Mumbai metropolitan area, including Aarey, is now confined to the nearby Sanjay Gandhi National Park and hilltops. The Aarey dairy cooperative transformed the area's woodlands into grasslands, scrubland, marsh, and water bodies, creating a haven for an intriguing and varied collection of plant and animal species. Munias, drongos, and egrets eat on the vast, open para-grass fields. Native fish species, crabs, shrimp, and water snakes, including the checkered keelback water snake, which is protected under the Wildlife Protection Act as a Schedule II creature, all call the drains that nourish these grass pastures home.[14].

Aarey is home to more than 77 different bird species. Here are a few of them to provide some colour to the statistics: the Glossy Ibis, Indian Roller, Hoopoe, Chestnut-tailed Starling, Rosy Starling, Grey Hornbill, and Spotted Owlet, all of which may be found right in the middle of the city. Aarey is home to a total of 16 species of mammals, including the elusive yet spectacular leopard, as well as 34 kinds of wildflowers, 86 species of butterflies, 13 species of amphibians, 46 species of reptiles, some of which are designated under Schedule II of the Wildlife Protection Act.

Before, it was thought that the leopards in this area had wandered in from the Sanjay Gandhi National Park, which is adjacent to Aarey. Camera trap activities have, however, revealed the existence of local leopards, which are frequently seen in the region. And Aarey's wealth keeps on becoming revealed. In the interior of the Aarey forest, a rare amphibian that resembles a snake and deposits its eggs close to water sources has recently been found.

The Bombay High Court dismissed various petitions challenging the destruction of the Aarey Colony for the metro 3 car-shed of the Mumbai Metro Rail Corporation Limited (MMRLC) at a time when the rest of the world was moving toward climate action. Since the car shed proposal, protests to "Save Aarey" have been held, and they intensified following the approval in August. The only national park within the boundaries of a major city is Aarey, which is home to a large number of tribal groups that have been uprooted due to numerous government projects as well as flora and animals.[13]

On September 1, 2019, a number of protesters, including concerned citizens, environmentalists, students, and activists, walked to the streets with posters to form a human chain and voice their opposition to the decision. HC paved the way for tree cutting in the midst of this. Authorities from the Mumbai Municipal Corporation (BMC) cut down almost 2000 trees on the night of October 4 in an incomprehensible rush after being fired.

To protect the "green lungs of Mumbai," demonstrators flocked to Aarey. They were lathi-charged by the police, and several of them were held for several hours over the weekend in various police stations throughout Mumbai. It was in effect until October 6. Things looked good when the newly elected CM Uddhav Thackeray ordered the shed's construction to cease. The problem is still present, though, and there is little chance that the forest will ever recover its previous splendour.

E. Save Dehing-Patkai

This protest was started in response to the National Board of Wildlife's (NBWL) April 2020 decision to permit North-Eastern Coal Fields (NEC) to conduct opencast mining on 98.59 hectares of the Dehing-Patkai Wildlife Sanctuary. The Save Dehing Patkai Movement was first launched by students at Gauhati University through an online initiative to protect the only rain forest in Assam.[15]. The movement gained momentum, but very quickly the focus shifted to another topic of discussion, leading to the emergence of two competing narratives that centre around the Dehing Patkai. Concerned about coal mining in the area, some environmental activists and groups asserted that Dehing Patkai is not safe as a wildlife sanctuary and that there are problems with the sanctuary.

According to an RTI request made by activist Rohit Chaudhary, CIL has been mining in the recently permitted area's 57.2 hectares since 2003. The 111.19-hectare sanctuary, often known as the "Amazon of the East," is home to more than 40 species of animals, 300 species of birds, 40 species of reptiles, and 100 different kinds of orchids. The greatest variety of wildcats can be found there. Giving these activities legal status will only make the logging, hunting, and illegal mining that already plague the Elephant Reserve worse. Conflicts between humans and animals will increase when the habitat is reduced.

In Tinsukia district earlier this May, members of the All-Assam Students' Union (AASU) and All Assam Matak Youth Students' Union staged protests by forming a human chain. With the help of the hashtag #SaveDehingPatkai, citizens from all around the nation, including well-known figures like Adil Hussain, Randeep Hooda, and Joi Barua, took to the internet to protest. The Forest Man of India, Jadav Payeng, requested that the Centre rethink its choice. The Guwahati High Court has directed both the Centre and the State to produce all pertinent paperwork, and NEC has temporarily halted coal mining operations.[16].

III. CONCLUSION

The inquiry at hand is focused on environmental movements across India. Among the movements are Right to Breathe Protest, Save the Sundarbans, Save the Aarey, Save Dehing-Patkai, and Climate Action Strike. As a result, the current study includes environmental movements in India in its theoretical conceptual underpinnings. With each passing year, it appears like the methods used to safeguard land, water, livelihoods, and cultures are growing crueller. In contrast to the rising number of homicides of environmental activists or

environmental defenders, which is the easiest way to recognise violence, this article aims to analyse different overt and covert manifestations of violence.

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Intramural Investigation of Pollen in Osmanabad

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ABSTRACT
A present investigation deals with the monthly frequency of pollen in the intramural environment of cattle shed. A systematic aeropalynological investigation was carried out from 01 January 2017 to 31 December 2017. This investigation was conducted by using volumetric Tilak air sampler in the intramural environment of cattle shed.
In the present investigation 26 pollen types were found. The Grass pollen contribute highest percentage (41.54%), Cyperus rotundus (15.33%), Moringa oleifera (8.62%), Poaceae (7.71%), Parthenium hysterophorus (6.22%). Frequency of pollen grains shows seasonal variation.
KEYWORDS: Pollen, Intramural environment, Grass pollen.

I. INTRODUCTION

Pollen grains are produced by flowering plants and found in the air. Pollen grains are male gametophytes of Angiosperms. Pollen grains are of variable in size, ranging from 3µm to 250 µm. Wind borne pollen range from 10 µm to 100 µm [(1)]. 'Palynology' is a science for pollen and spore studies and its application[(2)]. Pollen grains are widely known to be the cause of various allergic complaints like hay fever, eczema, asthma and urticaria[(3)]. So it is important to monitor airborne pollen, their emission patterns through systematic air sampling.

II. MATERIAL AND METHOD

In the present investigation was carried out with the help of volumetric air sampler [(4)].

SAMPLING METHOD:
Samples were collected by using continuously operating Tilak air sampler. Sampler was kept at constant height of 2 meters above ground level. Air was sampled at the rate of 5 liters per minute and inside placed transparent cello tape coated with adhesive petroleum jelly was collected and changed every 8 days at about 6 p.m. The exposed transparent cello tape was cut into 8 equal parts each parts representing 24 hrs. trace area. These eight parts of tape were again cut into 2 parts, each representing 12 hrs. trace area of day and night

accordingly. The transparent cello tape pieces were mounted on slides, with the help ofglycerine jelly as a mountant.

SCANNING:

Scanning of pollen was done regularly scanned under microscope (10 x 45 eye pieces and objectives lens combination of the microscope). The identification of the trapped pollen types was done based on 1) Morphological characters 2) Visual identification by comparison with reference slides.

STUDY SITE:

Investigation of pollen studies were carried out at Osmanabad a district of Maharashtra State, India. Osmanabad is located at 18°19'10''N latitude and 76°4'25''E longitude and situated at 652 meters above sea level[5].

CLIMATIC CONDITION:

Graphical presentation show climatic conditions.

III. RESULTS

In the intramural environment of cattle shed total 26 pollen types were found.These pollen types and their percentage contribution to the total air palynosdporaare as fallow *Acalypha hispida*(1.08%), *Amaranthus viridis*(2.74 %), *Argemon mexicana*(0.5 %), *Azadirachta indica*(0.91 %), *Bougainvillea spectabilis*(0.91 %), *Caesalpinia pulcherrima*(0.91 %), *Casuarina equisetifolia*(0.83 %), *Cassia fistula*(0.75 %) ,*Cocos nucifera*(0.91 %), *Cyperus rotundus*(15.33 %), *Datura metel*(1.07 %), *Eucalyptus globulus*(0.41 %), *Euphorbia* sp.(0.91 %), *Grass*(41.54 %), *Helianthus annuus*(0.25%), *Hibiscus rosa-sinensis*(0.33 %), *Lantana camera*(0.41%),*Leucaena leucocephala*(0.91 %),*Mangifera indica*(0.50 %), *Moringa oleifera*(8.62 %), *Parthenium hysterophorus*(6.22 %), *Poaceae*(7.71%), *Ricinus communis*(2.99 %), *Sorghum sp.*(0.58 %), *Syzygium cumini*(0.25 %) *and* Unidentified pollen(2.40 %). Unidentified pollen category includes those pollen grains types whose identification is not clear due to the following reason attach and mix with other particles, semitransparent, rupture wall, etc.

Grass pollen contributed highest percentage of contribution (41.54%) to the total palynospora. The size of grass pollens were > 50 µm. Second highest contributor was *Cyprus rotundus* contributed (15.33%) to the total air palynospora. Third contributor was *Moringa oleifera*contributed *(8.62%)* to the total air palynospora. Pollen grains are two types Anemophilous and Entomophilous [6]. Anemophilous pollen were abundant in the air as compare to Entomophilous pollens. Pollen availability is correlated with meteorological factors such as wind speed, rainfall etc. and flowering season.

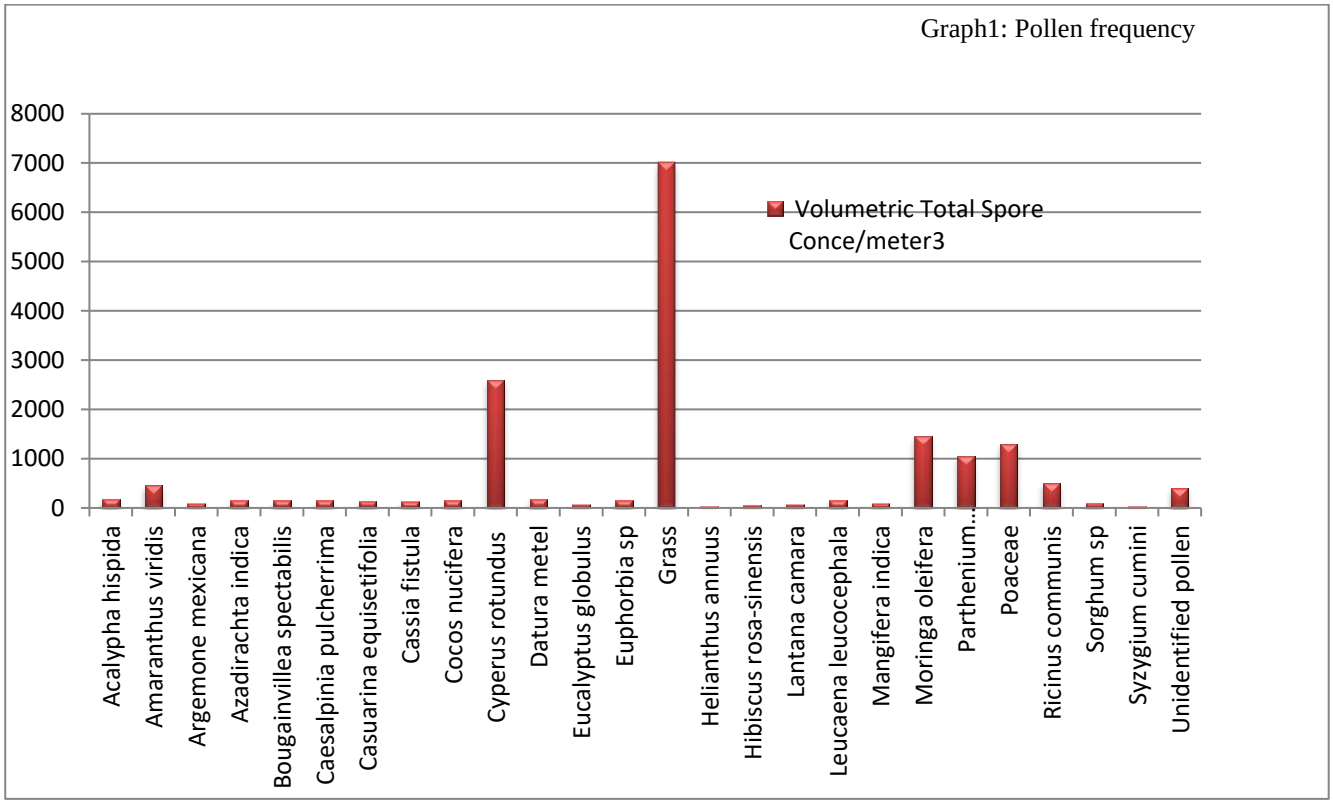
Table 1: Monthly frequency of various aerial Pollen of intramural atmosphere trapped in Tilak Air Sampler from 1 Jan 2017 to 31st Dec 2017

Sr. No.	Pollen grains	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Total	Volumetric Total Spore Concentration Per m^3	Percentage Contribution to the Total Air Palynospora
1	*Acalypha hispida*	2	2	1	1	1	`-	-	1	1	1	1	2	13	182	1.08
2	*Amaranthus viridis*	3	2	1	1	1	1	1	8	7	3	3	2	33	462	2.74
3	*Argemon mexicana*	1	2	1	1	1	-	-	-	-	-	-	-	6	84	0.50
4	*Azadirachta indica*	3	4	2	2	-	-	-	-	-	-	-	-	11	154	0.91
5	*Bougainvillea spectabilis*	2	2	1	1	2	3	-	-	-	-	-	-	11	154	0.91
6	*Caesalpinia pulcherrima*	3	2	-	-	-	1	1	-	-	1	1	2	11	154	0.91
7	*Casuarina equisetifolia*	2	1	2	2	3	-	-	-	-	-	-	-	10	140	0.83
8	*Cassia fistula*	-	-	2	2	1	2	-	-	1	1	-	-	9	126	0.75

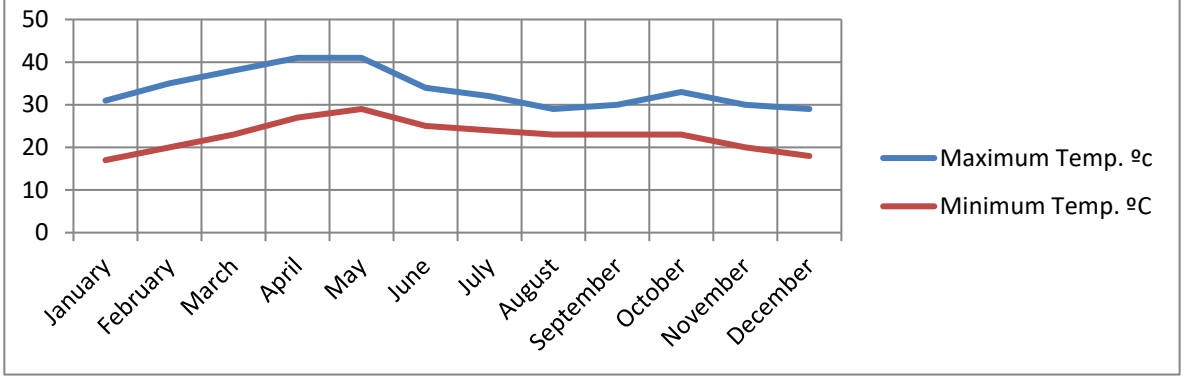
9	*Cocos nucifera*	1	1	1	-	-	-	1	1	2	1	1	2	11	154	0.91
10	*Cyperus rotundus*	12	8	4	1	1	6	7	32	35	36	22	21	185	2590	15.33
11	*Datura metel*	1	1	1	-	-	-	1	1	2	2	2	2	13	182	1.07
12	*Eucalyptus globulus*	1	1	-	-	-	-	-	-	-	1	1	1	5	70	0.41
13	*Euphorbia* sp.	1	1	1	-	-	-	-	1	2	2	1	2	11	154	0.91
14	Grass	50	36	19	8	5	6	15	66	107	98	55	36	501	7014	41.54
15	*Helianthus annuus*	-	-	-	-	-	-	-	-	1	1	1	-	3	42	0.25
16	*Hibiscus rosa-sinensis*	-	-	-	-	-	-	-	1	2	1	-	-	4	56	0.33
17	*Lantana camara*	1	-	-	-	-	-	-	-	2	1	-	1	5	70	0.41
18	*Leucaena leucocephala*	-	-	-	-	-	-	-	1	2	2	2	4	11	154	0.91
19	*Mangifera indica*	-	2	2	2	-	-	-	-	-	-	-	-	6	84	0.50
20	*Moringa oleifera*	9	11	14	20	15	3	2	4	6	8	6	6	104	1456	8.62
21	*Partheniu m hysteroph orus*	2	1	2	1	1	1	1	16	18	12	14	6	75	1050	6.22
22	Poaceae	9	7	4	2	1	1	4	13	20	15	10	7	93	1302	7.71
23	*Ricinus communis*	2	2	2	1	1	2	2	3	6	8	4	3	36	504	2.99
24	*Sorghum* sp.	1	-	-	-	-	-	-	2	2	-	-	2	7	98	0.58

25	*Syzygium cumini*	-	1	1	1	-	-	-	-	-	-	-	-	3	42	0.25
26	Unidentified pollen	2	2	3	2	2	2	2	3	4	3	2	2	29	406	2.40
	Total Pollen grains	108	89	64	48	35	28	37	153	220	197	126	101	1206	16884	99.99

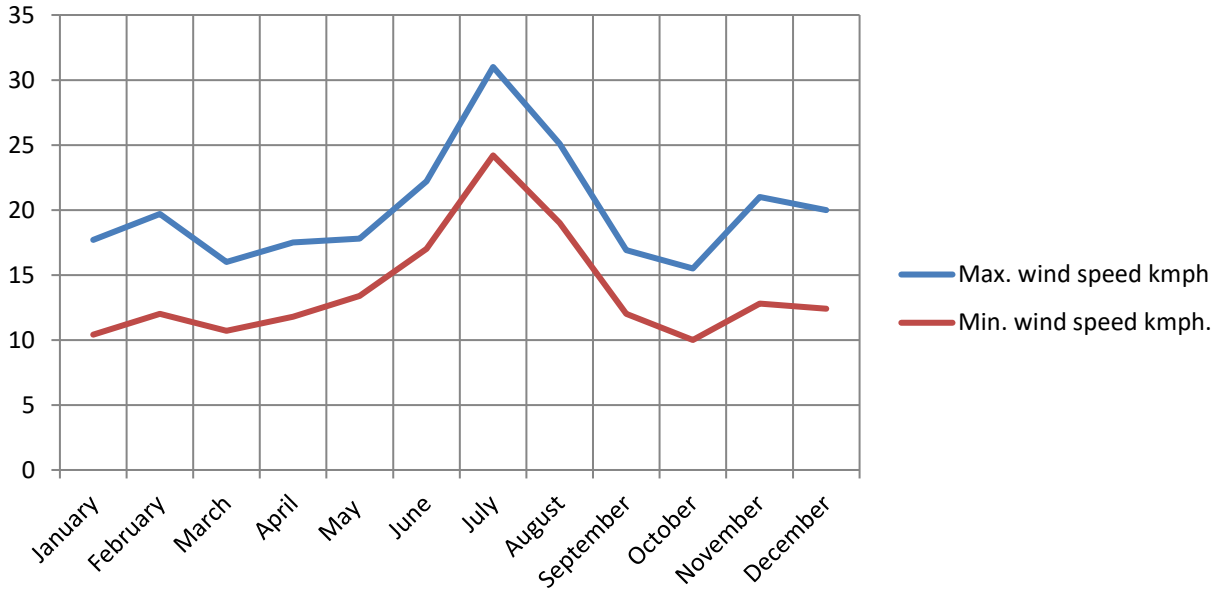
Graph1: Pollen frequency



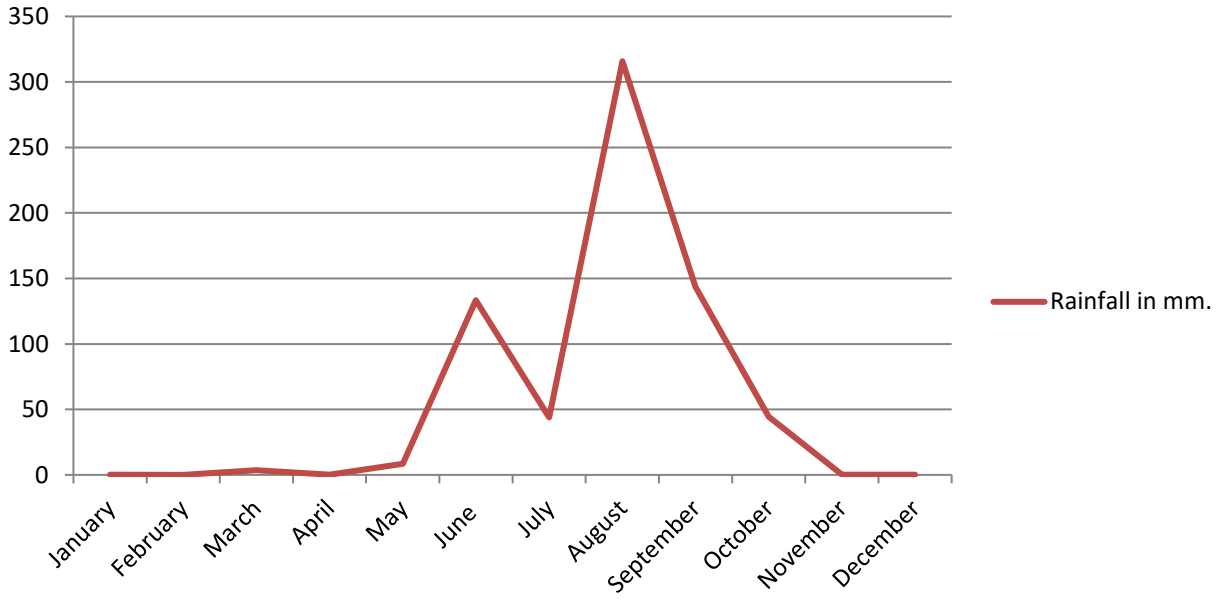
Graph 2: Monthwise average temperature 2017

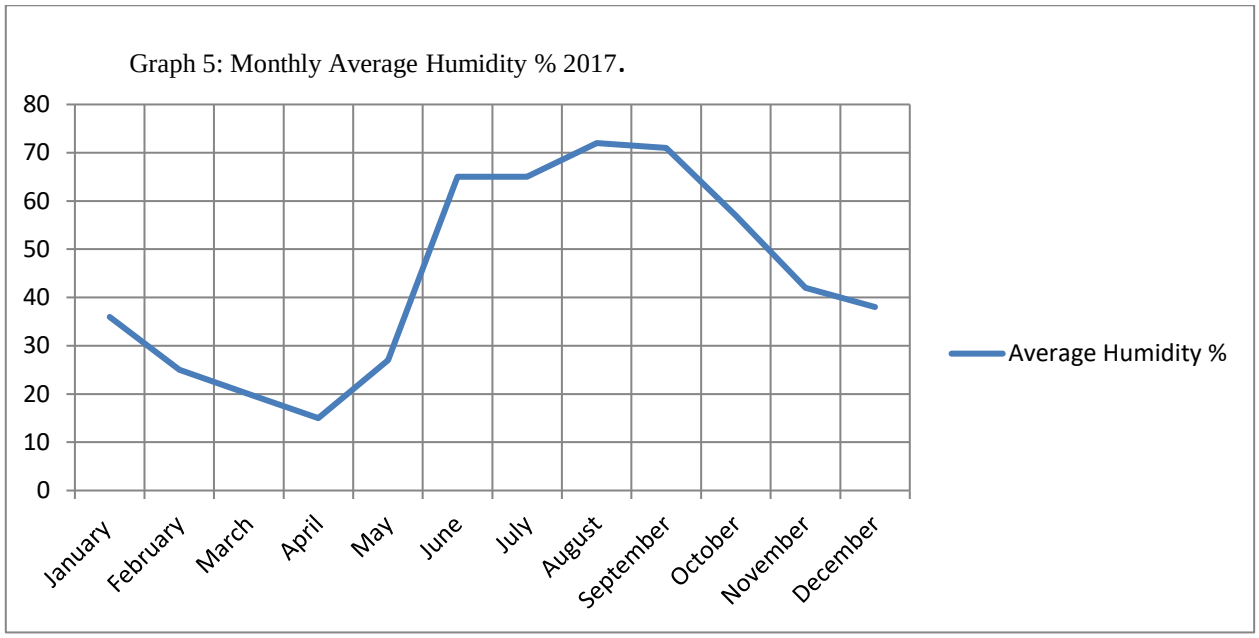


Graph 3: Monthwise average wind speed 2017



Graph 4: Monthwise average rainfall (mm) 2017.





IV. DISCUSSION AND CONCLUSION

Pollen grains are categorized into two major types Anemophilous and Entomophilous. In this investigation total 26 pollen types were found. Entomophilous plant species such as *Hibiscus rosa-sinensis, Lantana camera, and Bougainvillea spectabilis* also contribute to the airspora. Anemophilous pollen types were abundant in the air as compare to Entomophilous pollens. Pollen availability is correlated with meteorological factors such as rainfall, wind speed etc. and flowering season and vegetation.

Most of pollen grains concentration observed in the month of August to January due to rainy season. Grass pollen contribute highest percentage (41.54%), *Cyperus rotundus*(15.33%) second highest and third highest *Moringa oleifera(8.62%)* because *Moringa* plants were higher in number around the cattle shed.

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Hydrological Parameters of Groundwater of Daulatabad, Tq. Dist. Aurangabad, Maharashtra

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ABSTRACT

In this study we tried to study the present condition of ground water of Daulatabad, Tq. Dist. Aurangabad considering its hydrological parameters. The hydrological parameters studied are temperature, pH, total hardness, total dissolved solids, total alkalinity, calcium, turbidity, magnesium, chloride, sulphate, fluoride, nitrate. The results obtained are mentioned in the table 1 and are discussed to derive conclusion. On the basis of results suggestions are also given.

Keywords: Hydrological, Groundwater, Parameters. Daulatabad

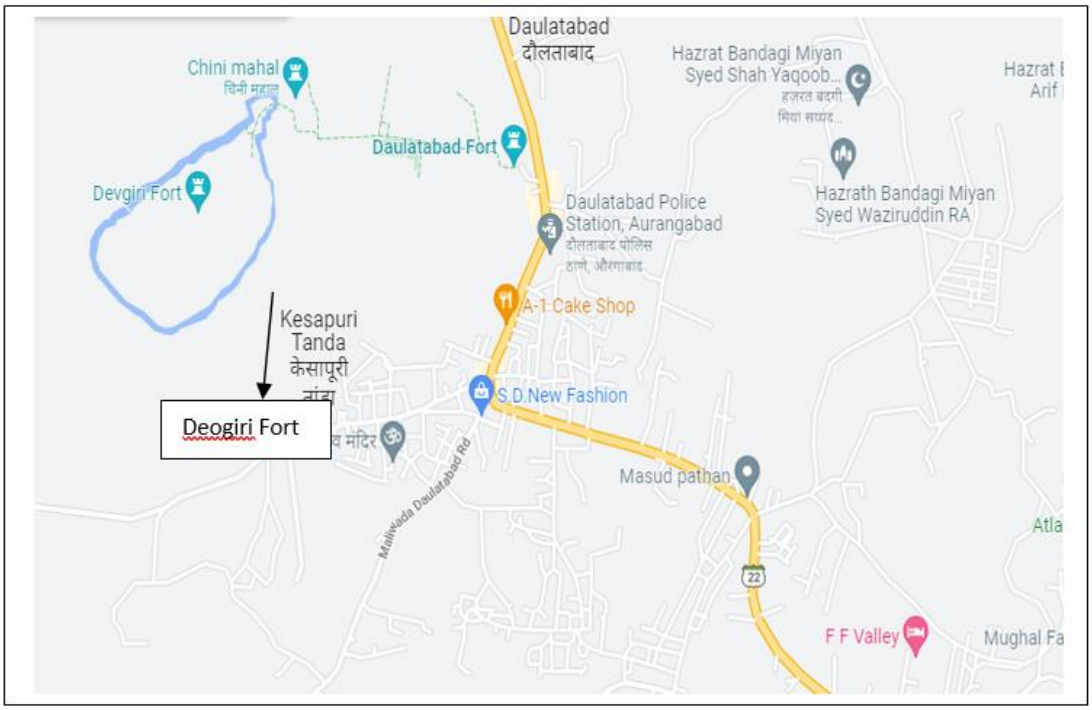
I. INTRODUCTION

The nature has provided us abundant source of water which is not available uniformly around the world during the all seasons or from time to time. Number of times it happens that water remains unavailable in the area where we need it or not in required amounts and vice versa there is too much water at some other places where there is no need. The freshwater resources are surface water, under river flow, frozen water and ground water. All these resources are playing important role in maintaining the water table of the earth. Surface water resources are rivers, lakes, dams, etc which are used to supply water for irrigation, drinking, hydropower, etc. In India the major source of water used to meet the domestic, agricultural and industrial needs is the ground water [1]. Pollution level of ground water is less compared to surface water as it is less exposed to the environment. But nowadays the quality of ground water is deteriorating due to solid waste disposal, use of more chemicals and fertilizers in agriculture and effluent of pharma and chemical industries. The hydrological parameters of water are highly important with respect to occurrence and abundance of species [2]. Daulatabadis a village of Aurangabad taluka, Maharashtra. It is famous for its Deogiri fort. It was a capital of Yadava's and Moghals. As it is a tourist place thousands of tourist visit the fort everyday including foreign tourists. The water quality is anvery important aspect with respect to the health of humans as well as animals. As per World Health Organization the good quality drinking water is the human right. In this paper we tried to study the hydrological parameters of ground water of Daulatabad of Aurangabad district. The

important parameters considered for study are odour, temperature, pH, total dissolved salt (TDS), total alkalinity, total hardness (TH), calcium, magnesium, fluoride, nitrate,sulphate.

II. MATERIALS & METHODS

Daulatabad village is located at about 15 km from the Aurangabad city. It is on national highway 52. Groundwater samples were collected from deogiri fort, near Jama Masjid, near police station and rokde hanuman temple. All the sampling stations range within one kilometer area. The water samples were collected at 10 o'clock in the morning in the month of August 2022. The plastic container bottle is washed and rinsed with the sample water twice before filling it with sample water. The water sample is collected in 1L low density polythene bottle, capped tightly and immediately brought to the laboratory for investigation. The temperature is measured with pocket thermometer and pH with portable pocket pH meter. The parameters like total dissolved salt (TDS), alkalinity, total hardness (TH), calcium, magnesium, nitrate,sulphate were assessed in the laboratorythrough titrimetric method given by APHA [3] and BIS [4]. The fluoride is measured through spectrophotometric method. All the chemicals and reagents used were of analytical grade supplied by the local dealer Lab Trading Aurangabad.



III. RESULTS & DISCUSSION

The hydrological parameters of ground water of Daulatabad Tq Aurangabad is investigated and reported in table 1. The highest temperature of the sample is found to be 22.5°C at Sampling Station II and lowest is about 22°C of remaining all sampling stations. The temperature is within the range of the permissible limits.

The highest pH is 7.4 found at station II whereas lowest is recorded at station I 7.1. All the stations show pH normal alkaline similar results were obtained by Samrat et al [5] The total dissolved solids of samples range from 880mg/L to 1050 mg/L. The lowest value is found at sampling station III and highest at sampling station I. All the stations show higher values of total dissolved solids compared to the permissible limits given. The higher values may be attributed to more contents of minerals and salts in the ground water of the village. All the stations show turbidity 1NTU. It is a permissible limit. The alkalinity values differ at all stations. The highest value is 95 mg/L found at station I while lowest is 36 mg/L at station II indicating more alkaline water of station I. The total hardness value ranges from 315mg/L at station I and 105mg/L at station II. Indicating ground water of station I is more hard compared to other stations.

Hydrological Parameter	Sampling Station I Deogiri Fort	Sampling Station II Jama Masjid	Sampling Station III Police Station	Sampling Station IV Rokde Hanuman Temple	Permissible Limit (BIS)	Permissible Limit (WHO)
Temperature (°C)	22	22.5	22	22	-	40
pH	7.1	7.4	7.2	7.2	6.5 – 8.5	6.5 – 8.5
TDS mg/L	1050	920	880	910	500	500
Turbidity (NTU)	1	1	1	1	1	5
Total Alkalinity (CaCO3) mg/L	95	36	56	58	20-200	30
Total Hardness mg/L	315	105	160	165	200	200
Calcium mg/L	115	110	68	70	75	75
Magnesium mg/L	58	35	38	35	30	150
Chloride mg/L	278	326	350	305	250	200
Fluoride mg/L	1.1	1.0	1.1	1.1	1.0	1.5
Nitrate mg/L	32	25	28	27	45	45
Sulphate mg/L	168	146	136	138	200	200

Table 1.Hydrological parameters of ground water of Daulatabad village of Aurangabad Taluka

Calcium as $CaCO_3$ estimates about 115mg/L at station I which is highest and 68 mg/L at station III which is lowest. The magnesium ranges from 58 mg/L at station I while lowest values is observed at station II and station IV which is 35 mg/L. Similar results were obtained by Mohammed Sadique and Abdul Majeed [6]. The highest chloride value is found at station II i.e. 326 mg/L and lowest value is 278 mg/L, found at station I. The chloride values range slightly above the permissible limits. The fluoride values are 1.1 mg/L highest at station I, station III and station IV while the lowest value is found at station II. All the fluoride values all slightly above the permissible limits. The nitrate values are highest is 32 mg/L at station I and lowest is 25 mg/L at station II. Though the nitrate values differ considerably at all stations but all these values are below the

permissible limit. Similarly the sulphate values are within the permissible limits. The highest value is 168 mg/L at station I and lowest value is 136 mg/L at station III. . Similar results were obtained by Dinesh Kumar Sharma (2015) [7], B. R. Agarwal et al. (2013)[8].

IV. CONCLUSION

In this study we have observed that most of the parameters are showing slightly higher values than the permissible limits given by the world health organization (WHO) and Bureau of Indian Standards The most of the parameters show variation in their values pertaining to the monsoon season. In the monsoon the inflow of ground water increases compared to other season. From the results obtained it is suggested to people living in and around the village that the water can be used for domestic purpose but it is to be filtered and proper treatment should be given before consumption and drinking purpose. It is also suggested to make aware the authorities to supply properly treated water after reducing its total dissolved solids and hardness.

V. ACKNOWLEDGEMENT

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Root Knot On pomegranate and Its Control Measure

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ABSTRACT
Pomegranate (Punicagranatum L.) belongs to family Punicaceae is an important commercial fruit crop in India. Pomegranate native to Iran and one of the favorite edible table fruit of tropical and subtropical region. It is an important fruit for fresh consumption, enriched in nutrition and medicinal values. India is one of the leading countries for the production of Pomegranate worldwide. It is one of the economical important fruit and used to cure from different disease and nutrients deficiency due to its antioxidant activity and present potassium, calcium, magnesium, iron, vitamin A and C. The root knot nematode Meloidogyneincognita has been reported in pomegranate. Thisparasitic nematode pest reduces the cropyield and quality of fruit. This primarily creating gall of root system and eventually are serious harmed to the main function of uptake of water and nutrients transport of the plant.
Root knot disease can be control by fumigation process and can also apply neemcake to the plant roots.

I. INTRODUCTION

Pomegranate*Punicagranatum* L. belong to family Punicaceae an important fruit crop of India which is commercially cultivated in state of Maharashtra, Karnataka, Andhra Pradesh, Gujarat, Tamil Nadu (Kuldeep Kumar 2010). Pomegranate is a native of Iran and one of the favorite edible table fruit of tropical and subtropical region. It is suitable for growing under arid and semi-arid region. It is low cost maintenance and high yield with good quality. (Tulicasingh 2019). Fruit are major source of nutrition as well as providesustainable income source to farmers. It is also commercially called as anar, dalimb. It is an attractive shrub or small tree with average height of 20-30 feet much branched more or less spiny leaves are deciduous showy flowers are present. The fruit are leathery skin or rind basically yellows more or less overlaid with light or deep pink or red clour. (SharadDandekar et al 2022). Plant parasitic nematode are worldwide an economically important pest reducing the yield and quality of crop. Several plant parasitic nematodeswere recorded as pathogen in many part of world. The root knot nematode *Melodigyne* incognita are serious pest of pomegranate which primarily create gall of root system that eventually are serious humped in their main function of uptake and transport of water and nutrients the reduce growth and productivity of pomegranate. (Nour El Deen A. H. 2016). The root knot nematode *Meloidogyne incognita* have reported root knot nematode species incidence in pomegranate. The root knot nematode *Meloidogyneincognita* and fusarium disease complex in pomegranatefield. (k. Poornima 2020). The most plant parasitic nematode are microscopic

in nature and known as an unseen and hidden enemy of crops and the root knot nematode produce gall on root. (Shakti Singh Bhati 2020). These nematode responsible for 30-40% in loss of yield in various crops the light soil favours the buildup of nematode population as compared to medium to heavy soil (Tulica Singh et al 2019). This was once deemed as a minor disease but now has become a serious threat for pomegranate production resulting severeyield loss. Root knot nematode association root show large gall or knot through the root system of influenced plant (Madhushri S. Kara Kalmatti 2019).

II. MATERIAL METHODOLOGY

To access extent of disease severity of root knot complex intensive roving survey of conducted during 2021-22 important pomegranate growing field of ShrigondaDistAhmednagar state Maharashtra*Meloidogyne* incognita create gall of root. The percent of disease incidence was calculated using the following formula.

$$\text{Percent disease incidence} = \frac{\text{Number of plant showing root knot gall}}{\text{Total number of plant}} * 100$$

Number of gall per root

Grade	Number of gall per root
1	1-2 gall per root
2	3 -10 gall per root
3	11-30 gall per root
4	31-100 gall per root
5	More than 100 gall per root

Major symptoms of nematode

1. lots of small and large size gall are formed on the root
2. All leaves of plant turned yellowish
3. Flowers fall down before the maturity.
4. There are huge reduction in the production of fruit.
5. The resulting setback in the uptake of plant nutrients lead to debility of the plant and production of small fruit.
6. The infection of nematode on root cause resulting in speedy gall and drying of plant inducing almost percent of loss of the farmer.

Management

1. Nematode management measure should be adopted along with the first crop.
2. Fumigation is very effective option for nematode management in pomegranate before the plantation.
3. Fumigation use formalin or methane sodium 30 ml per pit can used for the Fumigation.

4. They can be applied per plant nematode Fumigation carbofuran 3 G at 6 kg / hector has most effective treatment for nematode.
5. Treatment with neem (*Azardirectaindica*) cacke at 2.5 kg /hector has most effective for nematode.

III. RESULT

Root knot nematode *Meloidogyne* incognita pest of pomegranate. They create gall on root system and humped in their function of uptake and transport of water and nutrients of plant.

The percentage of disease gall incidence

$$\text{Percent disease incidence} = \frac{60}{400} * 100 = 15\ \%$$

Number of gall per root

Grade	Number of gall per root
1	12
2	16
3	14
4	10
5	8

IV. CONCLUSION

Root knot nematode disease is a major disease of the pomegranate and cause serious loss of quality and quantity of the plant. Chemical and bio control agent *Azardirectaindica*cake used were found effective against this root knot disease.

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Diversity of Phytoplankton in Different Seasons of Terna Dam, Osmanabad (MS) India

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ABSTRACT
This research work is compiled with the phytoplankton study of Terna dam. There are three families of phytoplankton in the fresh water i.e. Bacillariophyceae, Chlorophyceae and Myxophyceae. This study provides a basic knowledge on the phytoplankton diversity and productivity to help the management measures for the productivity improvement.
KEYWORDS: Terna Dam, Phytoplankton Diversity.

I. INTRODUCTION

The Phytoplanktons varies a different shapes, sizes, colours and types. They are generally important as they liberate Oxygen during the photosynthesis process that's why they are called as important component of the ecosystem. They are utilized in the energy exchange process(Khan2003).Phytoplankton community , structure, composition and species diversity in aquatic ecosystem are determined by several physic-chemical parameters (Sin et.al; 1990) .The phytoplanktons mitigate the climate change and global warming ,thereby record the global carbon di oxide levels (Santosh Kumar and Perumal,2009).

All the aquatic chemical and physical parameters affects on phytoplankton's productivity and growth like temperature, nitrate, nitrite, Ph, salinity, ammonia, silicates etc. The influence of these substances on phytoplankton community alters species composition and their diversity in the marine ecosystem. (Duarte et.al; 2006, Madhu et.al; 2007).It is due to the fact of planktonic organisms play a key role in the turnover of organic matter and energy through the ecosystem.

II. MATERIAL AND METHODS

The samples were collected in various seasons and month wise from the four different sampling stations e.i. A, B, C and D. Took a conical net with a bottle cached at its lower end for sample dilution. The net efficiency is also affected by the cloth used to construct the net, avoidance of target organism, escape of sampled organisms and clogging.

The phytoplanktons were preserved in 4 percent formalin. The phytoplankton need to be concentrated as their number is usually low in water. They were centrifuged at 1500 r.p.m. In order to save time it is better to keep the phytoplankton samples in 500 ml bottles for few days. After all the phytoplanktons are settled, the supernatant is siphoned off and the remaining sample is concentrate by centrifugation. After the collection and preservation they have been identified and classified by using standard methods followed by Trivedy and Goel (1984).

III. RESULT AND DISCUSSION

In this study 32 species of phytoplankton which belong three groups viz. Chlorophyceae, Bacillariophyceae and Myxophyceae were recorded. It is carried out at the four sampling stations (A, B, C, D) at the Terna Dam during the period of FEBRUARY 2021- JANUARY 2022.

Seasonal variation of phytoplankton in the year 2021-2022:

Sr. No	Season	Station	Chlorophyceae	Bacillariophyceae	Myxophycee	Total
1	SUMMER	A	350	245	440	1035
		B	400	250	350	1000
		C	350	190	320	860
		D	290	200	290	780
		TOTAL	**1380**	**885**	**1400**	**3665**
2	MONSOON	A	210	110	190	510
		B	220	120	245	585
		C	225	120	320	665
		D	300	100	320	720
		TOTAL	**955**	**450**	**1085**	**2390**
3	WINTER	A	850	430	450	1730
		B	750	350	500	1600
		C	650	350	400	1400
		D	588	240	420	1248
		TOTAL	**2838**	**1370**	**1770**	3178

The highest concentration of Chlorophyceae recorded in winter season i.e. 2838 as compared to summer and monsoon. The production of phytoplankton was maximum due to the moderate temperature, Ph and minimum turbidity, clear water and free carbon di oxide. Water is transparent due to the moderate due to the presence of the class of algae. The temperature is main factor for the productivity of the phytoplankton.

In the winter season the Bacillariophyceae were recorded in highest concentration i.e. 1370 with the comparison of summer and monsoon. It is due to the low temperature moderate alkalinity and minimum hardness of water which shows the growth of Bacillariophyceae. The highest concentration of Myxophyceae in winter was 1770. Phytoplankton was maximum in winter season as compare to summer and monsoon.

The temperature affects metabolic activities of plankton and proliferation, Shukla et.al; (2013). The Temperature is the determining factor in the seasonal distribution of organisms Sirsat et. al;(2004) were recorded 24 genera of phytoplankton from a freshwater pond at Dharmapuri at Beed District. Kumar (2014) stated that the diversity of phytoplankton is greater during summer, post monsoon and winter and is lowest in monsoon.

Goel and Chavan (1991) on limnology of a polluted freshwater tank in Kolhapur and recorded 05 species of Cyanophyceae. Kulkarni et.al; (2005) studied phytoplankton diversity in Bhatye Estuary, Ratnagiri and recorded total 45 phytoplankton species.

IV. CONCLUSION

These observations summarizes the seasonal fluctuations in phytoplankton diversity at Terna Dam Osmanabad (MS) India. Introduction of the high organic load during monsoon season containing phosphate, silicate, nitrate plays the substational role in phytoplankton growth in the forthcoming season which helps to get nutrients and good productivity.

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In Vitro Study and Micropropogation of Sugarcane (Saccharumofficinarum L.)

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ABSTRACT

Sugarcane (SaccharumofficinarumL.) is an important tropical and sub-tropical crop in India. Although sugar cane propagates vegetatively in its natural state, but propagation rate is too slow to meet demand of high-quality planting material for commercial cultivation. Micropropagation method using meristem as explant was standardized. Shoot cultures were initiated on MS medium containing 1.0 mg/l BAP+1.0 mg/l KIN+0.1 mg/l GA3. Maximum shoot proliferation was achieved on medium containing 0.2 mg/l BAP+0.1 mg/l KIN with 10 mg/l ADS within 5 weeks of culture. The regenerated shoots were rooted on half strength MS medium supplemented with IBA 2.0 mg/l+0.5 mg/l AC. Regenerated plants were transferred for hardening in greenhouse and they showed 97% survival.

Keywords: Sugarcane, Micropropagation, Plant Tissue Culture.

I. INTRODUCTION

Sugarcane (*Saccharumofficinarum*L.) is an important agricultural cash crop in tropical and subtropical region of the world and is the major source of sugar with respect to export product in many developing countries that accounts for more than 60% of the world's sugar production. It is the only member of the family *Grammineae* belong to genus*saccharum* in which *in vitro* propagation are standardized and commercially viable *in vitro* multiplication of sugarcane has received considerable research attention because of its economic importance as a cash crop. Genetically, Sugarcane (*Saccharumofficinarum*L.) originated from New Guinea. T. Venkatraman is father of Sugarcane breeding in India.

Sugarcane is C_4 plant with a high rate of photosynthesis. The main product of sugarcane is sucrose. They have stout jointed fibrous stalks that are rich in sugar. Sugarcane is tropical, perennial grass that forms lateral shoots at the base to produce multiple stems, typically three to four meter high and about five cm in diameter. The stem grows into cane stalk, which when mature constitutes approximately 75% of the entire plant. A mature stalk typically composed of 11-16% fiber, 12- 16% soluble sugars, 2-3% non sugar and 63-73% water. Sugarcane is one of the most efficient converters of solar energy into sugars and other renewable forms of energy. The plant was domesticated by the Polynesians for its sweet stem, but presently it has emerged as a

multipurpose crop providing not only sugar but also a series of value added products such as paper, ethanol and other alcohol derived chemicals, animal feed, antibiotics, particle board, bio-fertilizer and raw material for generating electricity. Ethanol has emerged as a key product from the sugarcane industry globally. With ever increasing oil prices, more and more countries are encouraging plant-based ethanol production as an environment-friendly fuel.

In a typical sugar mill, 100 tones (t) of sugarcane on an average produces 10 t of sugar, 4 t of molasses from which ethanol is produced, 3 t of press mud which is converted into biofertilizer, 30 t of bagasse used for cogeneration of power to yield 1,500 kW electricity and for manufacturing paper.

II. MATERIAL AND METHODS

The present investigation on "*in vitro*micropropagation of "*Saccharumofficinarum* (Var. Co-86032) was conducted in the tissue culture laboratory. The details of the material used and the methods adopted in the experiments were described here.

2.1. Material

Apical meristem of sugarcane (*V*ar.86032) was used as explants.

2.1.1. Collection of Plant material

Healthy young meristems were collected by removing the leaf sheath from field grown plants of sugarcane (*Saccharumofficinarum*L.*) (V*ar.Co-86032).

2.2. METHODS

2.2.1. Sterilization of glassware's

The glassware's such as culture bottles, measuring cylinders and the other equipment like forceps, cutting paper and blade holder were washed in running tap water using detergent followed by rinsing with double distilled water and then wrapped in aluminum foil and subsequently autoclaved at 121^0C at 15 lbs. pressure for 20 minutes.

2.2.2. Preparation of stock solutions

Separate stock solutions of macronutrients, micronutrients, potassium iodide, iron, glycine and various vitamins were prepared by dissolving each chemical separately in small quantity of double distilled water and making up the required volume with double distilled water. The stock solutions of growth regulators were prepared by dissolving them in small quantity of appropriate solvents, heating gently and then making up the volume with double distilled water.

2.2.3. Media preparation

According to the available literature on *in vitro* propagation of Sugarcane (*Sccharumofficinarum*L.) plants, Murashige and Skoog's (1962) medium is the most commonly used growing medium for sugarcane. The procedure for composition of 1 liter MS medium is given as follows-

1. Dissolved 30g of sucrose and 100 mg inositol in approximately 200 ml in DDH_2O.

2. After sucrose and inositol dissolution, the stock solutions were added in following order and mixed well.
   - Stock solution A (macronutrients) - 50 ml
   - Stock solution B (micronutrients) - 5 ml
   - Stock solution C (Iron) - 5 ml
   - Stock solution D (vitamin) - 1 ml
   - Stock solution E (KI) -1ml
   - Stock solution F (glycine) -1ml
3. Then adenine sulphate and growth regulators were added (in case of modified MS medium).
4. pH of liquid medium was adjusted at 5.6-5.8 with the help of 1N NAOH or 0.1N HCL.
5. The volume was made up to 400 ml with D.W.
6. In another flask 5.6 gm agar was added to the 300 ml of DDH2O. The agar was heated at 600C to dissolve completely.
7. The heated agar solution was added to the stock solutions and mixed thoroughly.
8. The total volume was made up to 1000 ml by addition of DDH2O.
9. The culture medium was poured into culture bottles (25-30 ml in each bottle approximately) and bottles were capped and autoclaved at 121^{0}C at 15 lbs. pressure for 15 to 20 minutes.After sterilization, the medium was cooled to room temperature and stored in cool and dry place until used.

A B

C D

Plate 2.2 Surface sterilization

A Few drops of Teepol solution - 5min

B 0.1% Bavistin treatment - 3min

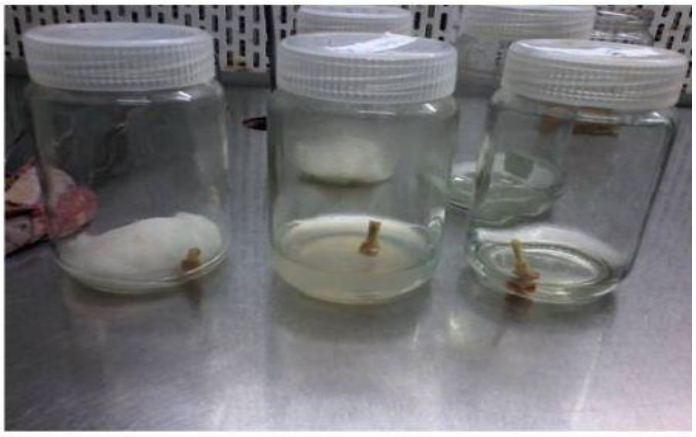
C 70% IPA under LAF - 30 sec.

D 0.12% $HgCl_2$ treatment - 5min

2.2.3.1. Inoculation of explants

All inoculations and aseptic manipulations were carried out in a laminar air flow cabinet. Before use, the working surface of the laminar air flow cabinet was cleaned by swabbing with 70% IPA and switch on the UV light for 20 min. to reduce the chances of contamination. After that the UV light became switched "off" and switch "on" the ordinary light.

1. MS medium + 1.5 mg/l BAP (SC -A)
2. MS medium + 0.5 mg/l BAP + 0.25 mg/l KIN (SC –B)
3. MS medium + 1.0 mg/l BAP + 1.0 mg/l KIN + 0.1 mg/l GA_3 (SC-C)
4. MS medium + 1.0 mg/l KIN +0.1 mg/l GA_3 (SC –D)
5. MS medium + 1.5 mg/l BAP + 0.5 mg/l NAA (SC –E)



2.4 Explant meristem. **2.5 Inoculation of explants**

After surface sterilization, explants were transferred to large sterile glass plate having sterile cardboard paper on it, with the help of sterile forceps under strict aseptic conditions in laminar air flow cabinet. Then explants were cut into very small pieces (about 2-3cm) with sterile scalpel. The bottles containing initiation medium prepared as given in (Table 3.8), were unplugged by holding them over spirit lamp and inoculations were performed by placing explants on the surface of the medium with the help of flame sterilized long forceps and replacing the cap of the bottle. During inoculation the explants were properly positioned on the media and were gently pressed with forceps to secure their firm contact with the media. After vertically inoculating explants in to culture bottles the mouth of bottles were quickly flamed and bottles were tightly capped and properly sealed with klin film to avoid entry of external air. After that properly labeled media, number of bottles and date of inoculation etc. The bottles were transferred to growth room. Data were recorded after five weeks of initiation in terms of average shoot length (cm), average number of shoots per explants.

2.2.3.2. Incubation of culture

The inoculated culture bottles were incubated at 25± 2^0C temperature for 16 hours light and 8 hours dark per day in 1500-2000 Lux light intensity under cool fluorescent white light in the culture room

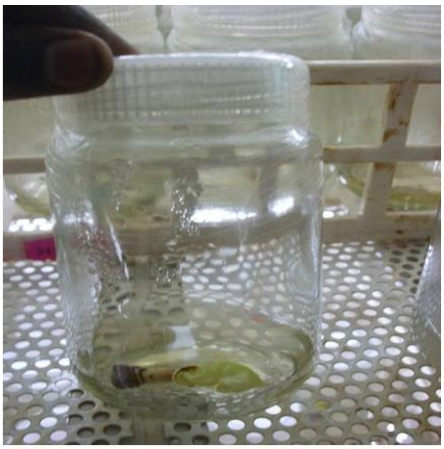



Plate 2.6 Establishments of SugarcanePlate 2.7 Incubation room

2.3. Shoot Multiplication (5 weeks)

Shoot multiplication was carried out using the 4-5 cm long and most vigorous shoots from the initiation stage. Stem nodal segments were cut in 2-3 cm size and cultured on shoot multiplication media.

1. MS medium + 0.1 mg/l BAP + 10 mg/l ADS.(SCM-A)
2. MS medium + 0.2 mg/l BAP + 0.1 mg/l KIN + 10 mg/l ADS.(SCM-B)
3. MS medium + 0.3 mg/l BAP + 0.2 mg/l KIN + 10 mg/l ADS.(SCM-C)
4. MS medium + 0.2 mg/l KIN + 10 mg/l ADS.(SCM-D)
5. MS medium + 0.1 BAP + 0.1 mg/l KIN + 10 mg/l ADS.(SCM-E)

Shoot proliferation was determined after five weeks of culture. Data were recorded in terms of average shoots length (cm), average number of shoots per explants.

2.4. Rooting:

Rooting was carried out using 4-5 cm long and most vigorous shoots from the shoot multiplication stage. Stem nodal segments were cut in to 3-4 cm size and cultured on rooting media.

1. ½ MS medium + 0.5 mg/l IBA + 0.5 mg/l AC.(SCR-A)
2. ½ MS medium + 1.0 mg/l IBA + 0.5 mg/l AC.(SCR-B)
3. ½ MS medium + 1.5 mg/l IBA + 0.5 mg/l AC.(SCR-C)
4. ½ MS medium + 2.0 mg/l IBA + 0.5 mg/l AC.(SCR-D)
5. ½ MS medium + 2.5 mg/l IBA + 0.5 mg/l AC.(SCR-E)

The following data were recorded after 5 weeks of culture on the rooting media in terms of average root length (cm), average number of roots per explants.

2.5. Primary hardening:

The well-rooted sugarcane plantlets were removed gently from the culture bottles after five weeks of rooting and washed thoroughly with running tap water to remove all the traces of the media. Then plantlets were dip in bavistin solution for 5 minutes.

After that the plantlets were transplanted in 4 cm diameter small polyethylene cups filled with soil: coco peat (1:1). Then plantlets were transferred to a poly house at 28 ± 2°C under 80-90% relative humidity.

III. RESULTS AND DISCUSSION

3.1. Establishment of SachharumofficinarumL. in vitro

Data were obtained after five weeks of initiation of culture showed that meristem of sugarcanecould be established at all tested media. The best results was obtained on MS medium supplemented with 1.0 mg/l BAP + 1.0 mg/l KIN 0.1 mg/l GA_3. (SC-C).

The maximum number of shoots was obtained on MS medium supplemented with 1.0mg/l BAP+1.0mg/l KIN 0.1mg/l GA_3 (average number of shoots 5.75±0.12) and best shoot length (average shoot length 4.0±0.54 cm) showed in (Table 4.1).

Table 3.1 Establishment of *Sachharumofficinarum* L.nodal explants using different combinations of BAP and KIN and GA_3 and NAA after 5 weeks of culture

Sr. No.	Medium + Hormones	Average shoot length (in cm)(mean ± SD)	Average number of shoots/explant
1.	MS+ 1.5mg BAP (SC-A)	2.40±0.60	1.05±0.56
2.	MS+ 0.5mg BAP+0.25mg KIN (SC-B)	2.80±0.42	1.25±0.70
3.	MS+ 1.0mg BAP+1.0mg KIN+ 0.1 mg GA_3 (SC-C)	4.0±0.54	5.75±0.12
4.	MS+ 1.0 mg KIN+0.1mg GA_3 (SC-D)	3.50±0.90	3.50±0.50
5.	MS+ 1.5 mg BAP+0.5 NAA (SC-D)	3.80±0.11	3.75±0.60

Plate 3.1 Result of initiation

3.2. Shoot multiplication

The shoot initials obtained from the *in vitro* established cultures were subjected to be multiplied. The best result observed on MS media supplemented with 0.2 mg/l BAP + 0.1 mg/l KIN + 10 mg/l ADS.

The maximum number of shoots was obtained on MS medium supplemented with 0.2 mg/l BAP + 0.1 mg/l KIN + 10 mg/l ADS. (average number of shoots 19±0.36) and best shoot length (average shoot length 8.8±0.80) showed in (Table 4.2).

Table 3.2 Effect of cytokinins on *in vitro* shoot multiplication of Sugarcaneafter 5 weeks of culture

Sr. No.	Medium+ Hormones	Average shoot length (in cm) (mean ± SD)	Average number of shoots/explant
1.	MS+ 0.1 mg BAP (SCM-A)	6.8±0.58	12±0.28
2.	MS+ 0.1mg BAP+0.1mg KIN (SCM-B)	7.6±0.02	15±0.25
3.	MS+ 0.2mg BAP+0.1mg KIN+ 0.1 mg GA_3 (SCM-C)	8.8±0.80	19±0.36
4.	MS+ 0.3 mg BAP+0.2mg KIN(SCM-D)	7.4±0.06	11±0.22
5.	MS+ 0.2 mg KIN (SCM-D)	7.2±0.15	14±0.19

Plate 3.2 Result of shoot multiplication

3.3. Rooting

Multiplied shoots were then transferred to fresh media for root induction.

The best results observed with half strength of MS supplemented with 2.0 mg/l IBA+ 0.5 gm/l + AC.

The maximum number of roots was obtained on MS medium supplemented with 2.0 mg/l IBA+ 0.5 gm/l + AC. (average number of roots 12±1.99) and best shoot length (average root length 2.0±0.09) showed in (Table 4.3).

Table 4.3 Effect of auxin (IBA) on root induction from isolated shoots of Sugarcaneafter 5 weeks

No.	Medium+ Hormones	Average root length (in cm (mean ± SD)	Average number of roots/explant
1.	½MS+ 0.5mg IBA (SCR-A)	0.09±0.34	8±1.00
2.	½MS+ 1.0mg IBA (SCR-B)	1.2±0.14	7±0.75
3.	½MS+ 1.5mg IBA (SCR-C)	1.4±0.04	10±1.22
4.	½MS+ 2.0 mg IBA(SCR-D)	2.0±0.09	12±1.99

Fig. 3.3 root induction from isolated shoots of Sugarcane.

Plate 3.3 Result of rooting

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Surface Analysis and Determination of Topographic Factor (LS) of Chopda Taluka, District: Jalgaon, Maharashtra, India

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ABSTRACT

In this study, the terrain was modeled and mapped using the capabilities of remote sensing (RS) and geographic information systems (GIS). The surface analysis tool in Arc GIS 10.5 is first used in this work for a variety of surface analyses, including slope, aspect, and hill-shade. In the Universal Soil Loss Equation (USLE), slope length and slope steepness are two crucial topographic parameters (L and S) for predicting soil erosion. Both slope length and slope gradient estimate was made in an Arc GIS 10.5. A 2.5-meter-resolution orthorectified Digital Elevation Model (DEM) from Cartosat-1 was used to examine various surface characteristics and compute topographic (LS) factors. Study examines that (91.05%) area falls under 0-15% slope, (8.30%) area falls under 16-30%, (0.66 %) area falls under 31-45% slope and (0.002%) area falls under >45% slope.Using flow accumulation and the gradient of the slope map in the Raster calculator, the LS factor, which ranges from 0.0 to 7.75, was determined. The highest yearly soil erosion rate and LS factor were found in locations with steep slopes.

Keywords: Surface analysis, LS factor, DEM, GIS

I. INTRODUCTION

Soil erosion is a global phenomenon that degrades agricultural land by removing nutrient-rich surface soil, increasing runoff from the more impermeable subsoil, and reducing the amount of water available to plants. Therefore, estimating soil loss and identifying the crucial region for applying best management practices are essential for a soil conservation program to be successful. An estimated 2 billion hectares of land are prone to soil deterioration brought on by humans. As a result, it is projected that 550 Mha of the land area is impacted by wind erosion and 1100 Mha by water erosion[1].An accurate quantitative assessment of soil erosion affects several functions like biodiversity, food production, carbon stock, and ecosystem services, and may be modelled. Despite their flaws, the Universal Soil Loss Equation (USLE) and its improved version (RUSLE) are frequently employed in modelling soil erosion at large scales[2].By modelling erosion processes in the watershed, soil erosion modelling can take into account many of the intricate relationships that affect rates of

erosion. To calculate soil loss, a variety of parametric models are available, including empirical (statistical), conceptual (semi-empirical), and physical process-based (deterministic) models. To estimate soil loss, the majority of these models require data on soil type, land use, landform, climate, and topography. They are created for a particular set of circumstances in a particular location[3].Rainfall erosivity factor (R), Slope Length and Steepness factor (LS), soil erodibility factor (K), vegetation cover factor (C), and erosion control factor are the five main input parameters used in USLE (P)[4].

The topographic factor is also known as the Slope Length and Steepness factor (LS). The slope, aspect, drainage area, network, curvature, and topographic index can all be derived from the Digital Elevation Model (DEM), a quantitative depiction of the Earth's surface that offers fundamental information about the terrain[5]. The DEM and the LS factor set the spatial resolution (cell size) and take into account the possibility for surface runoff to cause soil erosion. While the S-factor takes into consideration the effects of slope steepness, the L-factor accounts for the impact of slope length. The LS-factor has values that are equal to and greater than 0 and is dimensionless. The effects of topography on erosion in RUSLE are accounted for by the LS factor. When considering the slope length component, erosion rises as the slope length grows (L). The horizontal distance between the source of overland flow to the point at which either deposition starts or runoff becomes concentrated in a specific channel is referred to as the slope length. The slope steepness factor (S) depicts how erosion is impacted by slope gradient. According to RUSLE, both slope length and steepness have a significant impact on sheet and rill erosion [6].Since this parameter represents surface runoff speed and is an indicator of soil erosion risk in watersheds, topographic analysis is crucial for USLE application[3].

In this study we foundout different surface parameters like slope, aspect and hill-shade as well as slope length and steepness factor using Digital Elevation Model (DEM). Maximum area was found gentle to moderately sloped and LS factor calculated was ranged from 0 to 7.74.

II. STUDY AREA

The Chopda taluka is located in the Jalgaon district of Maharashtra. Western India contains the state of Maharashtra. Chopda has an average elevation of 190 meters, stretches between 21.15^0 to 21.45^0 North and from 75.00^0 to 75.55^0 East. It is located next to the Tapi River, one of India's major rivers, as well as on the bank of the Ratnavati River. The majority of the study area's northern region is hilly and is located within the Yawal wildlife sanctuary. The taluka's superior quality soil contributes to the growth of its agriculture sector. The main crops grown in the study region are cotton, bananas, sugar cane, and legumes.

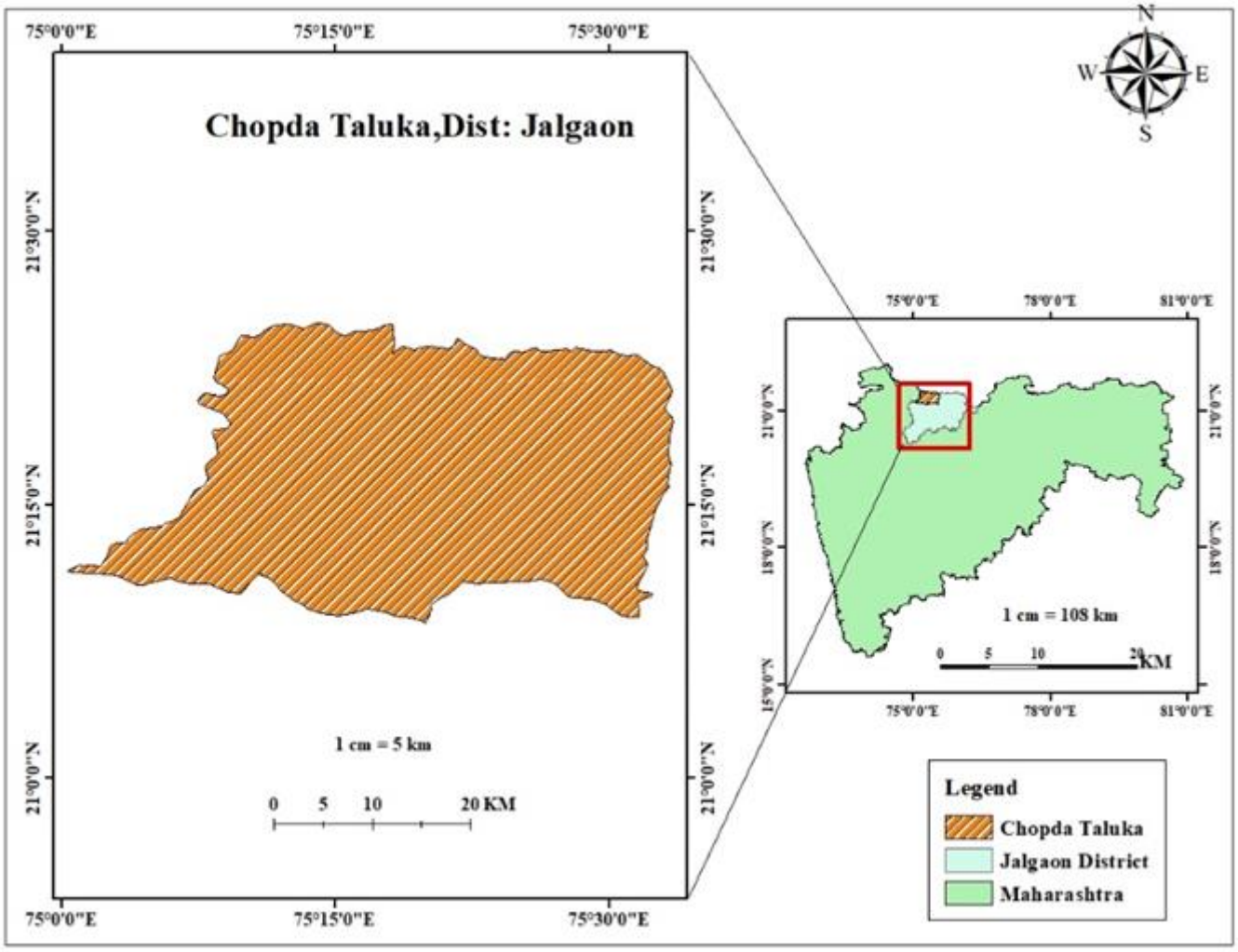

Fig.1. Study Area, Chopda Taluka Dist.: Jalgaon, Maharashtra

III. MATERIAL AND METHODS

We used Cartosat-1 orthorectified Digital Elevation Model (DEM), (Fig.2) with a 2.5-meter resolution for studying different surface parameters and calculating the topographic (LS) factor. Data was downloaded from a geoportal of the Indian Space Research Organisation (ISRO) known as Bhuvan. It is hosted through an online portal https://bhuvan.nrsc.gov.in.

A. Surface Parameters:

The following surface parameters are computed in the Spatial analyst tool of Arc Toolbox in Arc GIS 10.5:

a. Slope

The slope calculator determines the greatest rate of change for each cell relative to its neighbours, for instance, the sharpest incline for the cell (the maximum change in elevation over the distance between the

cell and its eight neighbours). The flatter the terrain, the lower the slope value, and the steeper the terrain, the greater the slope value. You can determine the output slope raster's % slope or degree slope. Using the DEM data, ArcGIS 10.5 was used to create a slope map of the research area (Fig. 5)[1].

b. Aspect

The steepest downward slope from each cell to its neighbours is identified by aspect. It can be compared to a hill's compass orientation or slope direction. From zero, which is north, to 360^0, which is north once more, the aspect is measured in degrees clockwise, making a full circle. Each cell's value in an aspect dataset represents the slope that the cell is facing. Flat areas without any downward slope were assigned a rating of -1. Aspect maps were produced using ArcGIS 10.5and the DEM data (Fig. 4)[1].

c. Hill-shade

The hill-shade function determines illumination values for each cell in a raster to provide the fictitious illumination of a surface. This is accomplished by placing a fictitious light source in that location and figuring out how well-illuminated each cell is in proportion to its neighbours. When employing transparency, can significantly improve the visualization of a surface for study or graphical display. The hill-shade map was produced using ArcGIS and the DEM data (Fig. 3) [1].

B. Calculation of Slope Length and Steepness (LS) factor

In the RUSLE model, the slope length (L) and steepness (S) were jointly estimated. Becausethe L and S of the slope directly affect the erosive force of water, soil erosion will be high if they are high and vice versa [6]. The slope gradient and slope length, which are topographic characteristics, have a big impact on how much soil erosion is caused by surface water movement. According to the relation created for usage in GIS for difficult topographical situations, slope length in meters (L) is computed from slope steepness in percentage (S).

$L=158-2.92 \times S$ …… (1)

The empirical equation (Wischmeier and Smith, 1978) uses the slope length and slope % to compute the LS factor [7].

$LS = (\text{Flow Accumulation} \times \text{Dem Resolution}/ 22.1)^m \times (0.065 + 0.045 \times S + 0.0065 \times S^2)$ …… (2)

where "m" is an exponent with a range of 0.2 to 0.6 based on the slope's percentage.

The slope gradient map was created using the spatial analyst tool in ArcGIS, while the hydrology tool was utilized to calculate the slope length and flow accumulation [6]. The Raster calculator used Eqs.(2) to incorporate all the input variables, including slope length and flow accumulation, to determine the LS factor.

IV. RESULT AND DISCUSSION

The study area is having 74 meters as a lower relief and 883 meters as a higher relief derived from Digital Elevation Model (Fig. 2). In this study we found out that Chopda taluka has 115,446.52 hectors area out of which 105,124.59 hectors (91.05%) area falls under 0-15% slope, about 9592.63 hectors (8.30%) area falls under 16-30% slope, about 727.96 hectors(0.66 %) area falls under 31-45% slope and 1.34 hectors (0.002%)

area fall under >45% slope.Erosion is thought to be caused by steep slopes. Since there will be more transported and dissolved materials as a result of the steep slope, erosion will be expedited. A steeper slope will improve the flow, resulting in more water and power to move the soil. Increased surface runoff causes increased erosion on steep slopes, which also contributes to decreased infiltration. Slope classes of 8-15%, 15-25%, and 25-40 % are typically considered to be erosion-prone zones. Therefore, these classes need to get extra consideration and care [8]. Though 91.05% of our study area falls under 0-15% it seems the maximum of this area hasa slope of more than 8% which makes it susceptible to soil erosion.

Aspect is the slope's orientation and is measured from 00 to 3600in clockwise degrees, where 00is north, 900is east, 1800 is south, and 2700 is west (Fig.4). The study shows the aspect of slope in each direction. Hill shading is a method for visualizing terrain as shaded relief that is illuminated by an illustrative light source. Eachraster cell's illumination value is based on its orientation to the light source, which is based on slope and aspect.A digital elevation model's (DEM) relief shading uses shadows to highlight the topography of the terrain. It is making use of a process known as hillshading. The elevation displays hilly or flat portions of the data using variations in hill shade, creating a 3D impression (Fig. 3).

The topographic factor is a single measurement made up of the slope factor, slope gradient, and length of the eroding surface (LS). The LS factor shows its effects on soil loss [9]. The highest surface elevation of the study area is 883 m and the slope's highest percentage is over 45. Using flow accumulation and the gradient of the slope map in the Raster calculator, the LS factor, which ranges from 0.0 to 7.75, was determined (Fig. 6). The highest yearly soil erosion rate and LS factor were found in locations with steep slopes. The erosivity factor for rainfall (R) and the topographic factor (LS) was shown to be strongly correlated; as the slope increases, so does the erosive strength of runoff water. [10] have demonstrated that the high overland flow velocity can be produced as an increment in slope length and steepness, leading to higher erosion. Similarly [11],[12],[13],[14] reported severe soil erosion on the steep slope of small mountainous river basin [15],[16],[17].

V. CONCLUSION

A digital elevation data collection is highly useful for determining the slope, aspect, and hillshade, which are important for agricultural activities. Determining the bare minimum number of stations required to supply mobile communication towers with communication coverage in a particular area or region can be done using the view-shade calculation, which can also be done using DEM. The study also demonstrates that regions with bigger slopes are more vulnerable to soil erosion because a topographical component closely correlates with both the degree of slope and the rate of erosion (LS factor). In terms of precision and turnaround times, GIS and remote sensing have proven to be significant. The geographical approaches for calculating soil erosion utilized in the Chopda Taluka of Maharashtra will be useful. This study confirms that increased soil loss from water erosion will occur if rainfall intensity rises and human land use activities are not effectively managed. The local government should consider quickly minimizing this serious loss of natural resources by implementing preventive and control measures. Sustainable vegetation management techniques and cover

could significantly reduce soil erosion.Length factor and steepness factor are combined to form the LS factor. The length slope factor, which reflects the fact that erosion increases with slope angle and slope length, represents the impact of terrain on erosion. In this study, the LS factor is computed using DEM. According to the slope classes, the study region's highest slope is observed to be between 0 and 15%, hence this area is classified as moderately sloping. It was discovered that agricultural areas and mainstream channels have the least slope. The slope in the study region is moderate to steep, as indicated by the slope map. Because this value characterizes surface runoff speed and is an indicator, topographic analysis is crucial in USLE applications.

The slope factor (LS) is combined with the slope gradient and the length of the eroding surface into a single factor. In the Revised Universal Soil Loss Equation (RUSLE) the LS refers to the actual length of the overland ow path. It is the distance fromthe source ofthe overland ow to a point where it enters a major ow concentration. This de nition is particularly relevant for forested or vegetated catchments areas where the overland ow seldom exists on hill slopes (Bonnel and Gilmour, 1978; Bruijnzeel, 1990). In forested catchment areas the subsurface storm ow is more dominant than the overland ow and the latter only exists at limited areas near the channel margins or on shallow soil as the return ow or saturated overland ow (Bruijnzeel, 1990). Consequently, the overland ow path in forested catchment is expected to be shorter than the slope length identi ed from the map. The slope length and gradient were calculated from topographical map of the study area The slope factor (LS) is combined with the slope gradient and the length of the eroding surface into a single factor. In the Revised Universal Soil Loss Equation (RUSLE) the LS refers to the actual length of the overland ow path. It is the distance from the source of the overland ow to a point where it enters a major ow concentration. This de nition is particularly relevant for forested or vegetated catchments areas where the overland ow seldom exists on hill slopes (Bonnel and Gilmour, 1978; Bruijnzeel, 1990). In forested catchment areas the subsurface storm ow is more dominant than the overland ow and the latter only exists at limited areas near the channel margins or on shallow soil as the return ow or saturated overland ow (Bruijnzeel, 1990). Consequently, the overland ow path in forested catchment is expected to be shorter than the slope length identi ed from the map. The slope length and gradient were calculated from topographical map of the study area The slope factor (LS) is combined with the slope gradient and the length of the eroding surface into a single factor. In the Revised Universal Soil Loss Equation (RUSLE) the LS refers to the actual length of the overland ow path.

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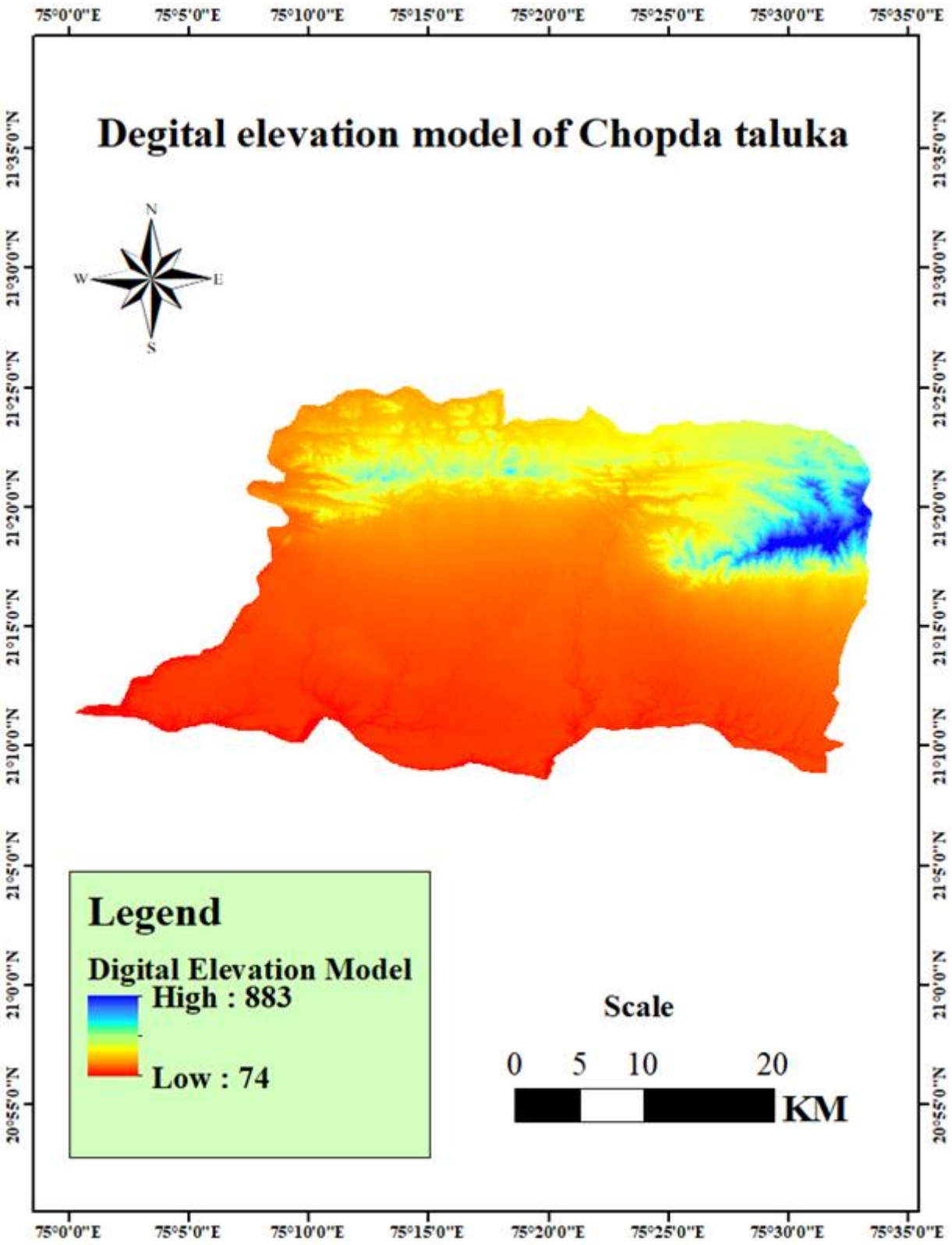

Fig. 2. Digital Elevation Model of Study Area

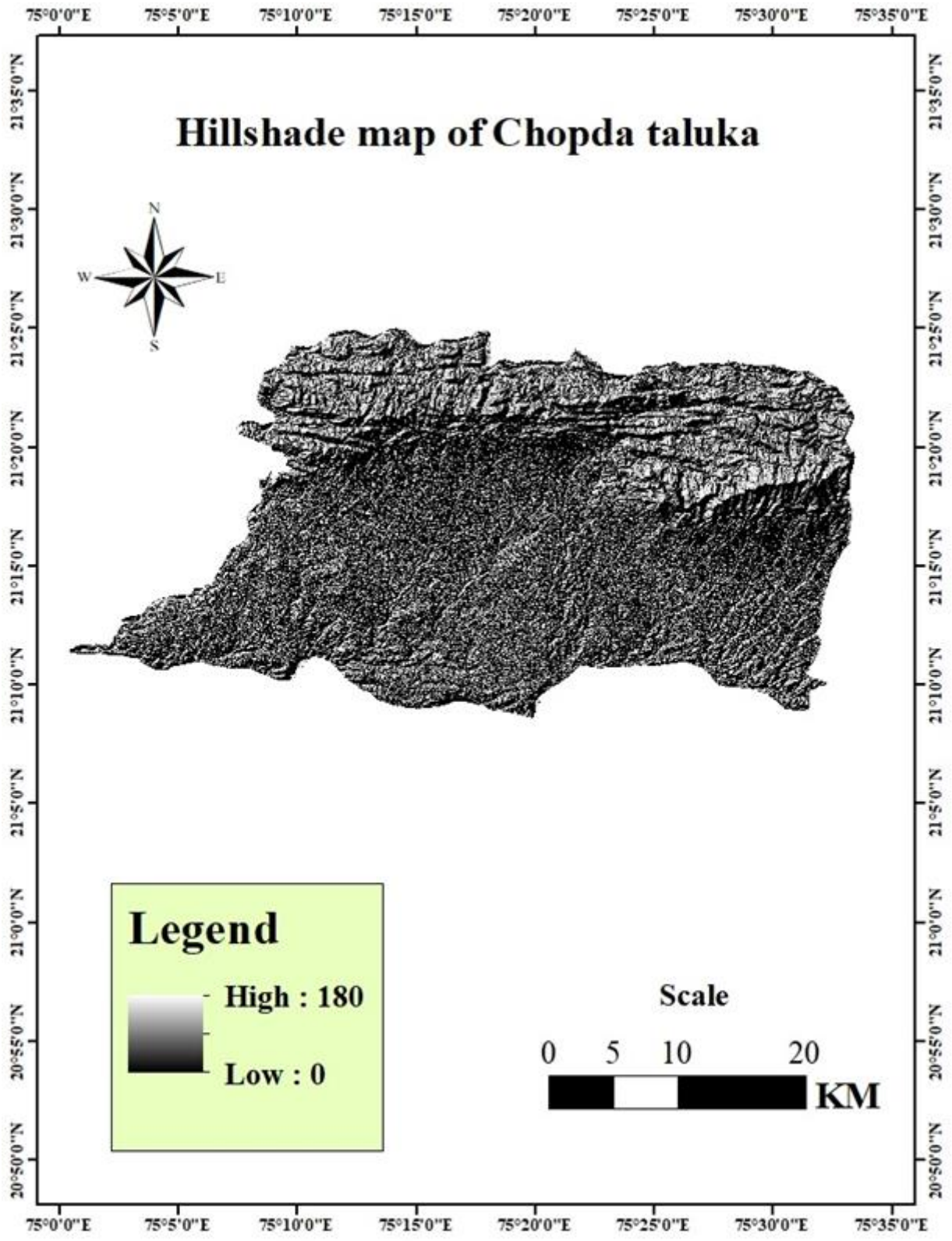

Fig. 3. Hill-shade Map of Study Area

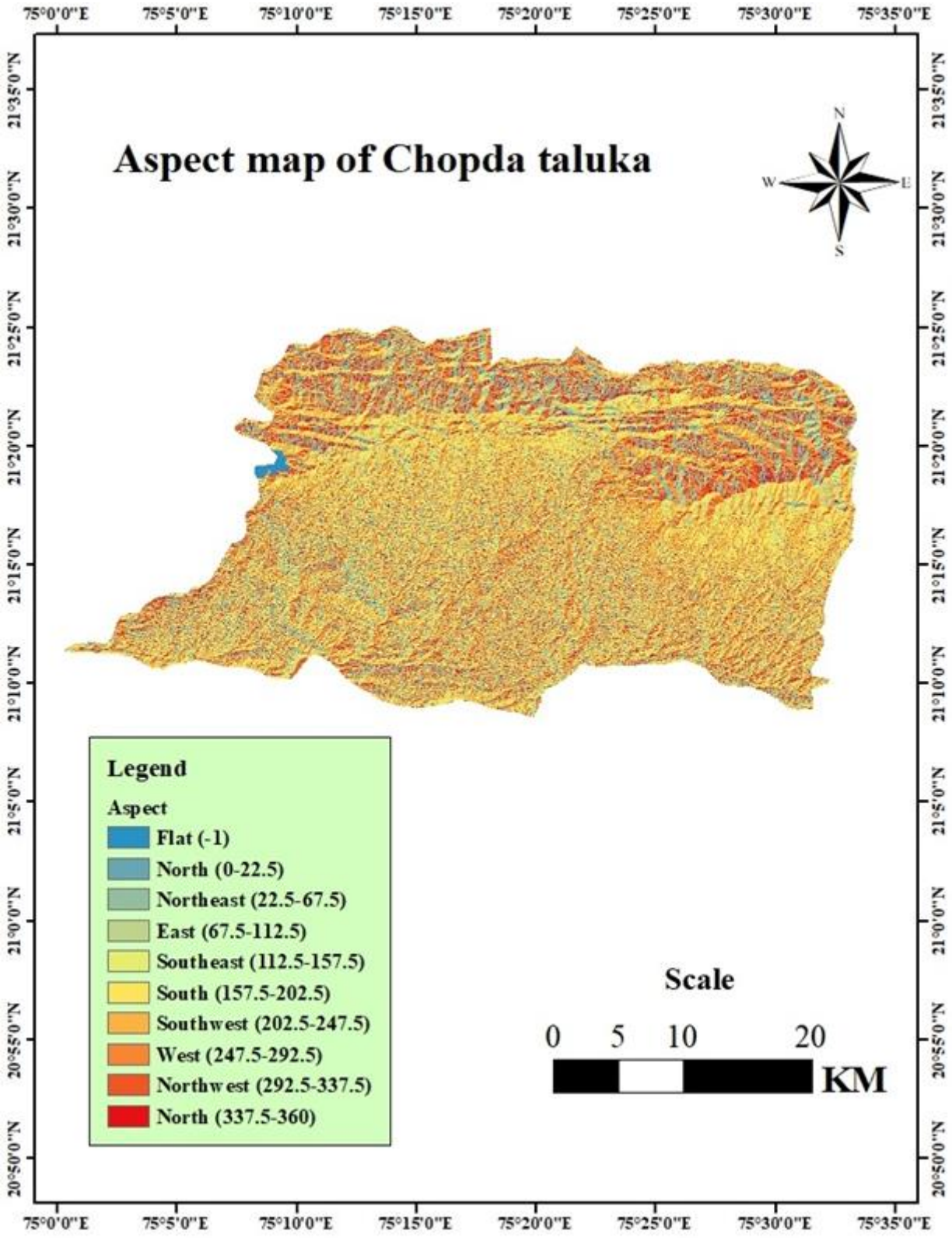

Fig. 4. Aspect Map of study Area

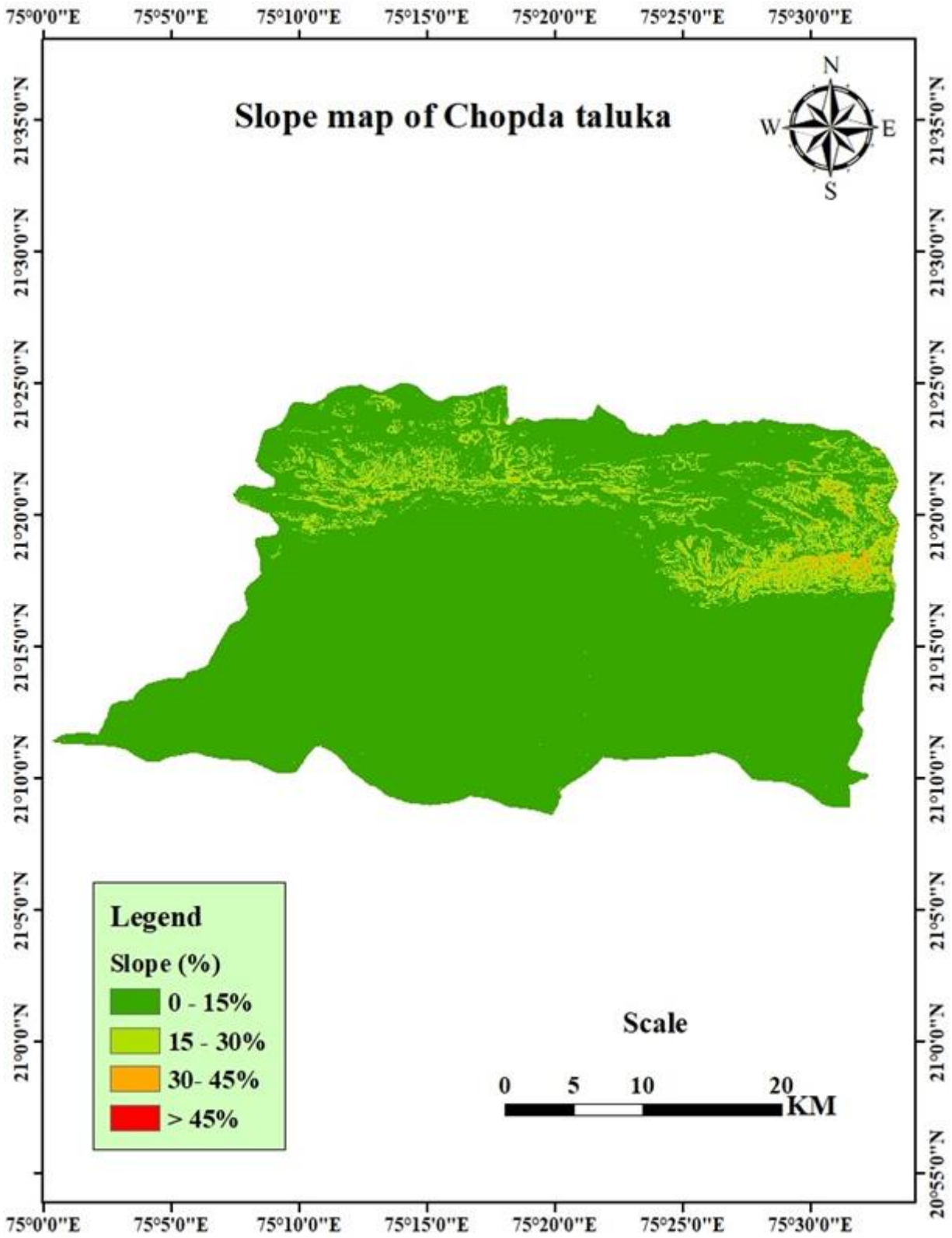

Fig. 5. Slope map of Study Area

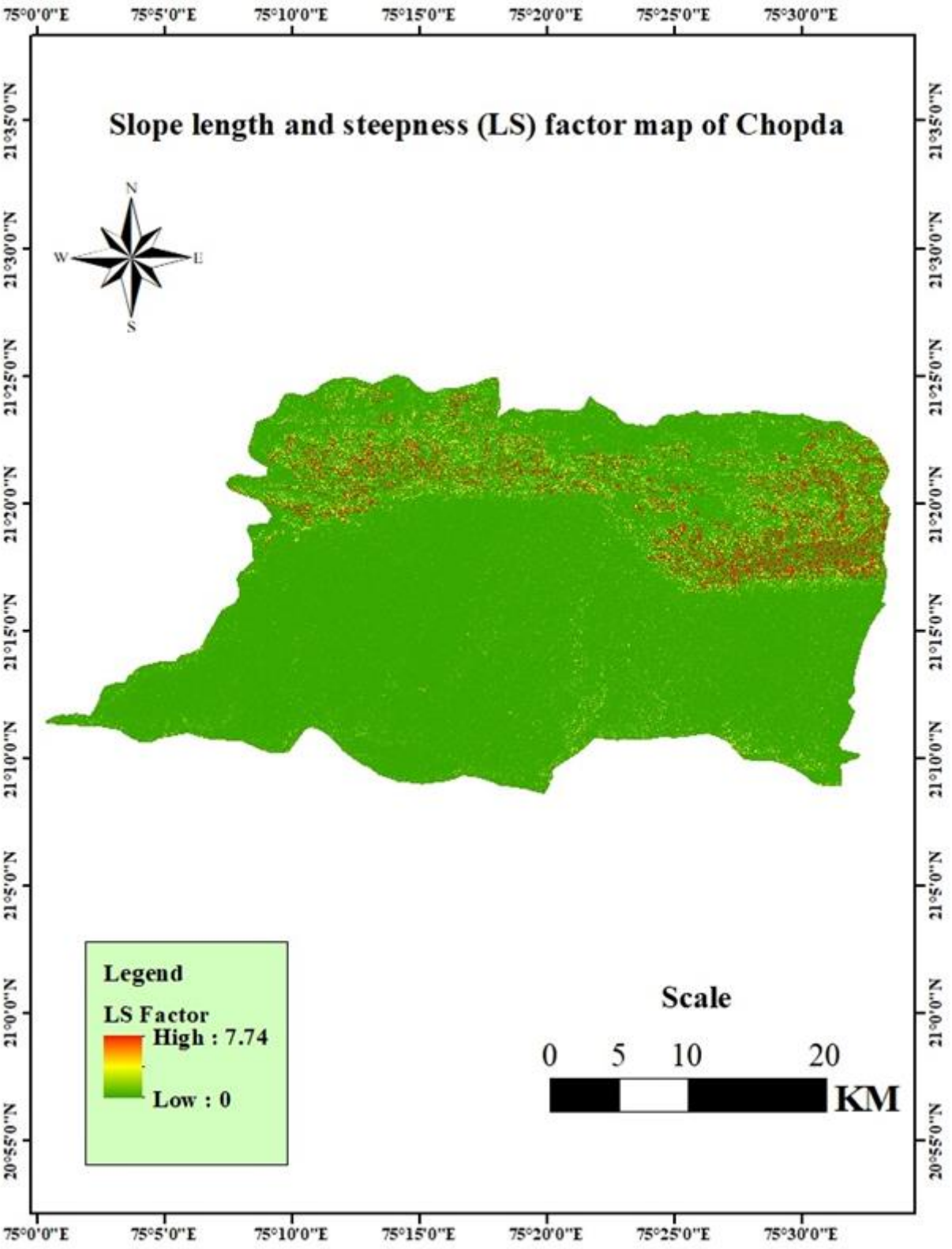

Fig. 6. Slope Length and Steepness (LS) factor map of study area

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One-Pot Synthesis of Pyrido 2,3-D:6,5-D′ Dipyrimidine Derivatives in Aqueous Ethanol Using Dimethylaminopyridine (DMAP)

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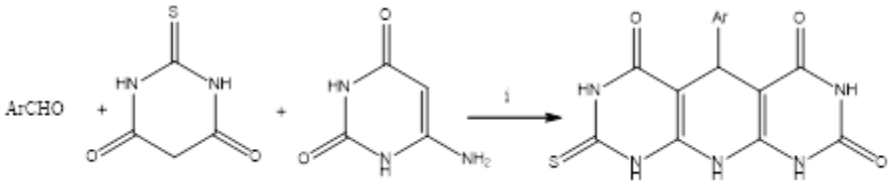
ABSTRACT
I have reported dimethylamino primidine (DAMP) as efficient and convenient catalyst for one-pot green synthesis of pyrido [2,3-d:6,5-d′] dipyrimidine derivatives. Aromatic aldehyde, thiobarbituric acid and 6-amino uracil are reacted under reflux in this multi-component reaction. The protocol was carried out under mild reaction conditions with operational simplicity. Good product yield, high atom economy, usage of aqueous ethanol as a green reaction medium and simple work-up procedure are some of the advantages of this protocol.



Scheme 1: Reagent and conditions: (i) Dimethylaminopyridine (DMAP), H2O:C2H5OH (10 mL), reflux, 38 to 65 min.

Keywords: 6-Amino uracil, Pyrido[2,3-d:6,5-d'] dipyrimidine, multi-component reaction, DAMP

I. INTRODUCTION

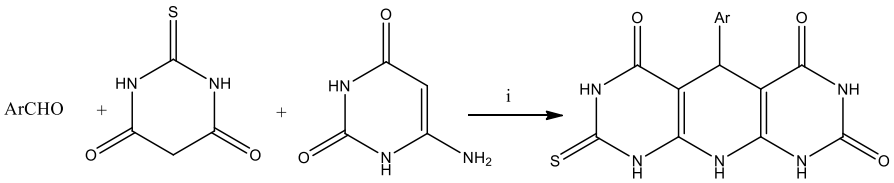
Multi-component reactions (MCRs) has become an important area of research in organic, combinatorial, and medicinal chemistry[1–4] to produce biologically active compounds. MCRs leads to synthesize attractive heterocyclic scaffolds which are particularly useful for the creation of diverse library of drugs [5,6]. In MCRs a series of final products containing diverse substituents from all of the reactants can be 96ynthesis96d. Low reaction time, easy operation, isolation of the product, low energy consumption, elimination of the isolation of unstable intermediates is some advantages of MCRs [7-12]. Over the last few decades, with increasing environmental concerns, the design of new MCRs with eco-friendly, green procedures have become increasingly useful tools, especially in the fields of drug discovery, organic synthesis, and material science [13, 14].

During the past few years annulated pyrimidine derivatives have received high attention, because they exhibit various biological activities. Uracil and its fused derivatives, such as pyrano[2,3-*d*] pyrimidines, pyrido[2,3-*d*]-pyrimidines, pyrazo[3,4-*d*]pyrimidines, or pyrimido[4,5-*d*]-pyrimidines, are reported to have a wide range of biological activities such as antibacterial and antifungal activity[15], antiasthmatics, antiallergic[16], antihypertensive[17], cardiotonic[18], bronchodilator[19], antibronchitic[20], orantitumor[21] activity. The synthesis of the heterocycles containing uracil ring poses significant synthetic challenges. Hence, for the 97ynthesis of these fused heterocycles, great efforts have been taken for the manipulation of annulated pyrido[2,3-*d*:6,5-*d*]dipyrimidine derivatives. Different procedures such as Knoevenagel condensation, Michael addition followed by cyclodehydration strategy and finally heterocyclization[22] have been applied.

Therefore different methodologies have been developed for the synthesis of these derivatives by one pot multi-component reaction of barbituric acid with aromatic aldehydes and ammonium acetate in presence of Fe-MCM-41-ionic liquid [23], $CuFe_2O_4$ nanospheres [24], [H-NMP]+[HSO_4] [25], nano $CuFe_2O_4$ [26, 27] and nano-[SiO_2-$RNMe_2SO_3H$][Cl] [28]. Other methods include reaction between aldehyde, thio-barbituric acid and 6-amino uracil which produces pyrido[2,3-d:6,5-d]dipyrimidines catalyzed by MWCNTs@L-His/Cu(II) [29], DBU [30] and p-TSA [31]. 6-amino uracil and aldehyde to afford the corresponding derivatives using SBA-15 supported sulfonic acid [32] and microwave irradiation in acetic acid [33]. 6-Amino uracil, aldehydes and dimedone on reaction in the presence of encapsulated-γ –Fe_2O_3 [γ –Fe_2O_3@HAp-SO_3H] afford these derivatives [34]. Recently Diisopropylethylammonium acetate (DIPEAc) catalyst was employed for such synthesis [35].

The above reported methodologies for synthesis of pyrido [2,3-d:6,5-d'] dipyrimidine derivatives have shown good results in many instances. However, some of synthetic strategies also have limitations in terms of expensive reagents, long reaction time, environmentally hazardous, harsh reaction conditions, tedious work-up procedure and unsatisfactory yield. 4-(Dimethylamino) pyridine (DMAP) is a catalyst of outstanding utility in a variety of group-transfer reactions, such as the acylation of alcohols and amines.[36-40]. Despite the frequent use of DMAP itself and the recent development of chiral DMAP derivatives for applications in stereoselectivecatalysis[41-45].

Hence I were interested in the synthesis of pyrido [2,3-d:6,5-d'] dipyrimidine using DMAP as versatile catalyst. In the search of better reaction condition for the synthesis of pyrido [2,3-d:6,5-d'] dipyrimidine, I have developed aqueous ethanol (1:1) mediated synthetic protocol with excellent yield using DMAP catalyst (Scheme 1).



Scheme 1: *Reagent and conditions*: (i) Dimethylaminopyridine (DMAP), H_2O:C_2H_5OH (10 mL), reflux, 38 to 65 min.

II. EXPERIMENTAL

(A) General details

All chemicals were purchased from Sigma Aldrich and Spectrochem companies and used without further purification. The reactions were monitored by TLC using aluminum sheets 20 x 20 cm, Silica gel 60 F254, Merck grade. Products were characterized by ^{1}H and ^{13}C NMR spectra recorded on a Bruker spectrometer using $CDCl_3$ & DMSO-d6 as a solvent and tetramethylsilane as an internal standard. Mass spectrometric data was recorded by an electron spray ionisation (EST) technique on a Q-tof-micro quadruple mass spectrometer (Micro mass). Melting points were determined on DBK-programmable melting point apparatus.

(B) General procedure for the synthesis of 5-aryl-8-thioxo-7,8,9,10-tetrahydropyrido[2,3-d:6,5-d]dipyrimidine-2,4,6(1H,3H,5H)-trione derivatives:

In a 25 mL round bottom flask aromatic aldehyde (1 mmol), 2-thio barbituric acid (2 mmol) and ammonium acetate (1 mmol), 5mL water and Dimethylaminopyridine (DAMP) (10 mol%) were refluxed for 50 to 65 minutes. The progress of reaction was monitored by TLC. After completion of reaction; confirmed by thin-layer chromatography (TLC) using eluent petroleum ether– ethyl acetate (7:3), the reaction mixture was then filtered. The product as residue was washed with water thrice. The crude product obtained was recrystallised using ethanol to afford the products in good yields. The structure of the product was confirmed by Mass and 1H NMR specta.

III. RESULTS AND DISCUSSION

Herein, I reported synthesis of 5-aryl-8-thioxo-7,8,9,10-tetrahydropyrido[2,3-d:6,5-d]dipyrimidine-2,4,6(1H,3H,5H)-trione derivatives in good to excellent yields via one pot reaction between aromatic aldehyde (1 mmol), 2-thio barbituric acid (2 mmol) and 6-amino uracil (1 mmol). All reactions were performed by the use of Dimethylaminopyridine (DAMP) as catalyst in aqueous ethanol (1:1) under reflux. The products were obtained in good to excellent yields.

To determine the suitable reaction condition, reaction of benzaldehyde (1 mmol), 2-thio barbituric acid (1 mmol) and 6-amino uracil (1 mmol) was performed at room temperature **(entry 1, Table 1)**. Low yield was observed in this case. So, I studied the effect of solvent and various amounts of DAMP catalyst on the model reaction **(Scheme1)**. The reaction was performed by using different solvents such as CH_2Cl_2, EtOH and CH_3CN at room temperature and under heat for about 40-90^{0}C with more time and low yield **(entry 1-5, Table 1)**. The same reaction was performed in presence of 10 mol% DAMP at 70- 80^{0}C aqueous ethanol (1:1) **(entry 6, Table 1)**. Good result was obtained using this condition. Then, using 05 mol% of the catalyst the reaction was carried out under reflux but yield was not satisfactory **(entry 7, Table 1)**.

Table 1: Optimization of reaction conditions

Entry	Solvent	Catalyst (mol%)	Temperature (^{0}C)	Time (min.)	Yield (%)
1	H_2O	10	Rt	200	55
2	CH_2Cl_2	10	30	120	60
3	CH_3CN	10	80-90	150	45
4	EtOH	10	70-80	55	88
5	H_2O	10	70-80	135	50
6	**EtOH :H_2O**	**10**	**70-80**	**55**	**90**
7	EtOH :H_2O	05	70-80	100	80

Thereafter, a series of reactions were carried out using diversely substituted aromatic aldehydes under identical reaction conditions. All these reactions afford good to excellent yields of 5-aryl-8-thioxo-7,8,9,10-tetrahydropyrido[2,3-d:6,5-d]dipyrimidine-2,4,6(1H,3H,5H)-trione derivatives (4a-4i), **(entries 1-9, Table 2).** All these reactions resulted in good to excellent yields **(Table 2)**.

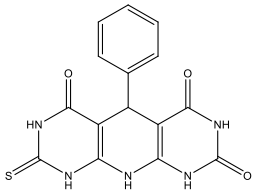
Table 2: Synthesis of 5-aryl-8-thioxo-7,8,9,10-tetrahydropyrido[2,3-d:6,5-d]dipyrimidine-2,4,6(1H,3H,5H)-trione derivatives catalyzed by DAMP.

Entry	**Aldehyde**	**Product**	**Time (min.)**	**Yield**	**MP (^{0}C)**
1	Benzaldehyde	4a	55	90	290-292[30]
2	3-Nitro benzaldehyde	4b	50	88	295-298[30]
3	4- Anisaldehyde	4c	62	85	298-300[30]
4	4-Methyl benzaldehyde	4d	58	88	288-290[30]
5	4-Chloro benzaldehyde	4e	52	82	290-293[30]
6	4-hydroxy benzaldehyde	4f	58	84	>300[30]
7	3,4-Dimethoxy benzaldehyde	4g	65	82	>300[30]
8	Furfuraldehyde	4h	62	80	205-207[30]
9	Pyrrole 2-carbaldehyde	4i	55	82	180-182[30]

[a]substituted aldehyde (1 mmol), 2-thiobarbituric acid (2 mmol), 6-Amino uracil (1 mmol), Ethanol:water (1:11) (10 mL), Rt, 50 -65 min.

[b]isolated yield.

Characterization data:



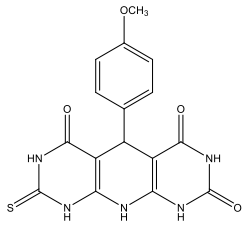
5-phenyl-8-thioxo-7,8,9,10-tetrahydropyrido[2,3-d:6,5-d]dipyrimidine-2,4,6(1H,3H,5H)-trione(4a):

IR(KBr,vcm–1): 3430 (NH), 3000 (C-H, sp2 stretch), 1726 (C=O), 1523 (C=C, Ar).

^{1}H NMR (DMSO-*d6*, 400 MHz) δ (ppm): 12.4 (s,1H, NH), 11.05 (s,1H, NH), 11.00 (s,1H, NH), 10.65 (s, 1H, NH), 7.25–7.15 (m, 5H, Ar–H), 6.00 (s, 1H, NH), 4.90 (s, 1H, CH).

^{13}CNMR (DMSO-*d6,* 100MHz,), δ (ppm): 174.5, 162.0, 161.5, 160.0, 156.6, 155.0, 140.5, 128.7, 128.4, 127.7, 98.6, 95.0, 52.5.

MS for $C_{15}H_{11}N_5O_3S$ (*m/z*):341[M+].



5-(4-methoxyphenyl)-8-thioxo-7,8,9,10-tetrahydropyrido[2,3-d:6,5-d]dipyrimidine-2,4,6(1H,3H,5H)-trione(4c)

IR(KBr,vcm–1): 3448 (NH), 3031 (C-H, sp2stretch) (C-H, sp2 stretch), 2929 (C-H, sp2stretch) (C-H, sp3 stretch), 2223, 1590 (C=O), 1564 (C=C, Ar).

^{1}H NMR (DMSO-d6, 400 MHz) δ (ppm): 14.00 (s, 1H, NH), 13.05 (s, 1H, NH), 9.35 (s, 1H, NH), 8.10 (s, 1H, NH), 7.80 (s, 1H, NH), 7.15 (2H, Ar–H), 6.85 (2H, Ar–H), 4.95 (s, 1H, CH), 3.85 (s, 3H, CH3).

^{13}C NMR (DMSO-*d6*, 100 MHz) δ (ppm): 174.3, 162.0, 161.6, 160.0, 159.2, 156.7, 155.0, 130.4, 129.5, 113.2, 98.5, 95.0, 56.0, 52.3.

MS(*m/z*) for $C_{16}H_{13}N_5O_4S$: 371[M+].

IV. CONCLUSION

In summary, I report an efficient synthesis of pyrido-dipyrimidine derivatives by the reaction of various aromatic aldehydes, 2-thio-barbituric acid and 6-amino uracil using DAMP catalyst. Non-hazardous reaction condition and the use of aqueous ethanol as the reaction solvent makes the present protocol an environmentally benign and green approach for the synthesis of pyrido-dipyrimidine derivatives.

V. ACKNOWLEDGEMENT

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VI. REFERENCES

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A Preliminary Survey - Medicinal Trees in Khuldabad, District Aurangabad, (M.S.), India

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ABSTRACT
Khuldabad is a great historical heritage, hilly station and also known to harbor a rich diversity of higher plants species and larger trees. Medicinal plants still play a vital role in the primary healthcare of this local community. Till now, a preliminary survey exists on the Khuldabad`s flora in general and medicinal species found within its limit in particular. Traditional medicine has its own great importance in Indian society. The paper deals with the preliminary investigation of 43 species of medicinal trees used by peoples of Khuldabad taluka of Aurangabad district in Maharashtra (India).

Keyswords: Traditional, Khuldabad, medicinal trees.

I. INTRODUCTION

Traditional medicine depend on herbal remedies has always played a key role in the primary health care system in India. In our country the native people are exploiting a variety of herbals for effective curing of various diseases. Medicinal trees are considered as a rich resources of ingredients which can be used in drug development either pharmacopoeial, non- pharmacopoeial or sysnthetic drugs.it was used as tonic, decoction, gum and even as a treating urinary problems, prostate condition, diarrhea, dysentery and many other symptoms. A part from that, these trees play a critical role in the development of human culture around the whole world.

Khuldabad is a harbors a rich diversity of ethnic botanical species, which generate considerable benefits from social and economic perspectives. Until now, people are preparing medicines from their available species of higher plants, which were used to treat common diseases. However, due to population pressure, accelerated urbanization, recurring drought, and deforestation, most of the medicinal trees are either destroyed or on the verge of extinction.

The native people are exploiting a variety of herbals for effective curing of various diseases. From the earliest days mankind has turned to plants for healing and various other uses. It is estimated that 61-85% of world`s population depends on tradition medicine Hooker (1989) has worked on the flora of British

of India, (Maheshwari 1962, Jain 1965, Gaur 1999, has studied the flora of district Garhwal, Khan et.al 2004 and Sivadasan 2004).

The aim of this study was, therefore, to identify and document the species of the trees associated with medicinal used in Khuldabad area District Aurangabad, Maharashtra, India.

II. MATERIALS AND METHODS

A preliminary field survey,Khuldabad is located at 20.05° N 75.18°E. It has pleasant climate,moderate by its altitude (2732 feet/832.7 meters).During the field survey, detailed information about the plants was gathered according the list through informal oral interview of Vaidhyas,Tribes,Hakimsandthenative rural people of Khuldabad Dist. Aurangabad (M.S.). Some Vaidhyas Dada Jaan, Momin Zafar Rashid and Syed Akram Ali Quadri and Tribes (Bawa) convinced for field survey to collect the plant species. Key questions asked included local names of plants,parts used,preparation,dosage and the specific ailments for treatment.

Proper identification of collected samples was done by consulting text, Singh (1986) worked on Selected Indian Folk Claims for the cure of bronchial asthma, Rawat and Pangtey (1987) studied the ethnobotany of Alpine regions of Kumaon. For ethno-medicinal taxa, the literatures;Singh (2000), Mukhopadhyay (1998), Dhiman and Khanna (2001),S. Chaudhary (2011), Dhal et.al (2015) Kajal et.al (2019)and Khan, RM (2021).

III. RESULTS AND DISCUSSION

The study found that the trees recorded from the different sites of Khuldabad area are highly valuable for medicinal uses. The study provides sufficient ground to believe that the traditional medicinalpracticeusingnativemedicinalplantsisalive well-functioning in the study area. Many communities use wild plants for the primary healthcare, due to belief in its effectiveness, easy accessibility and lack of modernmedicines.

A total 43 medicinal trees belonging to 24 families and 37genera were observed to be of popular medicinal value among locals. In table 1 various plants species are arranged alphabetically withtheir botanical names followed by local name, family, flowering and fruiting period and folk medicinal uses have been presented.

Their application ranged from treatment of stomach ache, joint pain, scabies, lactation, rheumatism, infections, dysentery, diarrhea, bleeding of the nose, skin disease, migraine, snake bites, boils vomiting, fever, skin problems, cold & cough, toothache, stomach ache, wounds, burns, constipation, night blindness, blood dysentery, indigestion, diabetes, asthma and jaundice. Different types of preparation made from medicinally important plants included decoction, juice, powder, paste, oil and whole plant extract.

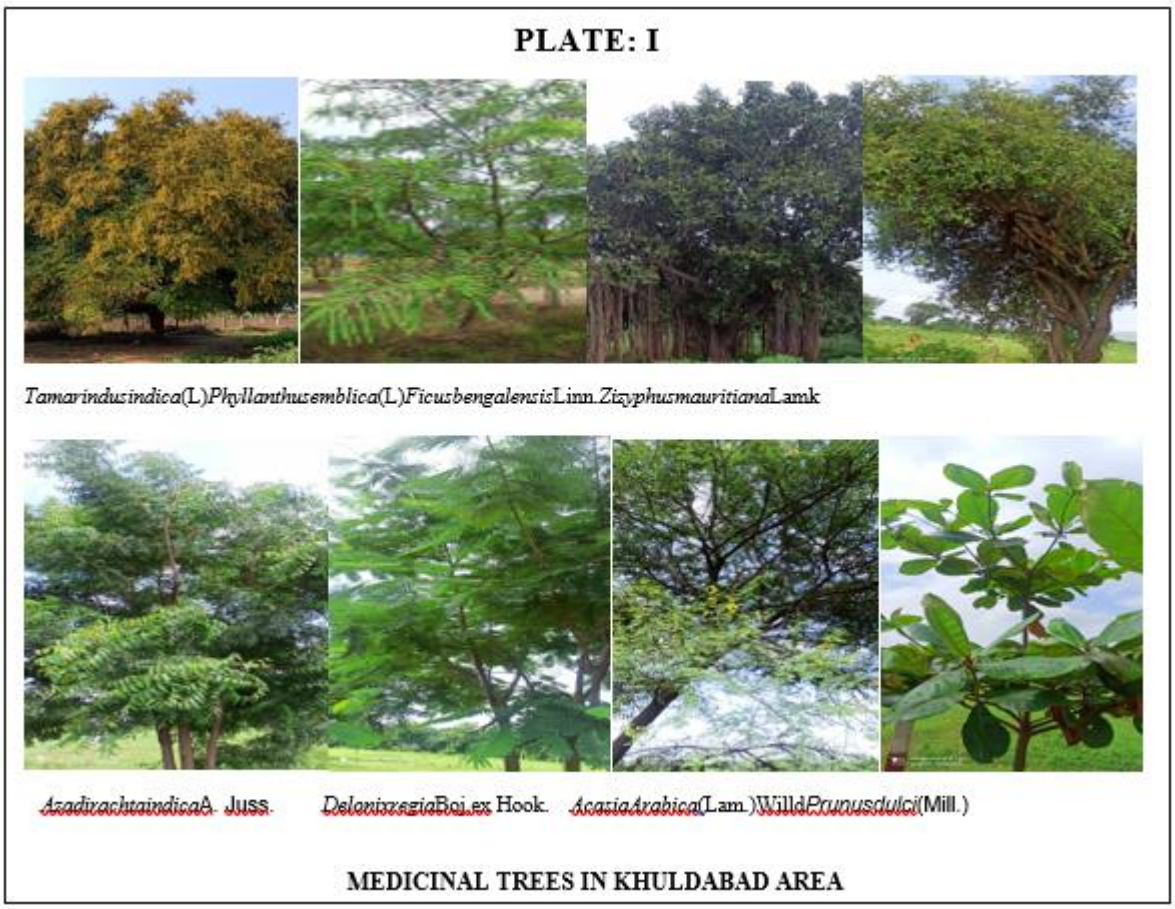

Table 1. Medicinal Tress in Khuldabad District Aurangabad

Sr. No.	Botanical Name	Family	Local Name	Medicinal Uses
1.	*Acasia Arabica*(Lam.)Will d	Mimosaceae	Babul	Useful in diarrhoea, dysentery, piles, Anthelemintic, bleeding disorder, cough and urinary disorders. Gum is used in dysuria and reduced hormone levels.
2.	*Annona reticulate* (L)	Annonacea e	Ramphal	Its treat abscesses,also used to treat diarrhoea and dysentery, decoction is taken as febrifuge.
3.	*Annona squamosal* (L)	Annonacea e	Sitaphal	It is use an insecticidal, an anti-tumor agent, anti-diabetic, anti- oxidant, anti-lipidimic and anti-inflammatory

				agent which has been characterized due to the presence of the cyclic peptides
4.	Anogeissus latifolia (Roxb. ex DC)	Combretaceae	Dhawda	It is used in treating snake bites and scorpion stings. Sweet meats and as an emulsifier in the food industry.
5.	*Azadirachta indica* A. Juss.	Meliaceae	Neem	• It is use anti-inflammatory property which helps reduces acne, Nourishes Skin, Treats Fungal Infections, Detoxification. Increases Immunity, Insect & Mosquito Repellent, Prevents Gastrointestinal Diseases, Treats Wounds.
6.	*Balanites aegytica* (L)	Balanitaceae	Hinguta,Hinganbet	It is traditionally used for jaundice, intestinal worm infection, wounds, malaria, syphilis, epilepsy, dysentery, constipation, diarrhea, hemorrhoid, stomach aches, asthma, and fever.
7.	*Bambusa valgaris* (L)	Poaceae	Bamboo	The stems used as fuel the leaves used as fodder, a large amount of ingestion of leaves is known to cause neurological disorder among horses.
8.	*Bauhina recemosa* Linn.	Fabaceae	Aapta, Bidi	Used as a refrigerant, astringent, in the treatment of headache, fever, skin diseases, blood diseases, dysentery, and diarrhea and bark useful wash for ulcers
9.	*Bauhinia variegate* Linn.	Caesalpiniaceae	Kachnar	.Diarrhoea: The decoction of its bark.
10.	*Bombax ceiba* (L)	Malvaceae	Kate Sawar	The treatment of cholera, tubercular fistula, coughs, urinary complaints, nocturnal pollution, abdominal pain due to dysentery, and impotency.

11.	*Butea monosperma*(Lamk.) Taub.	Fabaceae	Dhak, Palash	Flowers of the Bastard Teak have been used in ancient India in beauty care and to maintain complexion and suppleness of skin. Seeds have been employed in the treatment of worm infestations and as a antitode for snake bite.
12.	*Cassica fistula* Linn.	Caesalpiniaceae	Amaltas	Jaundice and Blindness: The seeds are used in jaundice and the bark
13.	*Citrus limon* (L)	Rutaceae	Nimboo	Health benefits of lemon highlights its value as anticatarrhal, benefits blood circulation, capillary protector, antihypertensive, antispasmodic, diuretic, applied to the skin and mucous membranes is antibacterial and antifungal.
14.	*Cordia dichotoma* G.Forst	Boraginaceae	Bhokar	Treatment for cough, asthma, skin diseases, fever, diarrhea, intestinal worms and wounds.
15.	*Dalbergiasissoo* Roxb.	Fabaceae	Shisham	Leprosy: The rasping's of itswood are boiled in water until these become half, then mixed with 'Sharbat' of shisham are drunk about for forty days in leprosy
16.	*Delonix regia*(Boj,ex Hook.)	Fabaceae	Gulmohar	For treat some disorders, such as constipation, inflammation, rheumatoid arthritis, diabetes, pneumonia, and malaria
17.	*Dolichandrome falcatus*(Wall. ex DC)	Bignoniaceae	Medhshigi	The bark juice is used for menorrhagia and leucorrhoea, fractures. The leaves of this plant are used as antioxidant, antiestrogenic and antidiabetic.
18.	*Eucalyptuscitridora* Hook.	Myrtaceae	Lyptis	Asthma and Chronic Bronchitis: The dried leaves in form

				of tincture is used in asthma and chronic bronchitis.
19.	*Ficusbengalensis* Linn	Moraceae	Bargad,Bar	A powder of its fruits in shade is prepared and is taken with honey in the morning and evening for a week to cure Spermatorrhoea.
20.	*Ficusrecemosa* Linn.	Moraceae	Gular	Its roots is used in dysentery and its fruits is given as a vehicle to medicine in diabetes.
21.	*Ficusreligiosa*Linn.	Moraceae	Pipal	The dried bark in powdered form is used in anal fistula and in the form of a paste, as an absorbent in inflammatory swellings.
22.	*Hardwickia binate* Roxb.	Fabaceae	Anjan	It is used for treating sexually transmitted diseases like leucorrhoea, chronic cystitis, gonorrhoea.
23.	*Lawsonia inermis* (L)	Lythreceae	Mehndi	It is use for antibacterial, antifungal, antiparasitic, antiviral, anticancer, antidiabetic, anti-inflammatory, antifertility and wound healing properties.
24.	*Mangiferaindica* Linn.	Anacardiaceae	Aam	Internal Haemorrhage andNasalbleeding: The bark is used in internal haemorrhage and the juice of kernel to stop nasal bleeding. bleeding: The bark is used in internal haemorrhage and the juice of kernel to stop nasal
25.	*Meliaazedarach* Linn.	Meliaceae	Bakain	Ulcers and Eczema: Decoctionofleaves is antiseptic and used to wash ulcers and eczema
26.	*Moringaoleifer* Lamk.	Moringaceae	Sahinjna	Rheumatism and Influenza:Thecrushed bark boiled in mustard oil is used as a balm in acute

				rheumatic pain and its leaves are cooked as vegetable curry and are eaten in influenza.
27.	*Morusalba*Linn.	Moraceae	Shahtoot	It has protective effect of against atherosclerosis, liver and kidney disorders, and inflammation and Fever and Soar Throat.
28.	*Murraya koenigii* (L) Sprengel	Rutaceae	Kadipatta	Indigestion and Jaundice: Itsleavesas curry are used in indigestion and jaundice
29.	*Phyllanthus emblica* (L)	Phyllanthaceae	Aola	Its used antibacterial & astringent properties which help improve the body's immunity system. Indian Gooseberry also increases white blood cells which help flush out the toxins from the body.
30.	*Prunus dulci*(Mill.)	Rosasaceae	Badam	In cosmetics and personal care products, Oil is used in many different products including bath oils, lipstick, skin cleansing products, moisturizers, night skin care products and sunscreen products.
31.	*Psidium gaava* (L)	Myrtaceae	Jaam	It is for diarrhea, dysentery, gastroenteritis, hypertension, diabetes, caries, pain relief, cough, oral ulcers and to improve locomotors coordination and liver damage inflammation.
32.	*Santalum album* (L)	Santalaceae	Chandan	White sandalwood is used for treating the common cold, cough, bronchitis, fever, and sore mouth and throat. It is also used to treat urinary tract infections.

33.	*Sapindus mukorossi* (Gaertn.)	Sapindaceae	Reetha	It is used in Ayurvedic medicine to remove tan and freckles from the skin. It cleanses the skin of oily secretion and is even used as a cleanser for washing hair as it forms a rich, natural lather.
34.	*Saracaasoca* (Roxb.)De Wilde	Fabaceae	Ashok	Blood Dysentery, Diabetes and Syphilis: Its flowers are pounded and used in blood dysentery, diabetes and Syphilis.
35.	*Semecarpus anacardium* (Linn.)	Anacardaceae	Bibba, Bhilawa	he fruit and nut extract shows various activities like anti-atherogenic, anti-inflammatory, antioxidant, antimicrobial, anti-reproductive, and hair growth promoter.
36.	*Syzygiumcumini* (Linn.) Skects.	Myrtaceae	Jamun	To Increase Lactation: Its stembark about 3 gm mixed with root powder about 10 gm. of Anantmool *(Hemidesmus indicus)* is given with water on empty stomach within 3 days of delivery to increase lactation.
37.	*Tamarindus indica* (L)	Fabaceae	Imli, Chincha	The bark is astringent and tonic and its ash may be given internally as a digestive, Leaf extracts exhibit anti-oxidant activity in the liver, The leaves and flowers are used to make a sweetened tea that is drunk by children as a remedy for measle The fruit is aperient and laxative.
38.	*Tectonagrandis*Linn. f.	Verbenaceae	Sagon	Biliousness, Bronchities and Urinary Problems: The flowers are used in biliousness, bronchitis and urinary problems.
39.	*Terminaliaarjuna* (Roxb.)W.&.A	Combretaceae	Arjun	Sores, Ulcers and Earache: The leaves are used as a cover on sores and ulcers

				and their juice is dropped in earache.
40.	*Terminalia bellirica* (Gaertn.)(Roxb.)	Combretaceae	Behada	Its used in the treatment of diarrhoea, cough, hoarseness of voice, eye diseases and scorpion-sting and as a hair tonic.
41.	*Thevesia pruviana* (Pers. K.Schum)	Apocyanaceae	Peeli Kaner	Leaves and bark were macerated is taken to cure amenorrhoea. Toxicity, intermittent fevers The bark is a powerful antiperiodic and febrifuge
42.	*Zizyphusmauritiana*Lamk	Rhamnaceae	Ber	Gout and Rheumatism: The juice of the root bark is applied externally to gout andrheumatism.
43.	***Lantana camara***	Verbenaceae	Umbe laterna, Guphool	Medicinal properties of lantana, its leaves are used for treating malaria, chickenpox, asthma, ulcer, swelling, eczema, tumour, high blood pressure, bilious fever, sores, measles, fevers, colds and high blood pressure

IV. CONCLUSION

The area of Khuldabad has rich diversity of higher plants species and larger trees. Medicinal plants still play a key role in the health care of the local population. Plants commonly used as traditional medicines in rural areas of Khuldabad and are collected and used by the local population. It is evident from the interviews conducted in different villages, knowledge of medicinal plants is limited to traditional healers, herbalists and elderlypersonswhoarelivinginruralareas. The findings of this study predicted that, most of the medicinal plants used by the community of study area contain medicinal substances in the root, leaf and stem part of surveyed plants.

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Study On Idol Immersion and Its Impact on Water Quality

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ABSTRACT
India is a multicultural country with many festivals. Some of these celebrations end with an annual "idol immersion" in adjacent bodies of water. The toxic paints used to embellish the idols contribute significantly to environmental pollution because they include paints like varnish, water colours, and others that could significantly affect the quality of the water. Numerous toxic elements, including zinc, chromium, and lead, are present in the paints used to colour these statues which even have the potential to cause cancer. On the other hand Heavy metals harm the aquatic ecosystem.This points to a serious environmental issue, and protecting water bodies from this threat will require widespread public knowledge. Employing idols made of environmentally friendly natural biodegradable materials rather than organic pollutants.
Keywords: Idol immersion, Water pollution, Physico-chemical analysis, Deterioration.

I. INTRODUCTION

India is a diverse nation with numerous festivities. Some of these festivals culminate in a "idol immersion" in water. However, during the festivities, individuals frequently forget the negative consequences of the custom. Immersion in idols has a very negative effect on the environment including water. By contaminating the water and negatively harming the flora and animals, it upsets the natural equilibrium. We cannot live without water. However, water contamination is a significant global problem today.

Industrial waste water and urban sewage entering aquatic bodies cause water contamination. Furthermore, religious activities close to water bodies' banks endanger the ecosystem. India is a ritualistic nation, and idol immersion is a significant anthropogenic activity that pollutes various bodies of water, including lakes, reservoirs, ponds, rivers, canals, and seas.[1] These idols are typically made of clay, textiles, bamboo, and non-biodegradable materials like plastic, cement, plaster of Paris (PoP), paints, varnishes, and toxic dyes. They are also embellished with different polishes, ornaments, and beauty products.[2-3]

II. SCIENTIFIC EVIDENCE

Lead, cadmium, copper, iron, manganese, mercury, and zinc are among the heavy elements found in the chemical paints used to decorate these idols. Arsenic, chromium, and other inorganic and organic materials, changing the quality of the water. Heavy metal bioaccumulation causes a health risk for consumers by

moving harmful elements from producer to consumer level.[4-5] According to the findings of one study, the immersion of several idols has caused the Budhabalanga River's water quality to deteriorate. After the idol immersion, the concentration of calcium in the river water surged dramatically and returned to normal after one to two months, but it was still below the permitted limits. Ten days following the immersion of the idol, the concentration of metals such as magnesium, chromium, cadmium, lead, and arsenic has also dramatically increased in the river water.[6] The addition of both biodegradable and non-biodegradable materials reduces the lake's water quality and increases its silt load. After decomposing, the floating material released into the lake by the idol causes eutrophication.[7]

After decomposition, biodegradable material is recycled back into the system, whereas non-biodegradable materials become sediments. A potential future health risk results from the hazardous element moving from the producer to the consumer level of a heavy metal through non-bio-accumulation in biological systems.[8] Idol immersion led to toxic dye contamination in lakes, which ultimately has an impact on agricultural crops because this water is utilised for irrigation. As a result, after idol immersion, the amount of heavy metals that enter the food chain from fish to people increases, which is particularly important for ecotoxicology.[9]

III. RESULT AND DISCUSSION

According to the study, idol immersion has a significant impact on the lakes' fish populations and water quality, particularly with regard to heavy metals. Following the immersion of idols, the levels of heavy metals in lake water and the muscles of tilapia fish (Oreochromis mos sambicus) exceeded the levels that are safe for human consumption. By eating such fish, humans are exposed to these accumulated metals, which can offer greater health hazards to people.[10] Numerous religious activities are the main cause of the Tapi River's water quality decline. Because the plaster of paris, clothing, iron rods, chemical dyes, varnish, and paints used to create the idols harm the Tapi River's water quality, Ganesh idol immersion is also significant.[11]

According to the proposed investigation, idol immersion has a detrimental effect on the physical and chemical characteristics of water in the Chandrabhaga River such as pH temperature, TDS, total alkalinity, total hardness BOD,COD, Nitrates,Phosphates etc .[12] Various religious activities are the main reason for the change in water quality in the Budhabalanga River. Because the plaster of paris, clothes, iron rods, chemical colours, varnish, and paints used to create the idols degrade the water quality of the river Budhabalanga, Bosor, Odisha, the immersion of idols like the Lord Ganesh idol, the Goddess Durga idol, and the Lord Viswakarma idol plays a significant role.[13] The physico-chemical characteristics of the Tapi River at Nanpura Ovara that were measured during the immersion of Ganesh idols showed substantial changes both before and after the immersion. This ritual practise degrades the quality of the water, rendering it inappropriate for residential usage as safe drinking water and other purposes due to pollutants of various types. The natural chemical and biological processes may be impacted by changes in physico-chemical factors such as temperature, pH, and dissolved oxygen. This could lead to unfavourable conditions for a variety of aquatic biota.[14] Our study results showed that most of the water quality parameters like pH , DO, BOD, electrical conductivity, hardness total hardness etc monitored during and post idol immersion were found not in

normal limit.[15] It was discovered in one study conducted in Chhatri Lake, Amravati, Maharashtra, that all physiochemical parameters measured after idol immersion were 20–30 times greater than those measured before immersion. Numerous pollutants can cause the receiving water to taste and smell bad, making it unfit for home use.[16] Another study unequivocally demonstrates the harmful effects of idol immersions in aquatic bodies, particularly the use of P.O.P.-based idols. Immersion of idols has a significant impact on water quality, particularly with regard to heavy metals. The addition of both biodegradable and non-biodegradable materials reduces the quality of the water and increases the silt load in the water bodies. After accumulating, the floating debris released by idols into the water bodies causes eutrophication.[18]

IV. CONCLUSION

Variations in the various phyco-chemical parameters of the water bodies have an impact on the water quality, as does the contaminating presence of heavy metals and other dangerous substances employed in the manufacture and immersion of idols. This indicates a major environmental problem, and wide-scale public awareness is required to preserve water bodies from this hazard. In order to practice eco-friendly customs, it is also advised to employ idols made of environmentally friendly natural biodegradable materials rather than organic pollutants in natural water bodies without harming the religious sentiments as well as the ancient culture of our country. This would definitely helpful to aquatic eco-system and also public health.

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The Effect of Tobacco Smoke on Tracheal System of Cockroach

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ABSTRACT
In this study the effect of tobacco is examined on the tracheal tissues of cockroaches. It gives impact on the damage caused by continuous provided smoke or discontinuous provided smoke of tracheal network.
In the first case where smoke of tobacco given to cockroach in continuous manner caused less damage in tracheal network by destructing them slightly. In Second case where smoke of tobacco given to cockroach in discontinuous manner caused more damage in tracheal network by bursting them almost. The crude method is used to give smoke.
Keywords: -Tobacco smoke, Tobacco, Cigarettes, Smoke Products, Cockroach trachea, Nicotina tabacum.

I. INTRODUCTION

Tobacco is a plant, grown for leaves which are dried and fermented before being put in tobacco contains nicotine an ingredient that can lead to addiction, which is why many people who use tobacco find it difficult to quite. Tobacco is the common name of several plants in the Nicotina genus and the Solanacea family the general term for any product prepared from the cured leaves of the tobacco plant Nicotina tabacum scientific name. In this study the effect of smoke on tracheal tissues is examined. The effect of tobacco smoke or its constituents on cellular processes, viz, growth, cilia movement, and enzymatic reactions, has been reported for several cell types. [1]. There is strong and consistent evidence that passive smoking increases the risk of lung cancer.[2]. The impact of tobacco on the population's health status is enormous. [3]
Tobacco was first discovered by native people of “Mesoamerica” and south America and later introduced to Europe and the rest of the world On “October 15, 1492 Christopher Columbus” was offered tobacco leaves as a gift from the American in Indians that he encountered soon after sailors brought tobacco back to Europe and the plant was being grown all over Europe. It is associated with an increased disease rate in terms of periodontal bone loss, periodontal attachment loss, as well as periodontal pocket formation.[3] Smoking dramatically increases chance of developing lung cancer, COPD (Chronic Obstructive Pulmonary Disease), Heart disease, Stroke, Esophageal Cancer, and Oropharyngeal Cancer. The different types of smoke products are Cigarettes, Light and menthol Cigarettes, Cigars and Pipes, Hookahs, Bidis and clove cigarettes. The chemicals like Hydrogen cyanide, Formaldehyde, Lead, Arsenic, Ammonia, Radioactive elements such as Uranium and Benzene are used.

II. MATERIALS AND METHODS

In this study cockroaches were collected from grocery shop by crude method. Cockroach was kept in starve condition for 2 days before giving smoke to them. The cockroach was kept in glass jar with cotton balls in it. The jar cap was covered with thin net cloth. The smoke was Prepared in a soil Pot. The smoke was prepared in by Crushing cigarette in soil pot. Then a burning coal was kept which created smoke in a soil pot. The smoke prepared in soil was transferred to the jar by keeping jar inverted at the top of soil pot.

The insect exposed to the smoke when continuously smoke given to cockroach its movements become very fast and then after completing the smoke procedure the insect become weak its movement become slow and after 5/10 minutes that insect died. This is happened just because of smoke of 13 cigarettes are given to cockroach after smoking 13 cigarettes contiguously that inset become weak not die because of it is more strong and after 5-10 minutes it's movement is continue and after some time insect died.

Another process by taking another cockroach and given to smoke discontinuously like time intervals 3 days smoke given to cockroach at particular time like morning evening and night 3 times one cigarette is given to cockroach after 3 days of smoke exposure cockroach died

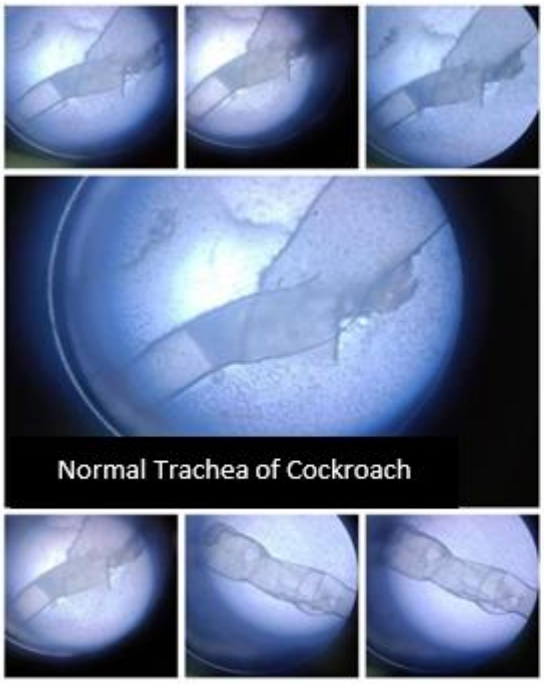
III. RESULTS

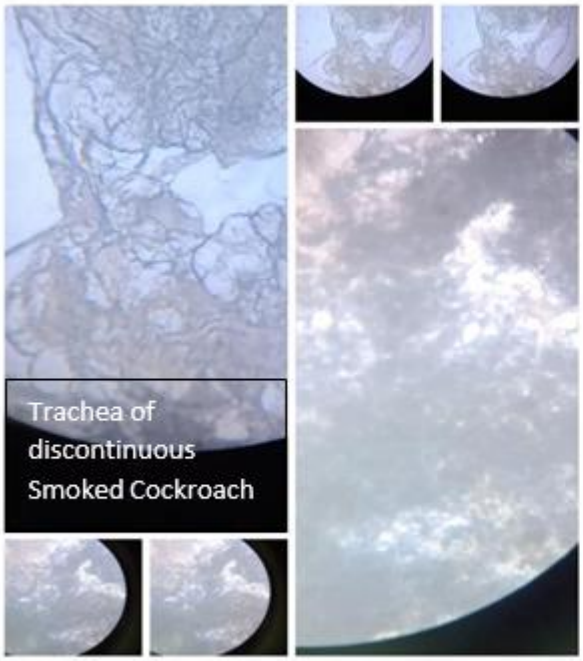
Continuous Smoke tracheal system showed following changes:

1. Tracheal network gets partly damaged.
2. Body become slightly delicate.
3. Tracheal tubes were observed partially.
4. The tube of tracheal walls were looking darker than normal ones.

Discontinuous Smoke tracheal system having following characteristics:

1. Tracheal network was broken down.
2. Body becomes highly delicate.
3. Tracheal tube were completely disappeared.
4. Tracheal walls lining were even broader.
5. Trachea got damaged at high rate.





IV. DISCUSSION

The main purpose of this study is to examine the difference between normal tracheal systems of cockroach and smoked cockroaches either by continuous or discontinuous method. This study show the harmful effects on the tracheal system of cockroach the discontinuous smoke processes is completely damaged the cockroach

tracheal system at very high rate. The normal tracheal system has branching of tubes which facilitates respiration in cockroaches, after giving smoke these tubes get ruptured in continuous method as well as in discontinuous method. In continuous method the tubes break off in fewer pieces, while in discontinuous method the tube break down in more pieces.

V. CONCLUSION AND FUTURE SCOPE

Exposure to environmental tobacco smoke (ETS), which contains potent respiratory irritants, may lead to chronic airway inflammation and obstruction. [4] The normal tracheal system in insect is tubular network used for respiratory mechanism that has simple diffusion mechanism. The main tracheal Trunk in cockroach is tubular structure of about 12cm in length 2.5 cm diameter, surrounded by haemolymph. So this study concludes the difference of continuous and discontinuous smoke, the continuous smoke damages the tracheal tubes but not at high level, the discontinuous smoke totally damaged or ruptured the tracheal tube. The best approach to assess ETS exposure will depend on the aim of the study, the health outcome, and the resources. [5] This study will be helpful for understanding the harmful effect of tobacco smoke on insect respiratory system. It will be also giving the differentiation between continuous provided smoke impacts whereas discontinuous provided smoke impact on tracheal system. Thousands of substances are found in tobacco, among them several carcinogens. The alkaloid nicotine is a well-known substance in tobacco as well as heavy metals such as cadmium and lead. [6] The metabolic syndrome predicts future coronary artery disease and type II diabetes and often emerges in childhood. Tobacco smoke potentially contributes to insulin resistance in this syndrome. [7]

Tobacco smoke is a risk factor for Chronic Obstructive Pulmonary Disease and a major public health problem. [8]

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Ethno Medico Botanical Study of Bhairudevrai (Sacred Grove) Pat, Mandangad

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ABSTRACT
Devrai or Sacred grove is ancient protected areas for the sake of conservation. These groves are associated with many beliefs and disbeliefs which create either fear or devotional attitude in people resulting in conservation of plants within it. BhairuDevrai is also an similar structure of conserved forest by local tribes. Situated in Konkan region it is rich in its biodiversity. This Devrai comprises many plant species which are more or less used as medicinal plants and have with fauna associated with these plants. Present research was focused on Ethno Medico Botanical study of plants known and unknown by tribes of Pat, Mandangad.
Keywords: Ethno Medico Botanical, Devrai, conservation, Mandangad.

I. INTRODUCTION

Sacred groves are areas which are traditionally conserved for sustainable utilization of natural resources. It is social institution which permits management of biotic resources through people's participation. The vegetation of Tal.Mandangad Dist. is very rich due be the good tradition practices like preservation of forest by naming them with synonyms of god and goddess. The sacred groves are important due to inadequate medical facilities to the local people which go to traditional medical practitioner for their treatment for simple diseases fever, piles, cold, headaches, diabetics, jaundice etc. These practitioners prescribe different parts of medicinal plants like root, leaves, bark and stem etc for the treatment necessary.
The present study was conducted for the documentation and search of indigenous traditional knowledge from the sacred groves of Pat village. The 'Pat' sacred grove is an extensive area which covers about 18.01 hectors of area under forest. It is conserved area in the name of goddess '*Bhairee*'.

II. METHOD AND MATERIALS

A detailed survey of medicinal plants of 'Pat' sacred groves was conducted during academic year 2011-12. The information of sacred grove was gathered with the help of published literature as well as personal visits to the department in the Mandangad Tehsil. Ethno-medico botanical survey of the selected study area was conducted by visiting several times during year. At the same time, fist hand information was collected from

the local practitioner such as vaidoos for medicinal uses of plants. The tribal herbalists were taken individually to be sacred groves where they pointed out the herbs/plants that which they used to cure different aliment. The herbalists were then interviewed orally on the spot by using a questionnaire in Marathi. All the plants specimens were identified with the help of different floras and photo identics. The field data was collected for plants part used. The local name of plants was recorded. All data was recorded in the tabular form.

III. RESULT AND DISCUSSION

Table1 List of Plants studied

Family	Botanical name of plant	Local name	Used part	Used in
Acanthaceae	*Jasticiaadhatoda* L.	Adulsa	Leaves	Cold, Cough
Amaranthaceae	*Celosia argentea*	Kurdu	Seed	Urinary calculus
Amaranthaceae	*Achyranthusaspera*	Aghada	Root, leaves	Infertility in females
Anacardiaceae	*Mangiferaindica*	Mango	Young leaves	constipation
Apocynaceae	*Holarrhena pubescence*	Pandhrakuda	Leaves, legume	Diarrhea
Apocynaceae	*Rauvolfiaserpentia*	Sarpagandha	Root	Snake bite
Apocynaceae	*Thevatianeriifolia*	Pivalikaner	Flower latex	Mumps
Apocynaceae	*Pulmeriarubra*	Pandharachampa	Flower &Adv root	Mumps
Bignoniaceae	*Oroxylumindicum*	Tetu	Bark	Nagin
Caesalpinaceae	*Cassia tora*	Takala	Leaves	Abdominal pain
Comkbretaceae	*Calycopteris floribunda*	Baganvel	Leaves	Dysentery& Ulcer
Compositive	*Eliphantousscaber*	Hastipata	Root	Wound
Crassulaceae	*Kalanchoepinnata*	Panphuti	Leaves	Kidney stone
Cucurbitaceae	*Momordicachranta*	Kartule	Leaves & Fruit	Diabetes
Euphorbiacea	*Jatropacuecas*	Yerand	Leaves	Jaundice
Euphorbiacea	*Ricinuscommunis*	Errand	Leaves	Jaundice
Euphorbiaceae	*Brideliaretusa*	Asana	Bark	Wound
Fabaceae	*Abrusprecatorius*	Gung	Leaves& Seed	White discharge
Fabaceae	*Dalbergia 1candanatensis*	Garudvel	Leaves	Insecticidal agent
Fabaceae	*Smithea sensitive*	Kovala	Leaves	Edible leaves
Laminacea	*Oscimumtenuiflorum*	Tulus	Leaves	Cold, cough, fever & asthma
Laminaceae	*Osmium gratissimum*	Sabja	Seed	Cooling agent
Liliaceae	*Aloe vera*	Khorpad	Leaves	Cold & cough,

Lithraceae	*Woodfordiafruticosa*	Dhayati	Leaves & flower	Dysentery, herbal tea
Malvaceae	*Thespesia lampas*	Ranbhendi	Root	Snakebite
Malvaceae	*Hibuscusrosa-sinesis*	Jaswand	Flower	Hair falling
Menispermaceae	*Tinosporacordifolia*	Gul-vel	Stem	Snakebite
Mimoceae	*Acacia catechu*	Khair	Bark	Mouth
Moraceae	*Ficusexasperta*	Leaves	Pimples	Cardiac tonic, cooling agent
Moraceae	*Ficushispidol*	Bhui-umber	Bark	Jundice
Moraceae	*Ficusracemosa*	Umber	Bark	Ringworm
Myrataceae	*Psidiumguaiava*	Peru	Leaves	Sore throat
Myrataceae	*Syzygiumcuminia*	Jambhul	Leaqves& seed	Diabetes
Nyctaginaceae	*Boerhaviarepens*	Punarnava	Leaves	Inflammation in Kindney
Nyctaginaceae	*Nictanthes arbor*	Parijatak	Leaves	Cold
Periplocaceae	*Hemidesmusindicus*	Anatvel	Root	Blood circulation
Piperceae	*Piper nigrum*	Kalimiri	Seed	Cold, Worm
Rubiaceae	*Haldinacordifolia*	Hedu	Leaves	Stomach infection
Rutaceae	*Aeglemarmelon*	Bael	Leaves,& Fruit	White discharge
Solanaceae	*Daturainoxia*	Dhotra	Levves	Joint pain
Sterculaceae	*Helicteresisora*	Murudseng	Pod	Abdomen , Bal-guti
Verbenaceae	*Clerodendrumserratum*	Bharang	Root	Snake bite
Verbenaceae	*Lantinacamara*	Ghaneri	Leaves	Wound
Verbenaceae	*Vitexnegundo*	Nirgundi	Leaves	Joint pain
Verbenaceae	*Vitexnegundo*	Katrinigad	Leaves	Joint pain

The data analysis show that six species used on white discharge. Six plant species are used on cold and cough. Five plant species are used on applied on wound. Four plant species are used on Jaundice. Three plant species are used on joint pain. Three plant species are used on snake bite. Three plant species are used on dysentery and diarrhea. Three plant species are used on skin diseases. Two plant species are used on urinary calculus. Two plant species are used on mump. Two plant species are used on stomach infection.Two plant species are used on abdominal pain. One plant used on naginThe present investigation is pertaining to the result of studies in 'Pat' Sacred Grove of Mandangad,Dist- Ratanagiri.Majority of plants are used on common known diseases like pain, cold, cough, acidity, snakebite, stomach infection, viral infection and weakness. Similar observation were made by Behera*et al.*, (2015). This Sacred grooves play an important role conservation of plants. It is a sustainable method of environmental conservation. Study conducted by Behera*et al.*, (2015), Basha*et al.,*(2002) showed similar observations. Sacred grove studied was climax forests and is the only

representatives of natural or near-natural vegetation, similarly stated by Basha*et al.,* (2002). Nipunage and Kulkarni 2010.

IV. CONCLUSION

The present status of sacred groves is critical due to presence of grazing animals, agricultural practices and modernization. There is also a lack of government policies or lack of its implementations. Being an important draft for sustainable conservation, devrais are to be well studied and conserved. It is more likely as conserving conserved forest.

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Micropropagation Studies In Philodendron (Philodendron Bipinnatifidum)

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ABSTRACT
Philodendron is of great interest due to their indoor and outdoor decorative value.This study was initiated to induce shoot from nodal explants of Philodendron. Multiple shoot formation was induced from excise nodal explants, on Murashige and Skoog medium with concentration of 6-benzylaminopurine (BAP) treatments. The maximum shoot length (3±0.29 cm) was observed with I5 which contain 4mg/l concentration of BAP treatment with in 6 weeks were obtained in growth chamber at 24±2°C with light source of 2500 lux for 16hr/day. When shoots were produced in vitro were subculture to multiply on fresh medium with different concentration of BAP & IAA. After about 6 weeks about (10±0.70) shoots & max length (3.2±0.16 cm) was obtained with media supplemented with M2 supplemented with 2.0 mg/l BAP along with 0.5 mg/l IAA. MS medium containing 1.0 mg/l concentration of IBA was found to be satisfactory for roots induction resulted in (3±0.27 cm) root length and (4±0.44) average no. of roots were observed.

Keywords: Philodendron; Micropropagation; Growth Regulator; In Vitro; BAP; IAA; IBA.

I. INTRODUCTION

Plant Tissue Culture and genetic engineering are the two most widely used methodsfor crop improvement in plant breeding. Plant tissue culture is an emerging tool for plant biotechnology and implied for the propagation of some economicallyimportant crops of agriculture, horticulture, forestry, endangered, rare and threatened plants.

Philodendron is large genus of flowering plants in the Araceae family consiting of about 900 species according to TROPICOS (a service of the Missouri Botanical Garden) other sources quote different number of species: S.J. Mayo reports about 350-400 formally recognised species whereas Thomas Croat lists about 700. Taxonomically, the genus is philodendron is still poorly known with many undescribed species. Many are grown ornamental and indoor plants. The name derives from the Greek words philo or love and Dendron or tree. They are commonly called by their generic name

Classification

Table 1.1 Classification of *Philodendron bipinnatifidum.*

Kingdom	Plantae
Division	Angiosperms
Class	Monocots
Order	Alismatales
Family	Araceae
Subfamily	Aroideae
Genus	Philodendron
Species	P. bipinatifidum

II. MATERIAL AND METHODS

The present investigation entitled,"Micropropagation studies in Philodendron (*Philodendron bipinnatifidum)"* was conducted at College of Agriculture, Loni.

2.1. Collection of plant materials

The explant was collected from Plant Nursery at College of Agriculture, Loni. Mother plants of Philodendron nodal segment 1-2cm explants taken from mother plants as that long was suitable for sterilizationprocedures.

2.2. Media preparation

According to the available literature on Micropropagation of Philodendron plants, Murashige and Skoog (1962) medium is the most commonly used growing medium for Philodendron. The procedure for composition of 1 liter MS medium is given as follows-

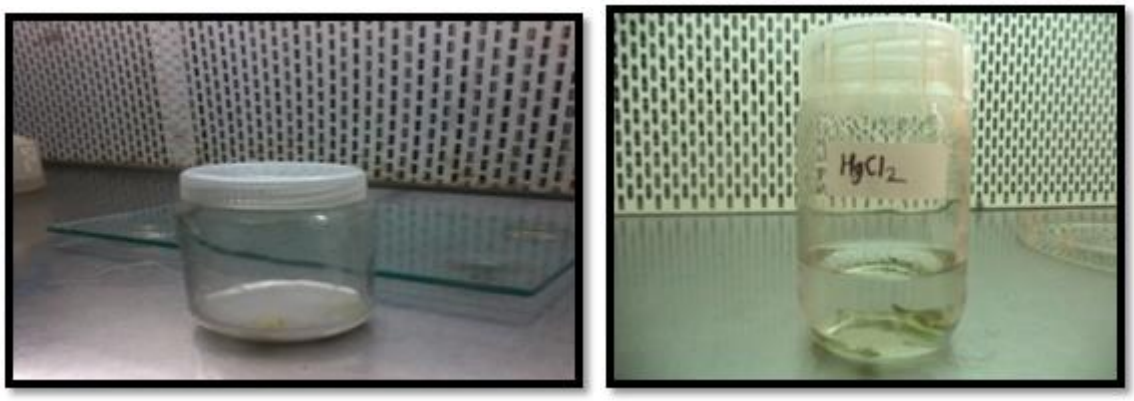
1. Dissolved 30g of sucrose and 100 mg inositol in approximately 200 ml in DDH_2O.
2. After sucrose and inositol dissolution, the stock solutions were added in following order and mixed well.
    1. Stock solution A (macronutrients) - 50 ml
    2. Stock solution B (micronutrients) - 5 ml

3. Stock solution C (Iron) - 5 ml
4. Stock solution D (vitamin) - 1 ml
5. Stock solution E (KI) -1ml
6. Stock solution F (glycine) -1ml
3. Then adenine sulphate and growth regulators were added (in case of modified MS medium).
4. pH of liquid medium was adjusted at 5.6-5.8 with the help of 1N NaOH or 0.1N HCL.
5. The volume was made up to 400 ml with D.W.
6. In another flask 5gm agar was added to the 300 ml of DDH_2O. The agar was heated at 60^0C to dissolve completely.
7. The heated agar solution was added to the stock solutions and mixed thoroughly.
8. The total volume was made up to 1000 ml by addition of DDH_2O.
9. The culture medium was poured into culture bottles (25-30 ml in each bottle approximately) and bottles were capped and autoclaved at 121^0C at 15 lbs. pressure for 15 to 20 minutes.After sterilization, the medium was cooled to room temperature and stored in cool and dry place until use.

2.2.1. Surface sterilization

1. Selection of explant (Nodal segament)
2. Cutting of explant into appropriate size (1-2cm)
3. Explantwashed under running tap water for 30 min.
4. Explant treated with Bavistin 0.1% for 10 min.
5. Explant washed with distilled water for 20 min.
6. Explant treated with tween-80 for 10 min.
7. Explant washed with distilled water for 20 min.
8. Again treated with Bavistin for 5 min.
9. Explant treated with 70% Ethanolfor 30 sec.in LAF.
10. Explant washed with sterile distilled water 3 times.
11. Explant treated with 0.1% $HgCl_2$ for 4 min.
12. Explant werethroughly washed with sterile distilled water for 4-5 times.

0.1% Bavistin treatmentTween 80 treatment



70% Ethanol0.1% HgCl2treatmen

Plate3.3 Surface sterilization

2.2.2. Inoculation of explants

The instruments like scalpels, forceps were sterilized by an alcoholic dip followed by flaming inside the laminar air flow cabinet. Other requirements like bottles, conical flasks, cotton, distilled water etc. were sterilized by steam sterilization method. Before the onset of inoculation, hands were washed thoroughly by soap and then swabbing with 70% Ethanol. Initiation media (5liter) divided in to 5 parts as given below. Each part contains 1 liter MS medium. All five parts contains different concentrations of growth regulators.

Table 2.1 Media Combination For Initiation

Sr. no	Media combination	Code
1	MS Medium	I_1
2	MS Medium + 1 mg/l	I_2
3	MS Medium + 2 mg/l	I_3
4	MS Medium + 3 mg/l	I_4
5	MS Medium + 4 mg/l	I_5

After surface sterilization, explants were transferred to large sterile glass plate having sterile cardboard paper on it, with the help of sterile forceps under strict aseptic conditions in laminar air flow cabinet. Then explants were cut into very small pieces (about 1cm) with sterile scalpel. The bottles containing initiation medium prepared as given in were unplugged by holding them over spirit lamp and inoculations were performed by placing explants on the surface of the medium with the help of flame sterilized long forceps and replacing the cap of the bottle.

2.2.3. Incubation of culture

The inoculated culture bottles were incubated at 24± 2^0C temperature for 16 hours light and 8 hours dark per day in 2000-3000 Lux light intensity under cool fluorescent white light in the culture room.

2.2.4. Shoot Multiplication (6 weeks)

Shoot multiplication was carried out using the 3-4 cm long and most vigorous shoots from the initiation stage. Stem nodal segments were cut in 1-2 cm size and cultured on shoot multiplication media Shoot multiplication media (5 lit.)were divided in to 5 parts as given below. Each part contains 1 litre MS medium. First part was free from growth regulators and remaining four parts contains different concentrations of growth regulators (BAP and IAA).

Table 2.2 Media combinations for shoot multiplication

Sr.no	Media Combination	Code
1	MS Medium	M_1
2	MS Medium + 1 mg/l BAP + 0.5 mg/l IAA	M_2
3	MS Medium + 2 mg/l BAP + 0.5 mg/l IAA	M_3
4	MS Medium + 3 mg/l BAP + 0.5 mg/l IAA	M_4
5	MS Medium + 4mg/l BAP + 0.5 mg/l IAA	M_5

Shoot proliferation was determined after six weeks of culture. Data were recorded in terms of average shoots length (cm), average number of shoots per explants.

2.2.5. Rooting (4 weeks)

Rooting was carried out using 2-3 cm long and most vigorous shoots from the shoot multiplication stage. Stem nodal segments were cut in to 1-2 cm size and cultured on rooting media.

Table2.3. Media Combination For Rooting

Sr. No	Media combination	Code
1	MS Medium + 0.5 mg/l IBA	R_1
2	MS Medium + 1.0 mg/l IBA	R_2
3	MS Medium + 1.5 mg/l IBA	R_3
4	MS Medium + 2.0 mg/l IBA	R_4

The following data were recorded after 4 weeks of culture on the rooting media in terms of average root length (cm), average number of roots per explants.

III. RESULTS AND DISCUSSION

3.1. Establishment of philodendron *in vitro*

Shoot initiation and establishment fromPhilodendronnodal segment explants are cultured on MS basal and MS supplemented with different concentration of growth hormones. BAP 1.0mg/l, 2.0mg/l, 3.0mg/l, 4.0mg/l was successfully used. In present work same media concentrations has been used.

Data were obtained after 6weeks of initiation of culture showed that nodal segment Philodendronof could be established at all tested media including the control medium (free from growth regulators). The best resultswas obtained on MS medium supplemented with 4mg/l BAP. The shoot length (average shoot length 3.0±0.29 cm) was observed on medium containing on media supplemented with 4 mg/l BAP showed in (Table 3.1.).

Table 3.1.Effect of various combinations of hormone such as BAP on sprouting of bud by using nodal segment explant of Philodendron

Sr. No.	Media combinations	Media Code	Average Length of shoot (in cm) (Mean ± SE)	%Survival (in %)
1.	MS medium	I1	1.2±0.07	60
2.	MS + 1 mg/l BAP	I2	1.9±0.10	65
3.	MS + 2 mg/l BAP	I3	2.5±0.12	75
4.	MS + 3 mg/l BAP	I4	2.1±0.1	70
5.	MS + 4 mg/l BAP	I5	3.0±0.29	80

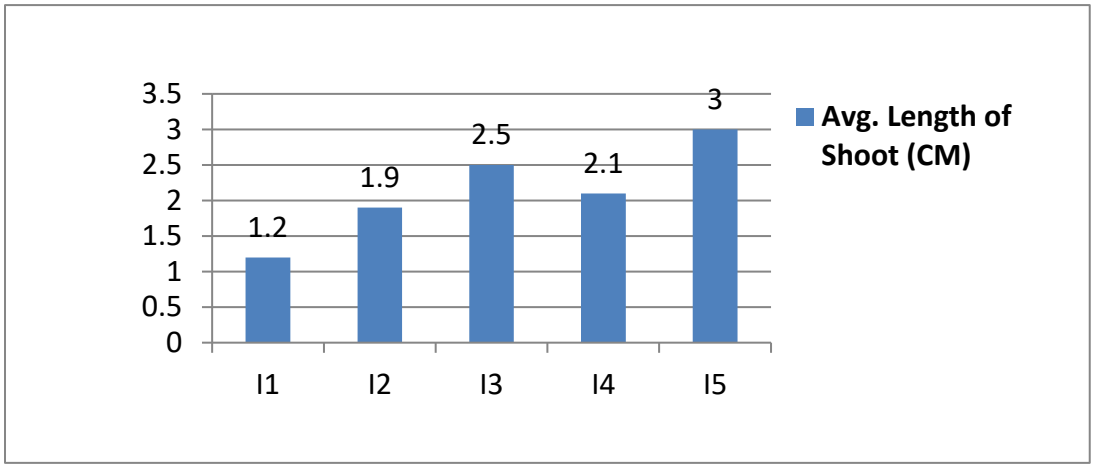


Fig. 3.1.Effect of various combination of growth hormone on sprouting of bud .

Plate 4.1. Result of initiation

3.2. Shoot multiplication

After 6 weeks of growth cycle, established cultures were subjected to different media concentration for multiplication. The shoot initials obtained from the *in vitro* established cultures were subjected to be multiplied. The shoot numbers per explant and shoot length varied under various cytokinins concentrations and combinations.

According to study of Jirakiattikul and Limpradithtanont (2006), for multiplication different combinations of BAP + IAA had been used. BAP 1.0mg/l, 2.0mg/l, 3.0mg/l, 4.0mg/l and IAA 0.5 mg/l was successfully used. The highest multiplication ratio was obtained on MS medium supplemented with 2mg/l BAP and 0.5 mg/l IAA. The maximum number of shoots (average number of shoots 10±0.70) and best shoot length (average shoot length 3.2±0.16cm) was observed on media containing 2mg/l BAP and 0.5 mg/l IAA(Table 3.2).

Table 3.2.Effect of various combinations of hormone such as BAP and IAA on multiple shoot formation by using sprouted bud of nodal segment of Philodendron

Sr. No.	Media combinations	Media Code	Average number of shoot (Mean±SE)	Average shoot length(cm) (Mean±SE)	%Survival (in%)
1.	MS medium	M1	4±0.31	1.9±0.10	60
2.	MS + 1 mg/l BAP +0.5 mg/l IAA	M2	6±0.54	2.6±0.07	70
3.	**MS + 2 mg/l BAP +0.5 mg/l IAA**	**M3**	**10±0.70**	**3.2±0.16**	**75**
4.	MS + 3mg/l BAP +0.5 mg/l IAA	M4	5±0.70	2.5±0.08	70
5.	MS + 4 mg/l BAP +0.5 mg/l IAA	M5	8±0.70	3.0±0.21	65

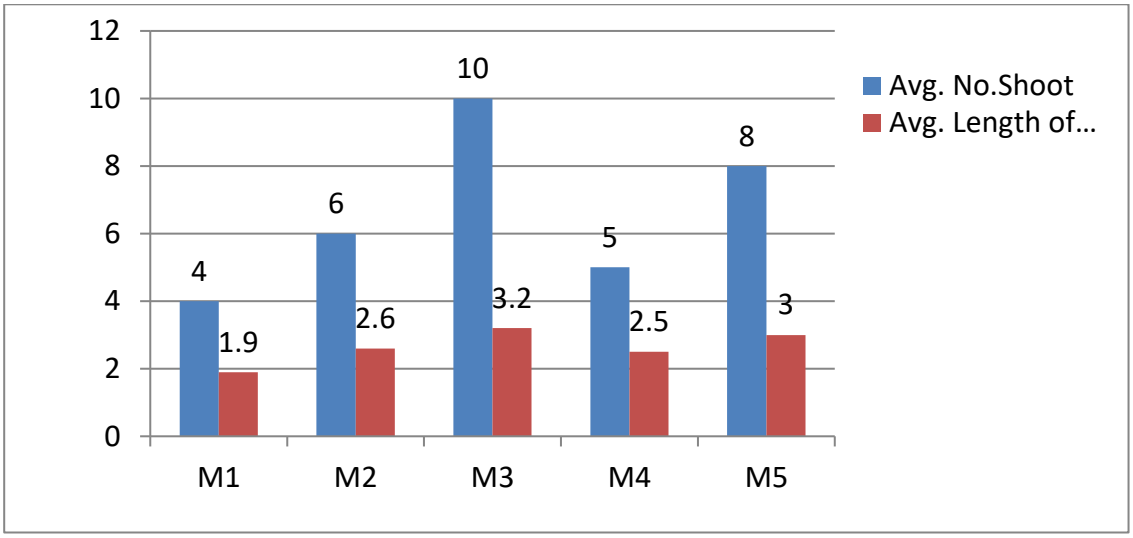


Fig. 3.2.Effect of BAP and IAA on multiple shoot formation using sprouted bud

Plate 3.2. Result of shoot multiplication

Rooting

Multiplied shoots were then transferred to fresh media for root induction.

The best results of rooting observed on MS supplemented with 1.0mg/l IBA.The maximum number of roots was obtained on MS medium supplemented with 1.0mg/l IBA (average number of roots 4±0.44) and (average length of roots 3±0.27 cm) showed-

Table 3.3.Effect of various combinations of auxins such as (IBA) on root induction from isolated multiple shoots of Philodendron

Sr.No	Media combination	Media code	Average Number of Roots (Mean±SE)	Average Length of Roots(cm) (Mean±SE)	% Survival
1	MS+0.5mg/l IBA	R1	2±0.31	1.7±0.20	70
2	MS+ 1.0 mg/l IBA	R2	4±0.44	3.0±0.27	85
3	MS+ 1.5 mg/l IBA	R3	3±0.44	2.7±0.07	75
4	MS+ 2.0 mg/l IBA	R4	2±0.31	2.3±0.12	65

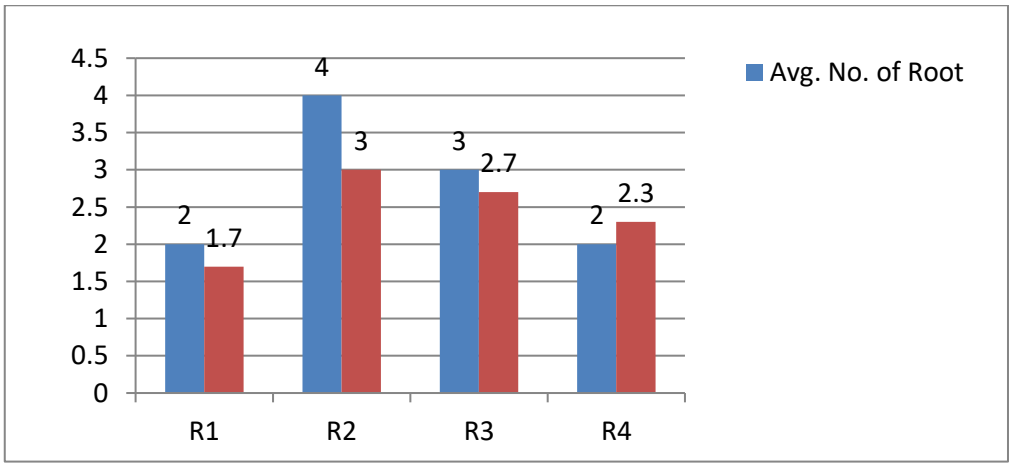


Fig 3.3Effect of IBA on root induction

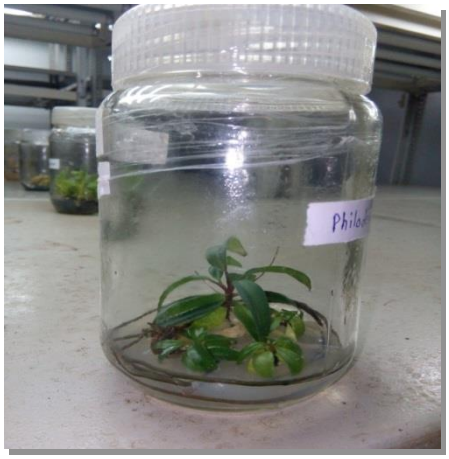


Plate 3.3 Result of rooting

IV. CONCLUSION

Using nodal segment of *in vitro* grown plant as explant source could be efficiently for rapid micropropagation to get multiple shoot and plantlets of philodendron. The production of large number of Philodendronplants were possible through *in vitro* propagation technic. In PhilodendronMS medium containing 4.0 mg/l BAP was the best for culture initiation.

In PhilodendronMS medium containing 2.0 mg/l BAP and supplemented with 0.5mg/l IAAwas most suitable for shoot multiplication. Improvement in shoot multiplication was observed by different concentrations of BAP (0.0, 1.0, 2.0 3.0, 4.0 mg/l) and IAA (0.5 mg/l). Best shooting response was observed on medium containing 2.0 mg/l BAP+0.5mg/l IAA (average number of shoots 10±0.70 andaverage shoot length 3.2±0.16cm).

The MS medium supplemented with different concentrations of auxin (IBA) The concentration of auxin were 0.5 mg/lit, 1.0 mg/lit, 1.5 mg/lit, 2.0 mg/lit taken after 4 weeks the best result obtained from the 1.0 mg/lit IAB. The average length of ofroots (3±0.27 cm) and average no. of roots (4±0.44) were formed.

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Python Programming For Solving Mathematical First Order Differential Equations

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ABSTRACT
A differential equation is an equation involving an unknown function y(t) and its derivatives y' ,y'' ,⋯, and the order of a differential equation is the highest order derivative of y(t) appearing in the equation. There are methods to solve first order equations which are separable and/or linear however most differential equations cannot be solved explicitly with elementary functions. We can always use graphical methods and numerical methods to approximate solutions of any first order differential equation.
Keywords: - Differential Equations, Euler's Method, Python Function and Python Programming.

I. INTRODUCTION

In mathematics, a **differential equation** is an equation that relates one or more unknown functions and their derivatives.[1] In applications, the functions generally represent physical quantities, the derivatives represent their rates of change, and the differential equation defines a relationship between the two. Such relations are common; therefore, differential equations play a prominent role in many disciplines including engineering ,physics economics, and biology.
Mainly the study of differential equations consists of the study of their solutions (the set of functions that satisfy each equation), and of the properties of their solutions. Only the simplest differential equations are solvable by explicit formulas; however, many properties of solutions of a given differential equation may be determined without computing them exactly.
Often when a closed-form expression for the solutions is not available, solutions may be approximated numerically using computers. The theory of dynamical systems puts emphasis on qualitative analysis of systems described by differential equations, while many numerical methods have been developed to determine solutions with a given degree of accuracy with Python Programming

```
import numpy as np
import matplotlib.pyplot as plt
```

II. LINEAR DIFFERENTIAL EQUATIONS

A first order differential equation is linear if it is of the form

$$y' + p(t)y = q(t)$$

for some functions p(t) and q(t). For example, the equation

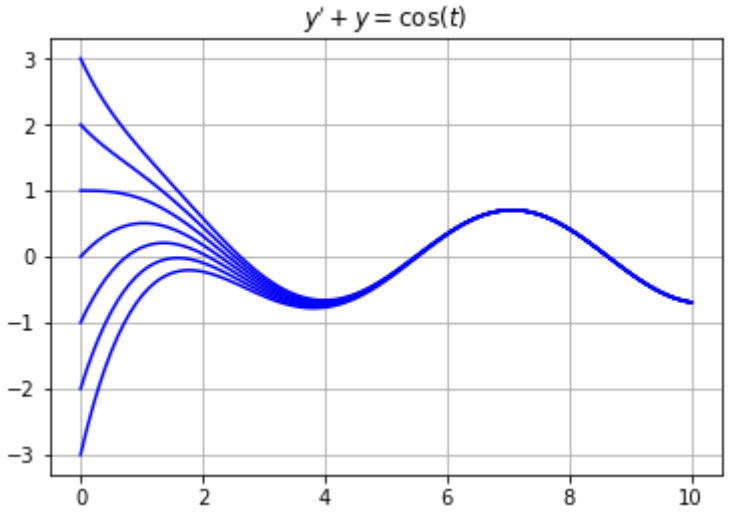
$$y' + y = \cos(t)$$

is a first order linear equation. Use the method of the integrating factor to compute the general solution

$$y(t) = Ce^{-t} + \frac{\cos(t) + \sin(t)}{2}$$

The constant C is determined by the initial value $y(0) = C + \frac{1}{2}$ Plot the solution y(t) over the interval $0 \le t \le 10$ for each initial value $y(0) = -3, -2, -1, 0, 1, 2, 3$.

```
t = np.linspace(0,10,100)
for y0 in range(-3,4):
C = y0 - 1/2
y = C*np.exp(-t) + (np.cos(t) + np.sin(t))/2
plt.plot(t,y,'b')
plt.title("$y' + y = \cos(t)$"), plt.grid(True)
plt.show()
```



Notice that all solutions in this example converge to the solution

$$y(t) = \frac{\cos(t) + \sin(t)}{2}$$

as $t \to \infty$.

Separable Equations

A first order equation is separable if it is of the form

$$y' = f(t)\, g(y)$$

for some functions f(t) and g(y).

For example, the equation

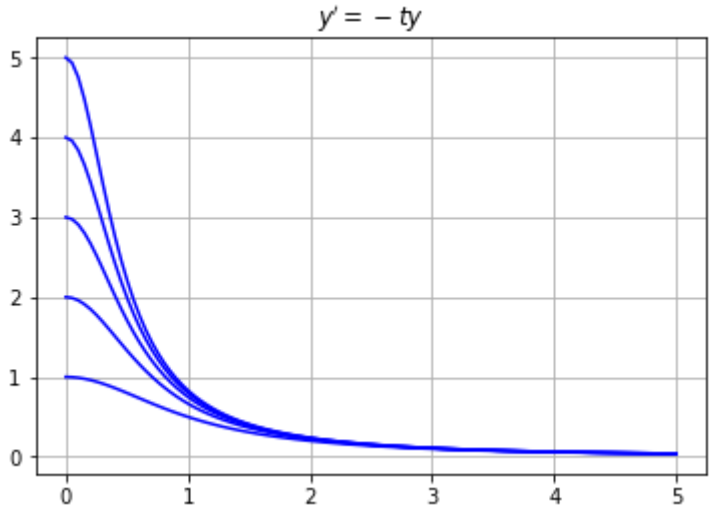
$$y' = -2ty^2$$

is a first order separable equation. Note that the equation is nonlinear. Use the method of separation of variables to compute the general solution

$$y(t) = \frac{1}{y2+C}$$

The constant C is determined by the initial value y(0)=1/C (except y(t) =0 if y(0) =0). Plot the solution y(t) over the interval $0 \le t \le 5$ for each initial value y(0) = 1,…,5.

```
t = np.linspace(0,5,100)
for y0 in range(1,6):
C = 1/y0
y = 1/(t**2 + C)
plt.plot(t,y,'b')
plt.title("$y' = -ty$"), plt.grid(True)
plt.show()
```



Notice that all solutions in this example converge y(t)→0 as t→∞.

Autonomous Equations

A first order equation is autonomous if it is of the form

$$y' = f(y)$$

where the right side f(y) does not depend on the independent variable t. Note that an autonomous equation is also separable. For example, the equation

$$y' = y(1- y)$$

is a first order autonomous equation. Compute the general solution using separation of variables

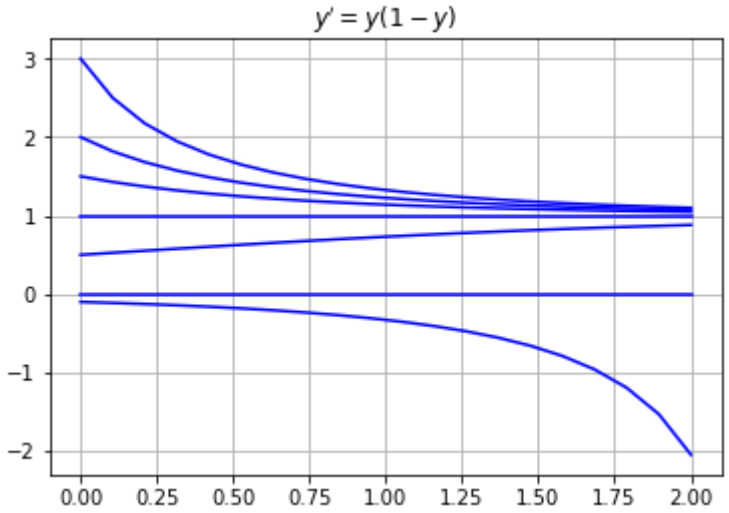
$$y(t) = 1+ Ce^t$$

$$y(t) = \frac{Cet}{1 + Cet}$$

The constant C is determined by the initial value y(0) = C / (1+C) (except y(t) = 0 when y(0) =1). Plot the solution y(t) over the interval $0 \le t \le 2$ for each initial value

$$y(0)=-0.1,0.0,0.5,1.0,1.5,2.0,3.0$$

```
t = np.linspace(0,2,20)
for y0 in [-0.1,0.0,0.5,1.5,2,3]:
C = y0/(1 - y0)
y = C*np.exp(t)/(1 + C*np.exp(t))
plt.plot(t,y,'b')
plt.plot([0,2],[1,1],'b') # Plot constant solution y(t)=1
plt.title("$y' = y(1-y)$"), plt.grid(True)
plt.show()
```



Notice that all solutions y(t) with intial value y(0) >0 converge y(t) →1 as t →∞. Also y(t) = 0 for all t if y(0) = 0. Finally y(t)→ −∞ as t→∞ if y(0) <0.

Slope Fields

In the examples above, we were able to find the general solution of the first order differential equation and plot the solution for different initial values. However most differential equations cannot be solved explicitly with elementary functions. So what do we do? We can *always* approximate solutions with numerical methods and graphical methods.

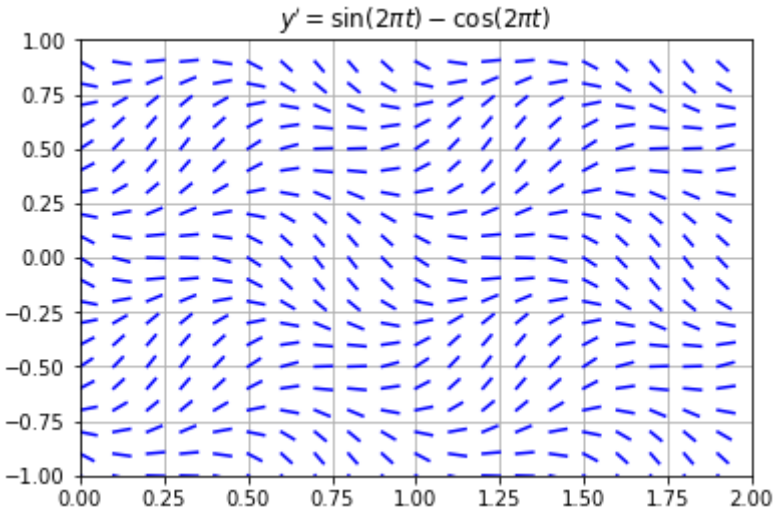
The slope field of a first order differential equation y'= f(t,y) is a graphical method for visualizing solutions. The idea is that an equation y'= f(t,y) gives us complete information about the slope of a solution at any point even if we don't know a formula for the solution. Create a slope field by simply drawing a small line of slope f(t,y) at various points (t,y) in a grid in the ty-plane.

For example,

plot the slope field of y' = sin(2πt) – cos(2πy) in the range –1 ≤ t ≤ 2, –2 ≤ y0 ≤ 2 with grid step size h=0.1.

```
f = lambda t,y: np.sin(2*np.pi*t) - np.cos(2*np.pi*y)
h = 0.1; L = 0.5*h;
t_grid = np.arange(0,2,h)
```

```
y_grid = np.arange(-1,1,h)
for t in t_grid:
for y in y_grid:
m = f(t,y)
theta = np.arctan(m)
plt.plot([t,t + L*np.cos(theta)],
[y,y + L*np.sin(theta)],'b')
plt.title("$y' = \sin(2 \pi t) - \cos(2 \pi t)$")
plt.grid(True), plt.xlim([0,2]), plt.ylim([-1,1])
plt.show()
```



The slope field allows us to describe the behaviour of solutions. For example, estimate the value y(2) for the unique solution y(t) of the equation y'= sin(2πt) − cos(2πt) satisfying the initial condition y(0) = 0.Starting at y(0) = 0 we trace the path through the slope field to find y(2) ≈ −0.4.

Euler's Method

The simplest numerical method for approximating solutions of differential equations is Euler's method. Consider a first order differential equation with an initial condition:

$$y' = f(t,y), \quad y(t_0) = y_0$$

The idea behind Euler's method is:

1. Construct the equation of the tangent line to the unknown function y(t) at t=t :

$$y = y(t_0) + f(t_0,y_0)(t-t_0)$$

where $y'(t_0)=f(t_0,y_0)$ is the slope of $y(t)$ at $t = t_0$.

2. Use the tangent line to approximate y(t) at a small time step $t_1=t_0+h$:

$$y_1 = y_0 + f(t_0,y_0)(t_1-t_0)$$

where $y_1 \approx y(t_1)$.

3. Repeat!

The formula for Euler's method defines a recursive sequence:

$$y_{n+1}=y_n+f(t_n,y_n)(t_{n+1}-t_n)\ ,\ y_0=y(t_0)$$

where $y_n \approx y(t_n)$ for each n. If we choose equally spaced t values then the formula becomes:

$$y_{n+1} = y_n + f(t_n,y_n)h\ ,\ y_0 = y(t_0)\ ,\ t_n=t_0 + nh$$

with time step $h = t_{n+1} - t_n$. If we implement N iterations of Euler's method from t_0 to t_f then the time step is

$$h = \frac{tf - t0}{N}$$

Note two very important points about Euler's method and numerical methods in general:

- A smaller time step h reduces the error in the approximation.
- A smaller time step h requires more computations!

Implementation

Write a function called odeEuler which takes 3 input parameters f, t and y_0 where:

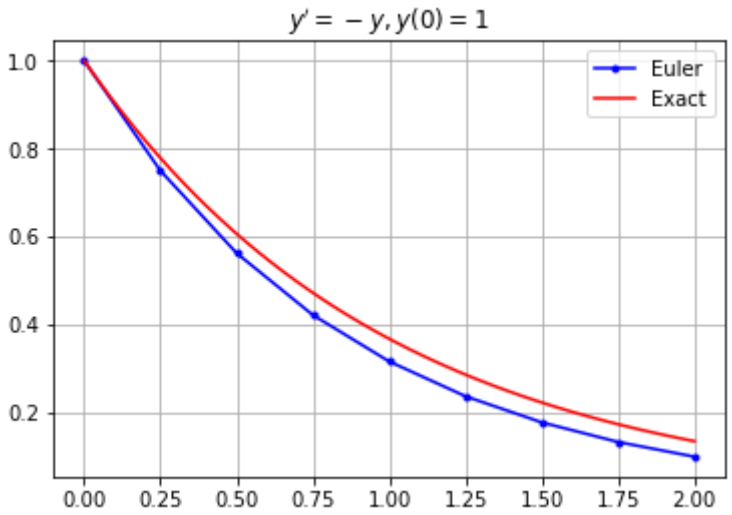
- f is a function which represents the right side of a first order differential equation y' = f(t,y)
- t is a 1D NumPy array
- y0 is an intial value y(t0)=y0 where t0 is the value t[0]
- The function odeEuler implements Euler's method and returns a 1D NumPy array of y values (with length len(t)) which approximates the solution y(t) of the differential equation y'=f(t,y), y(t0)=y0.

```
def odeEuler(f,t,y0):
y = np.zeros(len(t))
y[0] = y0
for n in range(0,len(t)-1):
y[n+1] = y[n] + f(t[n],y[n])*(t[n+1] - t[n])
return y
```

Example 1

Compute the Euler's method approximation of the solution of y' = –y, y(0) =1 using step size h=0.25.
Plot the approximation along with the exact solution $y(t) = e^{-t}$ on the interval $0 \le t \le 2$.

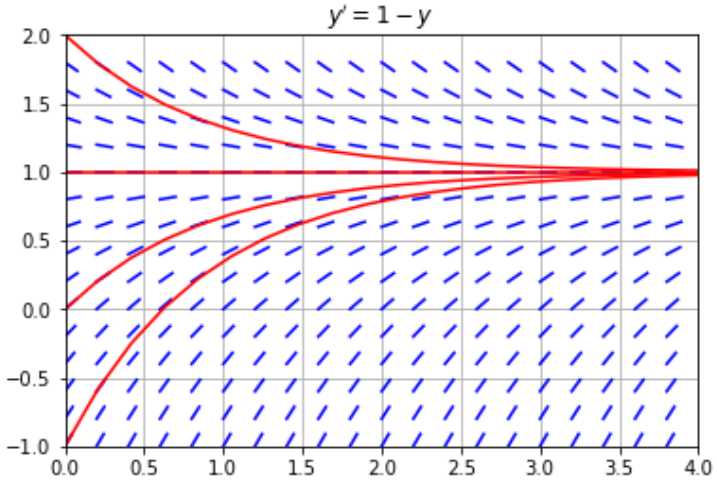
```
f = lambda t,y: -y
t0 = 0; tf = 2; h = 0.25; N = int((tf - t0)/h);
t = np.linspace(t0,tf,N+1); y0 = 1;
y = odeEuler(f,t,y0)
plt.plot(t,y,'b.-'), plt.grid(True)
t_exact = np.linspace(t0,tf,50)
y_exact = np.exp(-t_exact)
plt.plot(t_exact,y_exact,'r')
plt.title("$y'=-y,y(0)=1$"), plt.legend(["Euler","Exact"])
plt.show()
```



Example 2

Consider the equation y′=1−y. Plot the Euler's method approximation for different initial values along with the slope field.

```
f = lambda t,y: 1 - y
h = 0.2; L = 0.5*h;
t_grid = np.arange(0,4,h)
y_grid = np.arange(-1,2,h)
for t in t_grid:
for y in y_grid:
m = f(t,y)
theta = np.arctan(m)
plt.plot([t,t + L*np.cos(theta)],
[y,y + L*np.sin(theta)],'b')
t = np.linspace(0,4,20)
for y0 in range(-1,3):
y = odeEuler(f,t,y0)
plt.plot(t,y,'r-')
plt.grid(True), plt.xlim([0,4]), plt.ylim([-1,2])
plt.title("$y' = 1 - y$")
plt.show()
```



III. CONCLUSION

Using Python Programming solve Differential Education of first order using Eulers Method ,also we Solve above example with different method by using mathematical Function use in python programming and find derivates in the form Graphical charts .

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Effect of Nutrient Management Practices for Growth and Yield of Kharif Groundnut

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ABSTRACT
To study the feasibility of nutrient management practices on growth and yield of *kharif* groundnut, an experiment was carried out at PGI, Farm M.P.K.V., Rahuri. The balanced nutrition through STCR equation proved its superiority by recording significantly maximum growth attributes viz., plant height (29.14 and 31.14 cm), number of branches/ plant (6.82 and 6.96), number of leaflets/ plant (55.19 and 57.78) and leaf area/ plant (10.18 and 10.74 dm^2), days to flower iniation (30.67 and 30.85). Similar results recorded in yield attributes of groundnut like number of pods/ plant (23.76 and 30.64), number of developed pods/ plant (20.95 and 25.79), weight of pods/ plant (19.11 and 24.37 g) and weight of 100 karnels (37.31 and 37.49 g) during both years. Also Application of fertilizer to kharif groundnut as per STCR equation was recorded maximum and significantly higher dry pod yield (23.08 and 24.49 q/ ha) and creeper yield (42.21 and 40.64 q/ha) and harvest index (36.05 and 36.94 %) than rest of treatments during both the years. The control treatment recorded significantly lowest dry pod, creeper yield and harvest index. This indicates that, among the nutrient management practices, application of fertilizer dose as per soil test crop response (STCR) equation was recorded higher growth, yield attributes and achieved the yield target of 25 q/ ha in *kharif* groundnut.
Keywords: *Kharif* groundnut, Nutrient managements, pod yield and harvest index

I. INTRODUCTION

Groundnut (Arachis *hypogaea* L.) is the premier oilseed crop of India, occupies an area of 4.19 million ha and contributes 6.68 million tonnes production and average productivity of 1.59 t/ha in India (DGR, 2015). It is leguminous oilseed crop with high nutritive value of its kernels, containing 43.6 % edible oil and 25.3 % protein. Groundnut is energy rich crop and need sufficient amount of nutrients and moisture to meet their requirement for growth and development and high yields. Continuous cropping of cereal-cereal crop sequence over a long period of time reduces productivity and soil fertility. Sustainable groundnut production can be achieved by diversifying the groundnut cropping system and nutrient management (Das *et al,* 2017).

Nutrient management for groundnut is an important aspect for sustainable production in a long run. A thorough understanding of these practices *viz.,* recommended dose of fertilizer, fertilizer dose as per soil test and yield target eq^{n} (25 q/ha) were used in maximizing profitability of groundnut.

Dev (1971) described different techniques for evaluating soil fertility and approaches for recommending balanced fertilizer use based on soil testing. The approach of general fertilizer recommendations related to soil test ratings was in common use though it has its shortcoming. Because of the changing trend in agriculture, yield target concept and fertilizer recommendations for maximum profit per hectare became more promising. Yield target concept has the added advantage that targets can be varied by taking into consideration the resources available. The targeted yield concept has proved to be superior to others whose theoretical basis and proof was demonstrated by Ramamoorthy (2009) and his associates at IARI, New Delhi. Targeted yield approach has been an unique one in the sense that this method not only indicates soil test based fertilizer dose, but also the levels of yield, the farmers can hope to achieve if good agronomy is followed in raising the crop. The present investigation was conducted with an objective to study the effect of nutrient management on growth, yield attributes and yield of *kharif* groundnut.

II. MATERIALS AND METHODS

A field experiment entitled "Effect of Nutrient Management Practices on Growth and Yield of Kharif Groundnut was conducted during 2011-12 and 2012-13 at the Post Graduate Institute Farm, Department of Agronomy, MPKV, and Rahuri (M.S.) on sandy clay loam soil. The soil of the experimental site is clay in texture, pH-8.20 and EC-0.29 dSm^{-1} in the top of 15 cm of soil. The initial available soil nitrogen, phosphorus and potassium were 168.41, 15.69 and 427.00 kg ha^{-1} moderate in Fe (6.89 µg g^{-1} of soil), Mn (9.51 µg/g of soil), Zn (0.62 µg/ g of soil) and Cu (3.41 µg/g of soil), respectively. The organic carbon concentration of the soil was 0.54 %.The field capacity, permanent wilting point and bulk density of the surface (0-15 cm) soil were on 32.23,16.21(%) and 1.32 (g/cubic cm), respectively. The treatments consisted of four nutrient management practices *viz.,* recommended dose of fertilizer, fertilizer dose as per soil test and yield target (25 q ha^{-1}) and control treatment to *kharif* groundnut in main plot with strip plot design replicated in nine times. The crop varieties viz., groundnut, JL-501, was taken at 30 cm X10 cm, respectively. The application of fertilizer dose to *kharif* groundnut was applied as per recommended dose of fertilizer, fertilizer dose as per soil test and fertilizer dose as per STCR equation (25 q/ ha) through the chemical fertilizers like Urea, DAP, Single super phosphate and Muriate of potash. The plant protection measures were applied through recommended pesticides as and when required. Groundnut was inoculated with *Rhizobium* culture and phosphate solublizing bacteria for all treatments except control. Groundnut was sown in the third week of June and harvested in the second week of October during both years. The calculated doses of chemical fertilizers were applied prior to sowing and organic manures 5 ton ha^{-1} was applied one weeks to sowing of *kharif* groundnut. The total rainfall received during the *kharif* season (July-October) was 527.8 and 424.4 mm in 35 and 24 rainy days during 2011-12 and 2012-13, respectively which was 101.3 and 81.0 per cent of average annual rainfall

during crop growth period. The irrigation was given to *kharif* groundnut were two and three during first, second year, respectively.

III. RESULTS AND DISCUSSION

Growth attributes

The growth attributes *viz.,* plant height, number of branches plant^{-1}, number of leaflets plant^{-1}, leaf area/ plant, days to flower initiation and days to crop maturity as influenced by different treatments are presented in Table 1. The mean number of plant height, number of branches/ plant, number of leaflets/ plant, and leaf area/ plant, days to flower initiation and days to crop maturity were 27.04 cm, 6.18, 48.03, 8.10 dm^2,29.35 and 102.71. While during second year it was 28.17 cm, 6.12, 49.18, and 8.45 dm^2, 29.44 and 103.23, respectively.

The balanced nutrition through STCR equation proved its superiority by recording significantly maximum growth attributes *viz,* plant height (29.14 and 31.14 cm), number of branches/ plant (6.82 and 6.96), number of leaflets/ plant (55.19 and 57.78) and leaf area/ plant (10.18 and 10.74 dm^2), days to flower iniation (30.67 and 30.85) and days to crop maturity (104.52 and 105.19) than rest of all nutrients at harvest during both the years. Fertilizer dose as per soil test recorded second best nutrient management treatments. Control treatment registered significantly minimum number of all crop growth attributes during both the years. This might be because of balanced nutrition, the uptake of essential nutrients increased and which accelerates the activites of cell elongation and cell multiplication as well as metabolic activities resulted in increasing all the growth attributes. Similar results recorded by Dudhatra *et.al* (2002) and Jordan *et.al* (2002)

Yield attributes

The yield attributes of groundnut as influenced by different treatments are presented in Table 2. The mean numbers of total pods/ plant, weight of pods/ plant, weight of 100 kernels were 19.13, 15.21 g, 10.52 g and 35.85 g during first year, while during second year it was 24.29, 18.46 g, 13.06 g and 35.53 g, respectively.

The yield attributes of groundnut were influenced significantly due to different nutrient management treatments during both the years. Application of fertilizer dose as per STCR equation registered significantly higher number of total pods/ plant (23.76 and 30.64), number of developed pods/ plant (20.95 and 25.79), weight of pods/ plant (19.11 and 24.37 g) and weight of 100 karnels (37.31 and 37.49 g) than rest of treatments during both the years. However, the total number of pods plant and 100 karnels weight was at par with fertilizer dose as per soil test during second year and weight of kernel during first year. The balanced nutrition also increases the chlorophyll content in leaves, which increases the photosynthetic rate and translocation of photosynthates towards reproductive parts (pods). Similar results recorded by Safwat *et.al* (2002), Ghosh *et.al* (2003) and Varalakshmi *et.al* (2005).

Dry pod and creeper yield

The Dry pod and creeper yield of groundnut as influenced by different treatments are presented in Table 3.The mean dry pod and creeper yield of groundnut was 16.59, 17.08 and 33.15, 32.14 q ha^{-1} during first and second year, respectively.

Application of fertilizer as per STCR equation was recorded maximum and significantly higher dry pod yield (23.08 and 24.49 q/ ha) and creeper yield (42.21 and 40.64 q /ha) than rest of treatments during both the years. The dry pod yield of groundnut was 40.47 and 39.06 per cent higher than recommended dose of fertilizer. The yield target of 25 q/ ha was achieved by STCR equation with less than 10 per cent variation (-5.8 %). The fertilizer dose as per soil test was found second best treatment (18.91 and 19.59 q/ ha) during both years. The control treatment registered significantly minimum groundnut dry pod yield (7.96 and 6.63 q/ ha) and creeper yield (18.99 and 16.09 q/ ha) than rest of treatments during both years.

The harvest index was influenced by different nutrient management treatments during both the years. Application of fertilizer as per STCR equation registered significantly higher harvest index (36.05 and 36.94 %) than rest of the treatments during both the years. The control treatment recorded significantly minimum harvest index (29.81 and 29.14 %) during both the years. Similarly, the groundnut being a legume crop having more nitrate reductase activities in root which is beneficial for peg formation and pod development stage. These results are in confirmity with the results obtained by Varalakshmi *et.al* (2005), Patel *et.al* (2007), Rathika *et.al* (2009), and Jat *et.al* (2011).

Table 1. Growth attributes of groundnut as influenced by different treatments at harvest

Treatment	Plant height (cm)		Number of branches/ plant		Number of leaflets/plant		Leaf area/ plant (dm^2)		Days to flower initiation		Days to crop maturity	
	2011	2012	2011	2011	2011	2012	2011	2012	2011	2012	2011	2012
Nutrient management	27.81	28.47	6.35	8.72	8.72	50.57	8.72	9.21	29.56	29.63	102.07	103.41
T_1 – Recommended dose of fertilizer	28.10	30.16	6.76	9.43	9.43	52.71	9.43	9.87	29.85	30.15	103.48	104.11
	29.14	31.14	6.82	10.18	10.18	57.78	10.18	10.74	30.67	30.85	104.52	105.19
	23.12	22.91	4.78	4.06	4.06	35.66	4.06	3.99	27.33	27.11	100.78	100.11
	1.06	0.77	0.35	0.19	0.19	1.46	0.19	0.20	0.44	0.48	0.71	0.71
T_2 –Fertilizer dose as per soil test	3.09	2.23	1.02	0.56	0.56	4.26	0.56	0.58	1.29	1.39	2.06	2.05
T_3- Fertilizer dose as per STCR eq^n (25 q ha^{-1})												
T_4-Control												

(No fertilizer) SEm ± C.D. at 5%												
General mean	27.04	28.17	6.18	8.10	8.10	49.18	8.10	8.45	29.35	29.44	102.71	103.23

Table 2. Yield attributes and yield of groundnut as influenced by different treatments at harvest.

Treatment	Number of pods/plant		Weight of pods Plant (g)		Wt. of 100 kernels (g)		Dry pod yield (q/ha)		Haulm yield (q/ha)		Harvest index (%)	
	2011	2011	2011	2012	2011	2012	2011	2012	2011	2012	2011	2012
Nutrient management	19.56	25.54	16.26	19.35	35.22	35.64	16.43	17.61	34.33	34.72	32.31	33.34
T_1 – Recommended	20.17	28.42	17.01	21.76	36.53	36.47	18.91	19.59	37.07	37.12	33.72	34.46
dose of fertilizer	23.76	30.64	19.11	24.37	37.31	37.49	23.08	24.49	42.21	40.64	36.05	36.94
T_2 –Fertilizer	13.05	12.57	8.45	8.38	34.36	32.53	7.96	6.63	18.99	16.09	29.81	29.14
dose as per soil	0.91	0.92	0.59	0.75	0.54	0.47	0.59	0.52	0.91	0.75	0.70	0.57
test	2.66	2.67	1.72	2.20	1.57	1.36	1.71	1.54	2.64	2.17	2.04	1.68
T_3 T_3- Fertilizer dose as per STCR eq^n (25 q ha^{-1})												
T_4-Control (No fertilizer)												
SEm ±												
C.D. at 5%												
General mean	19.13	24.29	15.21	18.46	35.85	35.53	16.59	17.08	33.15	32.14	32.97	33.47

IV. CONCLUSIONS

Among the nutrient management treatments, application of fertilizer dose as per soil test crop response (STCR) equation was beneficial for increased growth attributes and achieved the yield target of 25 q/ ha in *kharif* groundnut.

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Occurrence of Fungi on (Allium Cepa L.) in Maharashtra India

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ABSTRACT
Present study was investigated of the occurance of fungi on onion. And infected from the fungal diseases. A complete causes the number of onion fields are infected for every year by fungi., Nashik red Bhima white Puna fursungi Panchganga Local red and different locality of Maharashtra Ahmednagar, Osmanabad, Beed, Aurangabad, Jalna, Nashik and Pune districts. Fungi were isolates from the infected onions pathogen as like, Alternaria porri Aspergillus niger, Fusarium sps ,Penicillium notatum sps, Rhizoctonia stolonifer, Stemphylium vesicarium and Colletotrichum gloeosporioides fungi are isolated in Maharashtra during study this Aspergillus niger are Dence occurance on all varieties and locality of onion and moderate also occurance on all varieties.
Keywords: Occurrence of fungi, onion

I. INTRODUCTION

Onion (*Allium cepa L.)* belongs to family Alliaceae and important commercial vegetable crops grown throughout the world including India. Vegetable and in spices, onion also called as "Queen of kitchen. India is the second largest producer country of onion after the china, and leader in production. In India occupies an area of 1.05 million hectare with the production of 16.81million tones (D A &C H D. 2013).The major onion growing states in India is the Maharashtra, Bihar Orissa, Andhra Pradesh, Karnataka, Rajasthan Tamil Nadu, Haryana, and Madhya Pradesh. Maharashtra is the pioneer state in onion production contributing 25% of country's onion (Gadge and Lawande 2012).In Maharashtra the major onion producing districts are, Aurangabad, Beed, Jalna, Ahmednagar, Nashik, Osmanabad, and Pune. Nashik district contributes 35 to 40 % of the onion production. Onions are cultivated in three different seasons' *Kharif* and *Rabi*. In Maharashtra, the production of onion likewise season, late *Kharif* (35-40%), and *rabbi* (40-45%) *Kharif*, (20%), respectively. (Data source: NHRDF, Nashik 2006).

Onion bulb contains anti-inflammatory, anticancer anticancholesterol Antiinflamentory, anticholestrol, and antioxidant compound quercetin (Augusti, 1996) and antioxidant properties such as quercetin (Slimestad *et.al* 2007). The fungicidal and insecticidal properties of onion are also well identified. (Mishra 2014.) It is used as row the onion also losses due to the causes of same Virus, Mycoplasma, bacterial, Nematode and fungi are cause diseases of onions. These concept understanding, chosen the most important think is occurance of fungi on onion Maharashtra in India.

II. MATERIALS AND METHODS

Collection of samples

Infected sample was collected from the fields, in the polythine bags, that bags was sterilized or aseptic in condition and brought in to the laboratory of Dr. Babasaheb Ambedkar Marathwada University, Department of Botany, Plant pathology and Fungal Biotechnology laboratory for further experiments.

Isolation and Identification causal pathogen:

The infected onion sample collected from the fields directly in polythine bags of different areas of Maharashtra. Likewise Aurangabad, Beed, Jalna, Ahmednagar, Nashik, Osmanabad, and Pune districts. These collected samples were cleaned and washed by sterilized water then surface sterilized with 1% $HGCL_2$ solution, the rinsed several times in sterilized water and dried, the surface sterilized sample were inoculated on to Potato Dextrose Agar (PDA) medium and incubated at 24^0c. After 4-5 days incubation period, the developed fungal colonies were purified by hyphal tip and single spore isolation technique. Identification and the fungal isolation were carried out by using the morphological characteristic of mycelia and spore as described by (Kritzman G.1983).

III. RESULTS AND DISCUSSION

Five different varieties of onions were screened for their association with fungi and results are given in table 1 & Photo plate.

Total twenty two fungi were isolated from five varieties of onion. Nashik red twenty, Local red seventeen and Panchganga varieties showed occurrence of nineteen fungi, Bhima white showed incidence of fifteen fungi and Puna fursungi showed growth twenty one fungi. Moderate to less growth of *Alternaria porri* was found on all the collected varieties. It is interesting to note that, dense growth of *Aspergillus Niger* was found on all the collected varieties of onion. On the other hand, *Botrytis allii, Botrytis cinerea, Cladosporium allii* and *Peronospora destructor* showed less whereas, *Fusarium chlamydosporum*, *Fusarium solani, Fusarium proliferatum*, *Fusarium equiseti, Fusarium roseum, Fusarium oxysporum, Penicillium notatum, Penicillium chrysogenum, Rhizoctonia stolonifer* and *Stemphylium vesicarium* showed moderate growth on all the varieties. Except Bhima white, *Colletotrichum gloeosporioides* was found on all the varieties of onion.

Occurance of fungi on different localities of onions

In order to study the effect of different environmental conditions on the incidence of fungi, seven different localities were selected for the collection of onion samples and the obtained results are given in the table 2. Total twenty two fungi were found to be occurred on the onion samples collected from different localities. Samples collected from Aurangabad and Nashik showed growth of twenty fungi while, Beed, Osmanabad and Ahmednagar samples showed occurrence of thirteen fungal species. Minimum fungi were found on the samples collected from Jalna and Pune. *Aspergillus niger* showed dense growth on the samples collected from

Aurangabad and Nashik. *Fusarium* species, *Penicillium chrysogenum* and *Rhizoctonia stolonifer* were found to be occurred on the samples collected from Aurangabad, Osmanabad and Nashik. Similarly results are shown by several researchers. Aiyer (1980) reported the most destructive diseases are black mould rot (*Aspergillus niger*), blue mould rot (*Penicillium* spp.), *Fusarium* bulb rot (*Fusarium* spp.), basal rot (*Fusarium monilifome*), *Aspergillus* rot (*Aspergillus* spp.) etc Visser (1999) tested the varietal susceptibility of 11 onion cultivars against *Fusarium oxysporum* f. sp. at field, at harvesting and after storage. Tyson *et al.* (2004) isolated *Aspergillus niger* on onion sample collected from onion fields in the Pukekohe/ Waikato regions of New Zealand during 2002 and 2003. Srivastava *et al.* (2005) reported an increase in onion leaf purple blotch disease incidence with increasing irrigation frequency. Shahanaz *et al.* (2007) reported losses about 50 to 100 per cent due to purple blotch disease. Neck rot disease caused by Botrytis allii (Schwartz.2011), and collar rot disease caused by *Sclerotium rolfsii* reported by Santha Lakshmi (et al.,2012).Root rot by *Sclerotium rolfsii* reported by Sultana et al.,(2012) Pawar and Chavan.,(2015) Stem rot. This is the Isolate of fungi from the infected part of onion plants. Vinay and Neeraj (2020) Penicillium repoted post harvested stored fungi from onions

Table no. 01- Occurance of fungi on different varieties of onion

Name of the fungi	VARIETIES				
	Nashik red	Bhima white	Local red	Panchganga	Puna fursungi
Alternaria porri	++	+	++	+	++
Aspergillus niger	+++	+++	+++	+++	+++
Botrytis allii	+	+	+	+	+
Botrytis cinerea	+	+	+	+	+
Botrytis squamosa	+	-	+	-	+
Cladosporium allii	+	+	+	+	+
Colletotrichum circinans	-	++	-	++	-
Colletotrichum gloeosporioides	+	-	+	+	+
Fusarium chlamydosporum	+	+	++	+	+
Fusarium equiseti	++	++	++	++	++
Fusarium moniliforme	++	+	-	++	++
Fusarium oxysporum	++	++	++	++	++
Fusarium Proliferatum	++	+	-	+	+
Fusarium solani	+	+	+	-	+
Fusarium roseum	+	+	-	+	++
Penicillium notatum	++	++	++	++	++
Penicillium chrysogenum	++	++	++	++	++
Peronospora destructor	+	+	+	+	+
Rhizoctonia stolonifer	++	++	++	++	++

Sclerotium rolfsii	-	++	-	++	++
Stemphylium botryosum	+	-	+	-	+
Stemphylium vesicarium	++	++	++	++	++

(+++) Dense, (++) = Moderates, (+)= Less, (-)= Absent

Table no.02-Occurance of fungi on different Districts of onions

Fungi	Locality						
	Aurangabad	Beed	Jalna	Osmanabad	Nashik	Ahmednagar	Pune
Alternaria porri	++	+	+	+	++	-	-
Aspergillus niger	+++	++	++	++	+++	++	++
Botrytis allii	+	+	-	-	+	+	-
Botrytis cinerea	+	-	-	-	+	-	-
Botrytis squamosa	-	-	-	+	-	-	-
Cladosporium allii	+	-	-	+	+	+	+
Colletotrichum circinans	+	-	-	+	++	-	-
Colletotrichum gloeosporioides	+	-	+	-	+	-	-
Fusarium chlamydosporum	++	+	++	+	++	+	+
Fusarium equiseti	++	+	+	++	++	+	+
Fusarium moniliforme	++	+	-	++	++	+	-
Fusarium oxysporum	++	++	+	++	++	+	+
Fusarium Proliferatum	+	+		+	+	-	+
Fusarium solani	++	+	+	-	+	+	+
Fusarium roseum	++	+	+	-	-	-	+
Penicillium notatum	++	++	-	++	++	+	+
Penicillium chrysogenum	++	+	+	++	++	+	-
Peronospora destructor	+	-	-	-	+	+	-
Rhizoctonia stolonifer	++	++	++	++	++	++	++
Sclerotium rolfsii	-	+	-	-	-	-	++
Stemphylium Botryosum	+	-	-	-	+	-	+
Stemphylium vesicarium	++	+	+	+	+	+	++

(+++)= High, (++) = Moderates, (+) = Less, (-) = Absent

Photo plate shows, fungal growth on different varieties of onions.

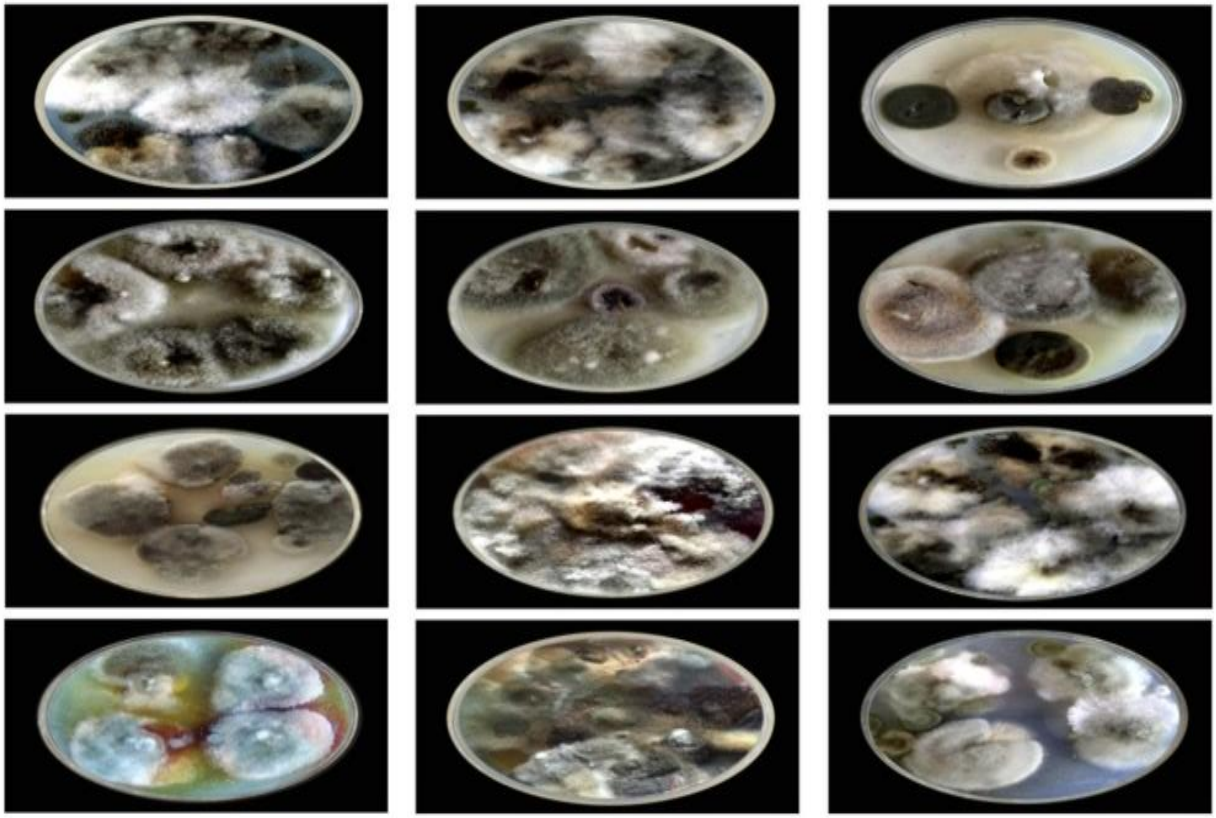
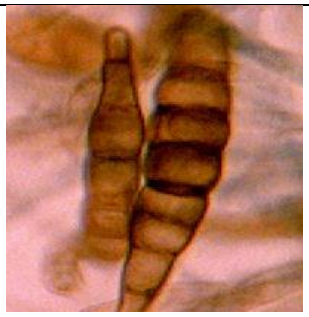
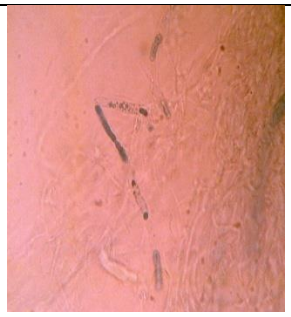
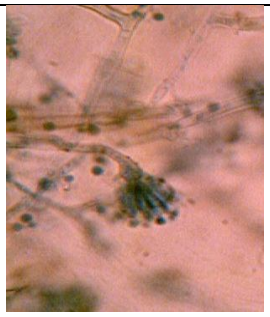
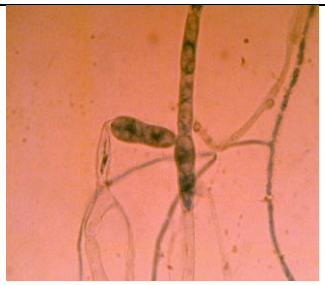
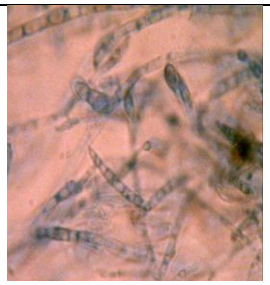
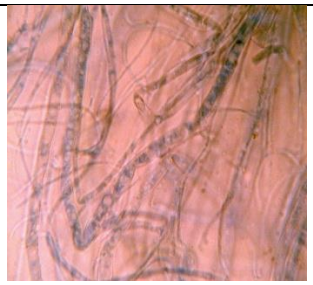


Photo plate shows, same Fungal Spores on different varieties of onions.

			
Alternaria Porri	*Aspergillus niger*	*Colletotrichum gloeosporioides*	*Penicillium sps*
			
Stemphylium vesicarium	*Fusarium sps*	*Sclerotium rolfsii*	*Rhizoctonia stolonifer*

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Scope and Opportunities of Solar Energy: Indian Perspective

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ABSTRACT
India has a huge potential for solar energy production. The country's location geographically favours the production of solar energy. India, a tropical nation, receives 3,000 hours of sunshine annually and receives solar radiation virtually all year round. This is more than 5,000 trillion kWh. Nearly everything in India receives 4–7 kWh of sun radiation per square metre. 2,300–3,200 hours of sunshine are the equal in a year. Due to their geographic location, states like West Bengal, Andhra Pradesh, Bihar, Gujarat, Haryana, Madhya Pradesh, Maharashtra, Orissa, Punjab, and Rajasthan have a significant deal of potential for harnessing solar energy.Since the vast majority of people reside in rural areas, there is a lot of potential for solar energy to be promoted there. Rural households may consume less firewood and dung cakes if they use solar energy. In India, there have been numerous large-scale projects proposed, some of which include: The best solar energy projects are in India's Thar Desert and are expected to produce 700 to 2,100 GW, respectively. By 2022, the Jawaharlal Nehru National Solar Mission (JNNSM), an initiative of the Centre, aims to generate 20,000 MW of solar power.Gujarat's innovative solar power programme intends to generate 1,000 MW of solar energy, and a Rs. 130 billion solar power plan that anticipated to generate 20 GW of solar power by 2020 was presented in July 2009. In addition to the aforementioned, around 66 MW is installed for a variety of uses in the rural area, including solar water pumps, street lighting systems, and lanterns.As a result, India has a large-scale plan for solar energy generation that may not only fill the gap in power generation but also significantly increase the production of green energy, which would assist to slow down world climatic change.

Keywords: Solar Mission, Solar energy, Solar radiation, Solar power projects, Green Energy Production

I. INTRODUCTION

According to a senior government source who asked to remain anonymous, the per-person electricity consumption peaked at 1010 kWh some time ago. However, experts are not very encouraged by the rising consumption statistic. "Crossing the 1,000-unit threshold for annual per-person electricity use is undoubtedly a milestone, but it is not particularly significant. In several East and North East states, less than 30% of families have access to electricity, meaning that one-fourth of all households in the nation still do not have it. According to Debasish Mishra, senior director, consulting, Deloitte Touche Tohmatsu India Pvt. Ltd., the most important milestone that the country must reach is 100% of households having a reliable 24x7 energy

supply[1].India has one of the lowest per-capita power consumption rates in the world. In the nation, almost 280 million people lack access to power. China consumes 4,000 kWh per person, while industrialised countries use an average of 15,000 kWh per person. Interestingly, despite the fact that the country's greatest shortage was at 2.3% in May, many think that the demand still appears to have been artificially controlled because state electricity boards (SEBs) are not purchasing electricity. Due to low prices, a lack of progress in cutting losses, rising power purchase costs, and crippling debt, SEBs have been reluctant to purchase energy since it would hurt their already precarious financial situation. India has an installed capacity for power generating of 272,503MW[2].States have not been buying electricity, according to Piyush Goyal, minister of power, coal, and renewable energy. Since some state governments haven't been as helpful as they could be, we kindly request that they increase their collaboration. If not, the electorate would respond appropriately in the ensuing days, Goyal stated at a press conference on May 25, 2015. The good news in the May industrial production statistics index was electricity generation. The production of electricity, which decreased by 0.5 percent in April, recovered to increase by 6 percent in May 2015. Only about 145,000 MW of our total installed capacity is now in use.To install 100,000MW of solar energy capacity and roughly 60,000MW of wind energy capacity by 2022, India will need to spend up to $200 billion. In April and May 2014, the Indian government took steps to ensure energy security and introduced a programme to guarantee agricultural consumers an adequate eight-hour supply of power and homes access to electricity around-the-clock[3].

II. SOLAR POWER STRENGTH IN INDIA

The most recent assessment of India's solar power potential has given its goal of becoming one of the world's major solar power markets a huge boost.According to a recently released paper by the Ministry of New & Renewable Energy (MNRE), the National Institute of Solar Energy in India estimated that the country's solar power potential is approximately 750 GW. The data on the availability of wasteland in each state and Indian jurisdiction has been used to assess the solar power potential. The calculation is predicated on the premise that just 3% of the total wasteland in a state is utilised for the construction of solar power installations[4].

III. REASON FOR SOLAR POWER GENERATION

All sources of energy originate from solar energy. This energy can be used in two different ways: thermally, by using heat to dry, heat, cook, or generate electricity; or photovoltaically, by converting solar energy into electricity, which can then be used for a variety of tasks like lighting, pumping, and electricity generating. Solar energy is an extremely alluring energy source due to its lack of pollution, nearly limitless supply, and widespread use[5]. Different uses can be made of solar energy. So, there are two ways to approach the issue "Why Solar": using solar energy for captive and off-grid (including grid-interactive) power generation.

A. Solar for network connected electricity

Grid-interactive solar energy is produced on a big scale by solar photovoltaic cells and CSP plants. The following factors led to the selection of the grid connection:

- Solar energy is accessible all day, throughout the period of highest load demand.
- Because solar energy conversion equipment lasts longer and requires less maintenance, it increases the security of the energy infrastructure.
- Low operating expenses & capital returns from grid ties (Net Metering).
- They produce clean energy without contributing to pollution, in contrast to traditional thermal power generation from coal.
- Free solar energy is available everywhere in the world (although gradually decreasing from equatorial, tropical, sub-tropical and polar regions). is practically everywhere usable.

B. Solar for off-network solutions

The places where utility power is scarce or prohibitively expensive to bring must choose their own generation while the ones with simpler grid access are using grid connectivity. With or without its own storage, they produce electricity from a variety of tiny local generators that run on a combination of fossil fuels (diesel, gas), as well as locally accessible renewable energy technologies (solar PV, wind, small hydro, biomass, etc). (batteries). Off-grid electricity is what it is. The following justifications are used to establish remote power systems:

- Desire for pollution-free, renewable energy sources.
- Hybrid power generation, which combines several of the possible generating sources.
- A desire for freedom from the erratic, prone to fault, and interrupted grid connection.
- The range of backup and storage possibilities.
- No transmission loss due to overhead wires.
- A variety of goods and uses, including lighting, communication systems, cooking, heating, pumps, and small-scale industry use.
- When generating captive electricity, solar energy is primarily used to substitute diesel.

C. Existing Projects (includes both installed and under installation projects)

Table-I displays the capacity of installed and under construction solar power generation by state. This demonstrates that Gujarat, where around 720 MW of solar generation has been installed, has made the most progress, and Maharashtra, where about 133 MW of solar generating is now under construction, come in second and third. Now, we also need to pay attention to other states.

IV. SOLAR PLANS IN INDIA

India has enormous solar energy generation potential. The geographical location of the nation is favourable for the production of solar energy. The reason behind this is that India is a tropical nation with about 3,000

hours of sunshine each year and solar radiation. India has enormous solar energy generation potential. The geographical location of the nation is favourable for the production of solar energy. The reason behind this is that India is a tropical nation with about 3,000 hours of sunshine each year and solar radiation. This is equivalent to almost 5,000 trillion kWh. India almost universally receives 4-7 kWh of solar radiation per square metre. This translates to 2,300–3,200 hours of sunshine annually. States like Bihar, Andhra Pradesh,Due to their geographic location, Gujarat, Haryana, Madhya Pradesh, Maharashtra, Orissa, Punjab, Rajasthan, and West Bengal have excellent potential for harnessing solar energy[6]. Since the vast majority of people reside in rural areas, there is a lot of potential for solar energy to be promoted there. Utilizing solar energy can help rural households consume less firewood and dung cakes.The states with the greatest potential for solar energy are Rajasthan and Jammu and Kashmir, according to estimations. Rajasthan has a potential of roughly 142 GW due to its abundant solar radiation and access to large areas of wasteland in the form of the Thar Desert. In India, Jammu & Kashmir has the greatest sun radiation levels and the largest area of wasteland in Ladakh. The state is thought to have a 111 GW potential. However, this assessment might also take into account the territory that Pakistan now controls[7].Both Madhya Pradesh and Maharashtra have a solar energy potential of more than 60 GW. These Indian states are among the biggest, and as a result, they have abundant resources from wastelands. Both of these states have ambitious intentions to build large-scale solar power projects and solar power legislation.Gujarat, the most solar energy capacity installed state in India, has a potential of 36 GW, according to estimates. Large areas of the state's terrain are covered in marshes;however, these grounds are also home to a diverse range of animals. Gujarat has already begun to establish utility-scale solar power plants over water canals and has close to 900 MW of installed solar power capacity.According to estimates of the potential for solar energy, agricultural states like Punjab and Haryana do poorly. Punjab has chosen to focus its efforts on installing solar power projects over rooftops and canals because it would be difficult to make land accessible for huge solar power projects[8].Less than 0.5 percent of the anticipated potential is represented by India's existing solar power capacity, which is now around 3 GW. Of course, there is a tremendous possibility to realise this promise. As a result, the Indian government upped its goal for adding solar power capacity by five times [9]. Instead of the former goal of building 22 GW of solar power capacity by 2022, the government now plans to create 100 GW of solar power capacity. This includes 20 GW of ultra-mega solar power plants spread across 12 states with installed capacities of 500 MW or more, compared to India's total solar capacity of 750 GWh[10].

V. MERITS AND DEMERITS OF SOLAR ENERGY IN INDIA

A. Merits of Solar Energy in India

The following are a few benefits of solar energy that make it even more appropriate for India:

- This is India's best non-renewable energy alternative because it is an endless supply of power.
- Environmentally beneficial is solar energy. It does not release CO2 or other air-polluting pollutants when in operation. As a result, given that India is one of the most polluted nations in the world, it is a very good fit for India.

- Solar energy is excellent for India's rural communities since it may be used for a range of tasks, including cooking, drying, heating, and power. It may also be utilised in calculators, satellites, huge power boats, cars, planes, and many other similar devices, which is ideal for urban dwellers.
- Solar energy has an endless supply. Solar energy is the finest alternative source of power generation in an energy-scarce nation like India where the cost of generating electricity is high.
- A power or gas grid is not required to obtain solar energy. Anywhere can have a solar energy system installed. Houses can readily accommodate solar panels. As a result, it is fairly affordable when compared to other energy sources.

B. Demerits of Solar Energy in India

The following are a few drawbacks of solar energy that require more study:

- Solar energy is insufficient for night time energy production.
- Additionally, during the day, it may be gloomy or wet with little to no sunlight. As a result, solar energy panels become less trustworthy as a solution.
- Solar energy can only be produced in locations that receive sufficient sunshine.
- In order to create power, solar panels also need inverters and storage batteries to convert direct electricity to alternating electricity. The cost of installing other equipment is more than that of installing a solar panel.
- A significant amount of land is needed to establish a solar plant with solar panels, and that area is occupied for a considerable amount of time and cannot be used for other reasons.
- Compared to other sources of energy, energy generation is quite low.
- Solar panels need a lot of upkeep because they are delicate and easily broken. As a result, additional fees are incurred for insurance.

C. Imminent of Solar energy in India

Numerous sizable projects have been proposed in India's solar energy sector.

- Some of India's best solar energy projects are located in the Thar Desert, with a potential output of 700 to 2,100 GW.
- India's largest solar power plant, Diken, was opened by Narendra Modi, who was Gujarat's chief minister at the time, in the Neemuch region of Madhya Pradesh on March 1.
- By 2022, the Centre's Jawaharlal Nehru National Solar Mission (JNNSM) hopes to generate 20,000 MW of solar power.
- Gujarat's innovative solar power policy seeks to generate 1,000 MW of solar energy.
- A $19 billion solar energy plan that aimed to generate 20 GW of solar power by 2020 was launched in July 2009.

VI. CONCLUSION

According to the country's geographic position, India benefits and has a huge potential for producing solar energy. More than 60 to 65 percent of our total energy needs can be satisfied by solar power generation alone. Therefore, we must concentrate on adhering to future plans for setting up significant projects in Rajasthan and Jammu & Kashmir, whereas Banda district in Uttar Pradesh is the best site to meet our needs there. In addition to the aforementioned, we also need to concentrate on roof-top solar energy generation, which might reduce our requirement to more than 50% of the needs of every household.

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Methylotroph : Isolation and Identification from Lonar Lake

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ABSTRACT
The Buldhana district of the geographical area state has Lonar Soda Lake. It is one of the largest craters, and it is the only one created by a high-speed meteoroid impacting volcanic rock about 50,000 years ago. Methylotrophic microorganisms are unique in that they can use methanol as their only source of carbon and energy. By using a minimum salt medium with a 2% methanol source of carbon and energy, the methylotrophic strain was identified. More detailed morphological, biochemical, and 16S rRNA sequencing descriptions of this strain were obtained. Sequencing results revealed that the strain belongs to the phylum proteobacteria and is an instance of the Achromobactrar Xylosonidans species. By using spectrophotometric techniques, this Achromobactrar species was further examined for its capacity to consume methanol. The Achromobactrar Xylosonidans were discovered to be exceptionally efficient methanol users and will be used for bioremediation of methanol-contaminated locations, according to the results. This work is beneficial for controlling global warming and reducing methane and other C1 compound pollutants.
Key words: Lonar Lake, Methylotrophs, Achromobactar.

I. INTRODUCTION

Lonar crater, which can be found in the village of Lonar, Buldhana district, region, India, is a straightforward, concave, nearly circular crater that was created by a meteor impact (Fredriksson et al., 1973) around 52 000 years ago (Sengupta et al., 1997). The crater's mean rim diameter is 1830 metres, and its apparent depth from rim to bottom is about 150 metres (Fredriksson et al., 1973). This has salinity (NaCl 0.9%) and alkalinity (pH 10) that together forms a severe environment for the growth of halophilic and alkaliphilic organisms. Rain, spring water oozing, and springs located at the lake's edge all contribute to the lake's water supply. Because of the lake's high salt concentration and resulting pH scale, it was previously exploited as a source of sodium carbonate (Thakker and Ranade, 2002; Tambekar et al., 2010). Throughout the year, Lonar Lake's water appears green due to cyanobacterial blooms that are in abundance (Surakasi et al., 2007). The methylotrophs' observation of cyanobacterial biomass decomposition in soda lakes may be moving to high concentrations of methane, methanol, methylamine, and dimethylsulfide (Jones et al., 1998). Methanotrophic microorganisms are a distinct group that only use methanol as a source of carbon and energy (Trotsenko and Murrell, 2008; Olivier et al., 2005). Methane oxidising bacteria (MOB) include species from the Gamma and Alpha proteobacteria (types I and II, respectively) (Bowman, 2000). Methanotrophs, also known as aerobic methane

oxidizing microorganisms, are a group of microorganisms that thrive on methane. They are a genus of methylotrophic organisms that may thrive on a variety of one-carbon chemicals, including methanol, alkyl group amines, methane, and alkyl compounds containing sulphur (Anthony, 1992; Lidstrom, 2006). Methylotrophic microorganisms, which are phylogenetically dispersed over a number of phyla, significantly contribute to the biogeochemical cycle of carbon by making it easier for biomass to incorporate carbon from C1 compounds (Anthony, 1992; Chistoserdova et al., 2009). The extremely significant environmental phenomena connected to the global climate change are significantly influenced by the planet's cycle of C1 compounds. The current study's objective is to identify methylotrophic organisms in Lonar Lake that can break down the C1 chemical and the industrial substance methanol.

II. MATERIALS AND METHODS

Sampling sites and sample collection: During the month of August 2012, sterile containers were used to collect sediment, water, and mat samples from several locations around Lonar Lake. They were labelled and taken to the lab for additional analysis. Sample enrichment and bacterial strain isolation Sediment (1 g), mat (1 g), and water (10 mL) samples from the collected sample were added to a 250 mL conical flask containing 100 mL of minimal salt medium with a composition of (g/l). CaCl20.01, MgSO4.7H2O 0.5, FeSO4.7H2O 0.116, H3BO3 0.232, CoCl2.6H2O 0.41, CuSO4.5H2O 0.008, MnSO4.H2O 0.008, (NH4)6 Mo7O24 0.022, ZnSO4 0.174, and 2% methanol as the only carbon source (Haddad et al., 2009). Subculturing was done in the appropriate medium five times after the media was incubated at 370C for three days at 100 rpm on a rotary shaker. The bacterial growth was subcultured on nutrient agar plates after repeated subculturing in order to isolate methylotrophs. Well-isolated and differentiating colonies were put on Nutrient agar slant after an overnight incubation and kept there for further research at 40C. The isolate was identified by 16S rRNA sequencing from NCCS, Pune and described by morphological and biochemical traits.

Morphological, biochemical identification of isolate:

The isolate was characterized by morphological and cultural characteristics. While rapid detection kit (Hi-media) was used to perform biochemical tests. The kit involves Citrate, Lactose, Xylose, Maltose, Fructose, Dextrose, Galactose, Raffinose, Trehalose, Melibiose, Sucrose, L-arabinos, Mannose, Inulin,, Xylitol, ONPG, Esculin, D-arabinose, Citrate, Mallonate, Sorbose ,nitrate reduction, urease and starch hydrolysis and identified by 16S rRNA sequencing from NCCS, Pune.

Study on methanol utilization:

For determination of methanol utilization of bacterial isolate was grown in nutrient broth and incubated overnight at 37^{0}C. This culture was then inoculated in minimal salt medium containing 2% methanol as sole source of carbon and energy. The methanol concentration was determined by analyzing samples at each 24 h to 96 h by using UV- Visible spectrophotometer at 481 nm (Zhan *et al.,* 2010*).* The effect of environmental parameters on methanol utilization efficiency was also studied.

III. RESULTS AND DISCUSSION

Methylotrophic bacteria are unique organisms with the ability to use compounds with single carbon atom as single sources of carbon and energy, thus playing a role in global carbon cycling. While studying the methylotrophic bacteria from Lonar Lake, a total of four samples comprising of sediment, matt and water samples were collected and processed on minimal salt media containing 2 % methanol as carbon source. After five times subculturing in minimal salt medium containing 2% methanol then inoculated on Nutrient agar plate. Then well isolated colonies are transfer on Nutrient agar slant for further characterization. The bacterial strain were analyzed for standard biochemical test and further confirmed by 16S rRNA sequencing. The isolate was gram negative, short rod, aerobic and motile. Xylose, citrate utilized (Table 1). Potentially novel haloalkaliphilic methanogens related to the genera *Methanosarcina*, *Methanocalculus* and *Methanoculleus* have also been isolated in culture from the Lonar lake sediments.

In this investigation a new method for direct determination of methanol using sodium nitroprusside (SNP) is developed. It has been reported that SNP can react with nucleophilic agent such as primary and secondary amines however no studies in the literature to date have been reported on the reaction of SNP can react with methanol to form colored product absorbance of product is linear with certain extent of the concentration of methanol compared with others method, this method is very simple rapid and reliable. The methanol utilization efficiency of several strain were examined spectro photometrically. (Tambekar *E tal*,2013)The experiment designed to find out methanol utilization percent utilization and rate of utilization after 24h, 48h, 72h and 96h respectively.

The result of 16S rRNA showed that the organism was found to be *Achromobactrar Xylosonidans*. In the present study, it was reported that (ALP10) 0.75, 1.9, 2.8 and3.2 mg/mL after 24h time interval. There is co-relation between incubation period and amount of methanol utilization. The graph(Fig.1) show that during early incubation period of 24h methanol utilization at slower rate after which increase sharply reaching a maximum value at 96h for all the isolates.

Tambekar *et al*., (2011) also isolate the methylotrophic bacteria from Lonar Lake and reported *Acinetobacter, Achromobactrum Xylosonidans*, *Ochromobactrum* among these organisms *Pseudomonas aeruginosa* was found to be efficient methylotroph.

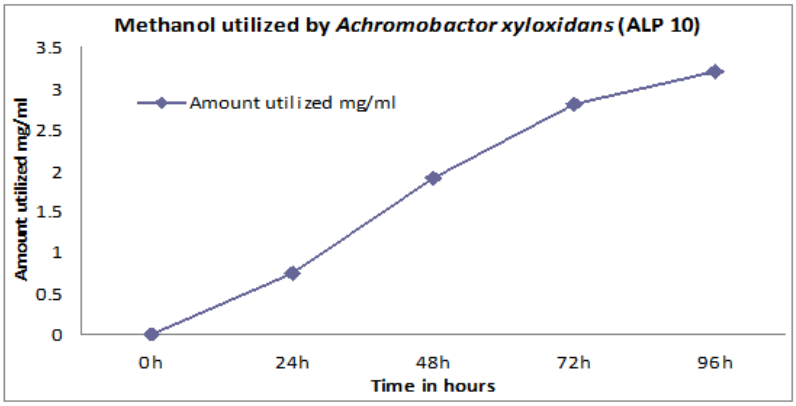
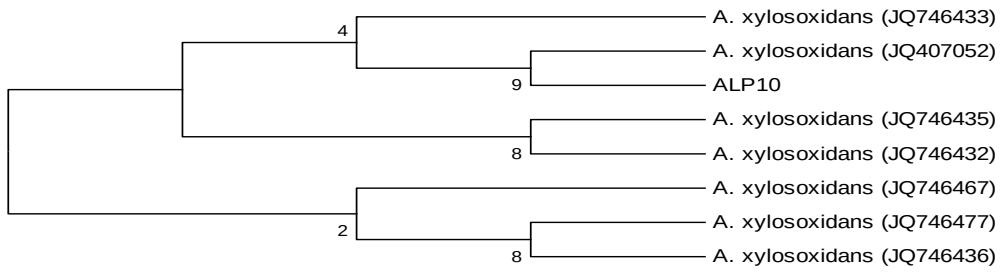


Fig. 1: Amount of methanol utilized by methanotrophs at different time interval

Fig.2 : Phylogenetic tree for methanotrophic bacteria isolated from Lonar Lake based on 16S rRNA gene comparisons and some of their closest phylogenetic relatives. The tree was constructed for the isolates ALP10. The phylogenic tree was constructed by neighbor-joining method. The number on the tree indicates the percentage of bootstrap sampling derived from 1,000 replications.



The phylogenetic analysis based on 16S rRNA gene sequences indicated that strains ALP10 was affiliated with the phylum Proteobacteria (Fig.2). According to the 16S rRNA gene sequences, the strain ALP10 showed a high level of similarity with the type strain of genus *Achromobacter* and a substantial degree of relatedness to references 16S rRNA sequences of genus*Achromobacter* in the database. The strains ALP10 from present study showed high value of similarity with isolate *Achromobacter xylosoxidans*(JQ407052).

ALP10

Lineage:

Results for Query Sequence: seqmatch_seq, 1407 unique oligos

rootrank Root (10) (match sequences)

domain Bacteria (10)

phylum "Proteobacteria" (10)

class Betaproteobacteria (10)

order Burkholderiales (10)

family Alcaligenaceae (10)

genus Achromobacter (10)

S003280602	not_calculated	1.000	1290	Achromobacter	xylosoxidans; BSS4;	JQ407052
S003291271	not_calculated	1.000	1225	Achromobacter	xylosoxidans;	JQ746428
S003291275	not_calculated	1.000	1225	Achromobacter	xylosoxidans; A13;	JQ746432
S003291276	not_calculated	1.000	1225	Achromobacter	xylosoxidans; A15;	JQ746433
S003291277	not_calculated	1.000	1225	Achromobacter	xylosoxidans; A16;	JQ746434
S003291278	not_calculated	1.000	1225	Achromobacter	xylosoxidans; A18;	JQ746435
S003291279	not_calculated	1.000	1225	Achromobacter	xylosoxidans; A19;	JQ746436
S003291289	not_calculated	1.000	1225	Achromobacter	xylosoxidans; A34;	JQ746446
S003291310	not_calculated	1.000	1225	Achromobacter	xylosoxidans; A61;	JQ746467
S003291320	not_calculated	1.000	1225	Achromobacter	xylosoxidans; A70;	JQ746477

ALP10

TCAGATGAACGCTAGCGGGATGCTTACACATGCAAGTCGAGCGCAGCACGGACTTCGGTCTGGTGGC
GAGTGGCGAACGGGTGAGTAATGTATCGGAACGTGCCCAGTAGCGGGGGATAACTACGCGAAAGCG
TAGCTAATACCGCATACGCCCTACGGGGGAAAGCAGGGGATCGCAAGACCTTGCACTATTGGAGCG
GCCGATATCGGATTAGCTAGTTGGTGGGGTAACGGCTCACCAAGGCGACGATCCGTAGCTGGTTTGA
GAGGACGACCAGCCACACTGGGACTGAGACACGGCCCAGACTCCTACGGGAGGCAGCAGTGGGGAA
TTTTGGACAATGGGGGAAACCCTGATCCAGCCATCCCGCGTGTGCGATGAAGGCCTTCGGGTTGTAA
AGCACTTTTGGCAGGAAAGAAACGTCGCGGGTTAATACCTCGCGAAACTGACGGTACCTGCAGAATA
AGCACCGGCTAACTACGTGCCAGCAGCCGCGGTAATACGTAGGGTGCAAGCGTTAATCGGAATTACT
GGGCGTAAAGCGTGCGCAGGCGGTTCGGAAAGAAAGATGTGAAATCCCAGAGCTTAACTTTGGAAC
TGCATTTTTAACTACCGGGCTAGAGTGTGTCAGAGGGAGGTGGAATTCCGCGTGTAGCAGTGAAATG
CGTAGATATGCGGAGGAACACCGATGGCGAAGGCAGCCTCCTGGGATAACACTGACGCTCATGCAC
GAAAGCGTGGGGAGCAAACAGGATTAGATACCCTGGTAGTCCACGCCCTAAACGATGTCAACTAGCT
GTTGGGGCCTTCGGGCCTTGGTAGCGCAGCTAACGCGTGAAGTTGACCGCCTGGGGAGTACGGTCGC
AAGATTAAAACTCAAAGGAATTGACGGGGACCCGCACAAGCGGTGGATGATGTGGATTAATTCGAT
GCAACGCGAAAAACCTTACCTACCCTTGACATGTCTGGAATGCCGAAGAGATTTGGCAGTGCTCGCA
AGAGAACCGGAACACAGGTGCTGCATGGCTGTCGTCAGCTCGTGTCGTGAGATGTTGGGTTAAGTCC
CGCAACGAGCGCAACCCTTGTCATTAGTTGCTACGAAAGGGCACTCTAATGAGACTGCCGGTGACAA
ACCGGAGGAAGGTGGGGATGACGTCAAGTCCTCATGGCCCTTATGGGTAGGGCTTCACACGTCATAC
AATGGTCGGGACAGAGGGTCGCCAACCCGCGAGGGGGAGCCAATCCCAGAAACCCGATCGTAGTCC
GGATCGCAGTCTGCAACTCGACTGCGTGAAGTCGGAATCGCTAGTAATCGCGGATCAGCATGTCGCG
GTGAATACGTTCCCGGGTCTTGTACACACCGCCCGTCACACCATGGGAGTGGGTTTTACCAGAAGTA
GTTAGCCTAACCGCAAGGGGGGCGATTACCACGGTAGGATTCATGACTGGGGTGAAGTCGTAACAA
GGTAGCCGTATCGGAAGGTGCGGCTGGATCACCTCCTT

Table 1 Morphological and biochemical characteristic of *Achromobactrar Xylosonidans* from Lonar Lake	
Name	ALP10
Source	W
Colony Colour	W
Colony Morphology	W,S,C,E
Gram Reaction	-
Shape	Irregular
Arrangement	Single
Endospore	-
Motility	-
Catalase	-
Oxidase	+
Indol	-
Methyl red	-
Vogespraskaur	-
Citrate	+
Lactose	-
Xylose	+
Maltose	-
Fructose	-
Dextrose	-
Galactose	-
Raffinose	-
Trehalose	-
Melibiose	-
Sucrose	-
L-arabinose	-
Mannose	-
Inulin	-
Adonitol	-
Xylitol	-
ONPG	-
Esculin	-
D-arabinose	-
Citrate	+
Mallonate	-
Sorbose	-

Nitrate Reduction	+
Urease	-
Starch Hydrolysis	-
Bacteria on the basis of 16S r RNA Sequencing	*Achromobacter xyloxidans*
S – Sediment, W-Water, S-Single, I-Irregular, Cir- Circular, W- White, S-Small, E-Entire, G- Green, SR-Short rod, CB- Coccobacilli, P- Paired and G- Group	

Table 1 provides information pertaining to the isolation of methanotrophs from Lonar Lake. The samples were collected from Lonar Lake. Samples were analyzed for, Morphological, Cultural and Biochemical Characteristics as well as 16s rRNA sequencing. On the basis of morphological, cultural, biochemical and 16s r RNA sequencing results it was evident that the methylotrophs was *Achromobacter xyloxidans.*

IV. CONCLUSION

Numerous methanogenic and methanotrophic genera can be found in the unknown area of alkaline Lonar Lake, which may be useful for preserving the environment. The findings of the current investigation indicate that methanotrophic bacteria Achromobacter xyloxidans are active over time for reducing methane and other C1 compound pollutants.

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Sequence of Lava Flows in Vambori Dongargan Ghat Section in Ahamadnagar District

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ABSTRACT
The basaltic lava pile of Vambori-Dongargan ghat section is comprised of lava flows between 613m and 719.5m elevations above MSL respectively. Majority of lava flows are compact porphyritic basalt flows ranging from thickness 2.75m to 27.00m. Plagioclase phenocrysts are visible to naked eyes. Olivine is altered to Iddingsite is also seen. Out of twelve lava flows nine flows are of compact porphyritic basalt two flows are of compact aphanitic basalt and one flow is of amygdaloidal basalt.

I. INTRODUCTION

The Deccan Basalt in Western India represents one of the most remarkable volcanic provinces of earth. This volcanic province occupies about 500000km^2 covering most of the parts of Maharashtra, Gujarat, and Madhya Pradesh(Krishnan 1982) Several research groups have studied Deccan Basalts over the entire length of Western Ghats (Mahoney et.al. 1982; Cox and Hawkesworth1984;1985; Beane et.al. 1986; Devey and Lightfoot1986; Devey and Cox1987; Lightfoot and Hawkesworth 1988; Bodseet.al. 1988; kadriet.al.1988, Subbarao et.al. 1988;1994)These investigations are essentially restricted to few areas , therefore, study of critically located ghat section of Ahamadnagar district has been taken up. Due to its proximity to Nasik, which is considered to be the centre of large shield volcano (Beane et.al. 1986) and secondly it constitutes link in between western part of Marathwada region of Deccan Volcanic Province. Stratigraphic correlation of the lava pile is crucial to understand the extent of volcanic eruption and the edifice of shield volcano.

Vambori-Dongargan ghat section is exposed on Ahamadnagar-Shendi-Dongargan-Vambori road. It is 21.500 Km away from township of Ahamadnagar. The ghat section is located towards North of Ahamadnagar Township. The ghat section starts from Vambori village River Bridge which is at base (Ch.21.500) MSL 613m to Dongargan village at top MSL 719.5m (Ch.19.00) and has length of 2.5km. The basalt flows are simple type and are ranging in thickness from 2.82m to 27.00m. Majority of the flows are compact porphyritic in nature with varying degrees with phenocrysts of plagioclase, sometimes of augite and rarely olivine set in groundmass of plagioclase, clinopyroxene, opaque and glass.

LOCATION/STUDY AREA

To carry out the systematic detailed study of the lava flows exposed in Vambori Dongargan ghat section the flow boundaries of the lava flows were demarcated. The flows are exposed in Vambori- Dongargan are from MSL 613m to MSL 719.50m. The ghat section is exposed on Ahamadnagar-Shendi-Dongargan-Vambori road at a distance of 21.500km from Ahamadnagar town towards north of Ahamadnagar and has length of 2.5km. The ghat section comprises succession of basaltic lava flows exposed from village Vambori (at river) which is at the base of ghat section and Dongargan village at the top of the ghat section. In this ghat section there are twelve lava flows exposed.

Fig 1:-Map of India

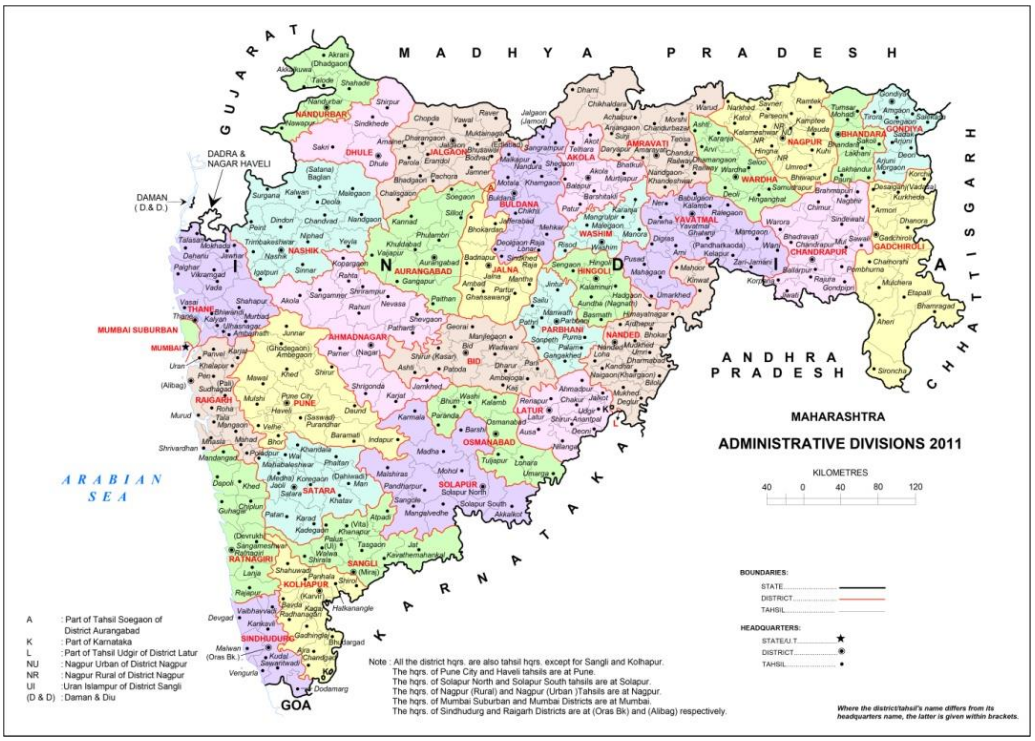

Fig 2:- Map of Maharashtra

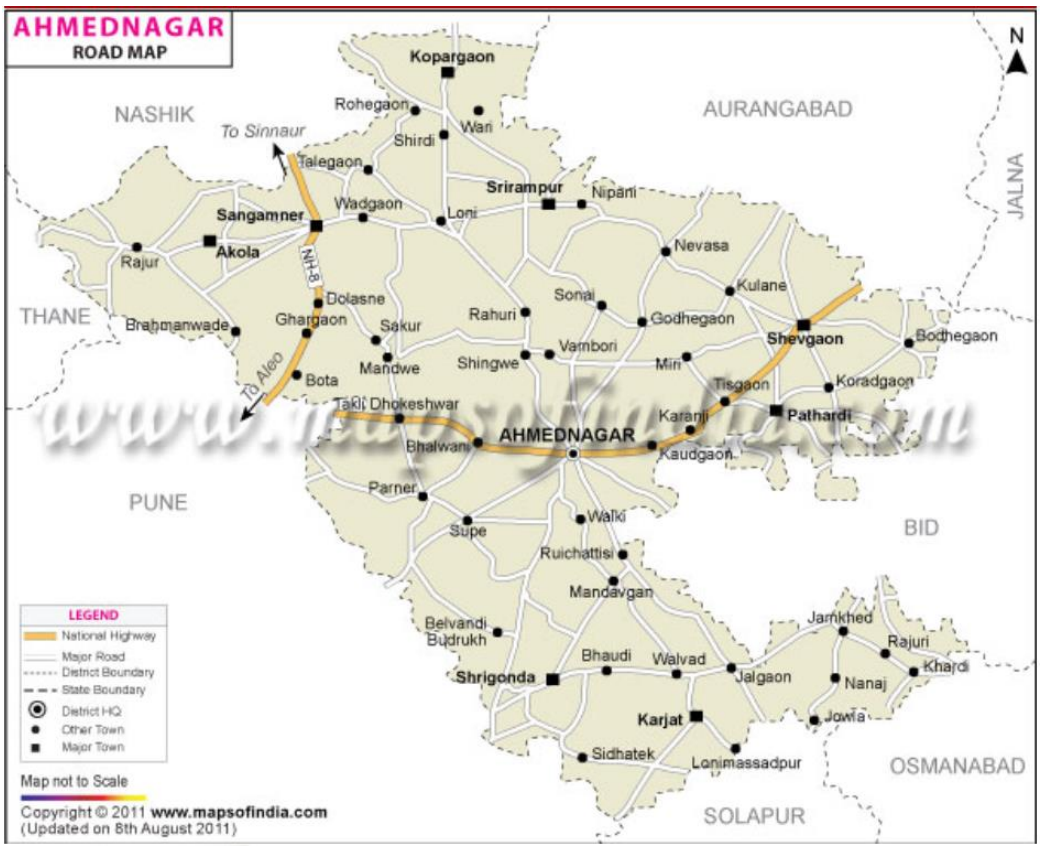

Fig 3:- Location of Vambori Study Area

II. METHODOLOGY

Field investigations were carried out with the help of ghat traverses and the basalt flows were marked in ascending order. Fresh samples were collected from the flows.

All the flows have horizontal surface and majority of the basalt flows are porphyritic and very few flows are aphanitic. The porphyritic basalt flows have plagioclase phenocryst of large size and are visible to naked eyes. The top portion of the flows is amygdales filled with secondary minerals like calcite, zeolite, chlorpheite etc. Spheroidal weathering of some compact aphanitic basalt flows is also seen. Entire ghat section is devoid of Tachylytic basalt flow and dyke. The summary of the salient features of Vambori-Dongargan ghat section is given below in table No.1

TABLE NO. 1

Vambori-Dongargan Ghat Section	Description
Thickness of lava pile	106.500m
Minimum elevation above MSL	613.000m
Maximum elevation above MSL	719.500m
No. of Flows	12
Minimum thickness of lava flows	2.75m
Maximum thickness of lava flows	27.13m
No. of Amygdaloidal basalt flows	1
No.of compact porphyritic basalt flows	9
No.of compact aphanitic basalt flows	2

Flow type, thickness and their percentage in Vambori-Dongargan ghat section is given below in table No.2

TABLE NO. 2

Flow Type	No of Flows	Maximum Thickness of Flow	Minimum Thickness of Flow	Average Thickness of Flow	Flow % In Ghat section
Compact Porphyritic Basalt	9	27.13m	2.75m	9.83m	83%
Compact Aphanitic Basalt	2	8.30m	7.00m	7.82m	14.36%
Amygdaloidal Basalt	1	2.82m	2.82m	2.82m	2.64%

Description of lava Flows

Flow No.1:- This flow is compact porphyritic basalt flow with medium sized phenocryst of plagioclase. These plagioclase phenocrysts are turbid white in colour. The thickness of this flow is 27.13m.

Flow No.2:-This is compact porphyritic basalt flow having lath shaped plagioclase phenocryst with length of 7cm. to 8 cm. Its middle portion shows Spheroidal weathering. The thickness of this flow is 4.00m.

Flow No.3:- This is compact porphyritic basalt flow with small to medium sized plagioclase phenocryst. The thickness of this flow is 8.42m.

Flow No.4:- This is compact porphyritic basalt flow having thickness of 7.32m.

Flow No.5:- This is compact porphyritic basalt flow having thickness of 8.25m. The plagioclase phenocrysts are of small to medium size.

Flow No.6:- This is compact porphyritic basalt flow having white coloured plagioclase phenocryst with white lustre embedded in glassy matrix. The thickness of this flow is 17.38m.

Flow No.7:- This is compact porphyritic basalt flow with small to medium sized plagioclase phenocryst. The thickness of this flow is 3.28m.

Flow No.8:- This is amygdaloidal basalt flow having thickness of 2.13m. The amygdales are filled with silica and zeolites.

Flow No.9:-This is compact porphyritic basalt flow. The plagioclase phenocryst has length of 6cm.and exhibit vitreous lustre. The thickness of this flow is 2.75m.

Flow No.10:- This is compact aphanitic basalt flow having thickness of 7.00m.

Flow No.11:- This is compact aphanitic basalt flow having thickness of 8.30m.

Flow No.12:-This is compact porphyritic basalt flow. Lath shaped plagioclase phenocrysts are visible to naked eyes having length up to 8 cm. The flow has thickness of 10.00m

III. SUMMARY AND CONCLUSION

1 It is observed that compact porphyritic basalt flows are predominating in this ghat section indicating that fissure type of eruption seems to have been prevalent occurring above MSL 600m and this is in agreement with central part of Deccan Trap. (Kulkarni 1984)

2 The predominance of lath shaped plagioclase phenocryst in Vambori – Dongargan ghat section is an indication of slow rate of cooling of lava and also indicates the accumulation of plagioclase phenocryst by floatation in highly differentiated magma that concentrated near the roofs of magma chamber at shallow depth which is in agreement with R.K.Sharma and Sudha vaddadi (1991)

3 The absence of Red Tachylyte is in agreement with the conclusion drawn by Kulkarni (1975) that the lava flows came in quick succession without intertrappean intervals.

4 The field characters of basalt flows have clean basalt to basalt contact at many places which confirms the view that the lava flows came in quick succession and there were no intertrappean intervals as concluded by P.S. Kulkarni (1984)

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What's New in Ethnopharmacology ? Future Issues to Consider

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ABSTRACT

Although it is commonly known that people have employed medicinal herbs for millennia, ethnopharmacology as a defined discipline of scientific investigation has a comparatively recent history. It is tied to the development of pharmacology in the nineteenth century (as shown by Claude Bernard's work relating explorers' observations on traditional usage of medicines and toxins) and to the 1960s preoccupation with psychedelic drugs. This curiosity gave rise to ethnopharmacology, a term that was first used in 1967.The field has grown significantly in recent years, with thousands of ethnopharmacological studies produced each year. It currently includes anthropological, historical, and other socio-cultural studies of local and traditional plants, fungi, and animals, as well as biological and clinical investigations of resources utilised as medicines, poisons, and foods, among other applications. It is one of the few topics in science that is really transdisciplinary, and it serves as a vital link between the social and natural sciences. Ethnopharmacological research is also critical for the advancement of human livelihood, health, and well-being.

I. INTRODUCTION

There is little doubt that ethnopharmacology is a growing discipline, as thousands of studies are published in renowned journals. While there aren't many institutes named after the phrase, many groups working in pharmacy, biology, and chemistry, among other fields, publish in it. It's astounding for a field of study with such a brief history.

By definition, ethnopharmacology is a scientific study of the biological activities of any preparation used by people that has, in a broad sense, either beneficial or poisonous or other direct pharmacological effects. As a result, the focus is on a broad anthropological and pharmacological-toxicological research of these mixtures, rather than on detailing (usually local or traditional) usage. This definition generally includes studies detailing the usage of helpful plants, but these are usually undertaken with the purpose of leading to an experimental investigation of botanical medications. (Heinrich et al., 2009).

The term 'ethnopharmacology' was first used in 1967 by Efron and colleagues in the title of a book on hallucinogens called Ethnopharmacological Search for Psychoactive Drugs (Efron et al., 1970; Holmstedt, 1967). This term came far later than ethnobotany, which was coined by American botanist William Harshberger in 1896 to describe the study of human plant use. Both ethnopharmacology and ethnobotany study the human-plant relationship in all of its complexities. "Essentially ethnopharmacology is the research

of non-Western (not mine) therapeutic plant species," says Daniel E. Moerman of the University of Michigan-Dearborn.

Limiting this conversation to the years after 1967 would be inappropriate. Plant- and animal-based remedies are an important aspect of many indigenous medical systems around the world, and they are part of a culture's traditional knowledge. An ethnopharmacological study is one that involves the documentation and systematic investigation of local and traditional usage of a plant or taxon. The applications of such medicinal plants are described by explorers, missionaries, merchants, and knowledgeable professionals in the local healing tradition, and may serve as a foundation for ethnopharmacology-based drug discovery. This knowledge has been widely used as a beginning point for drug development for centuries, and after an initial lead is discovered, many researchers no longer consider it to be useful. In today's ethnopharmacology, the emphasis has shifted to a better understanding of the advantages and hazards. with the goal of using regularly utilised local and traditional plants of assisting in the better and safer utilisation of such resources (Heinrich, 2006; 2009).

In a modern biological and biomedical context, ethnopharmacology requires an integration of pharmacological,or other natural science, approaches with research on local andtraditional uses. Hence, Claude Bernard (1813-1878), one of thefounding fathers of pharmacology and physiology, is rightfullyseen as one of the first researchers to conduct what today wewould call an ethnopharmacological study. His interest was onthe study of curare and the reasons behind why it was nontoxicif applied orally. He wrote (Bernard, 1966): 'One of thefacts noted by all those who reported on curare is the lack oftoxicity of the poison in the gastrointestinal tract. The Indiansindeed use curare as a poison and as a remedy for the stomach'(p. 93). This is also linked to the way curare is prepared andapplied. Bernard also stated:'If curare is applied into a livingtissue via an arrow or a poisoned instrument, it results in deathmore quickly if it gets into the blood vessels more rapidly. Thereforedeath occurs more rapidly if one uses dissolved curare instead ofthe dried toxin' (Bernard, 1966: 92). Bernard also was able todemonstrate that the animals did not show any nervousnessand no sign of pain. The main sign of death induced by curareis muscular paralysis. If the blood flow in the hind leg of afrog is interrupted using a ligature without interrupting theinnervations, and it is poisoned via an injury of the hind leg,it retains its mobility and the animal does not die from curare poisoning (p. 115). These and subsequent studies allowed a detailed understanding of the pharmacological effects of curare on other respiratory paralysis. This is an ethnopharmacological analysis of traditional practice using 19th century state-of-theart biomedical science.

The principal compound responsible for this activity was isolated for the first time from Chondrodendron tomentosum Ruizand Pav., and in 1947 the structure of the bisbenzylisoquinoline alkaloid, D-tubocurarine was determined. Finally, tubocurarine's structure was resolved using NMR in the 1970decade showing that it has only one quaternary nitrogen.Currently, in many European countries tubocurarine is sporadically used, for example, in France it is still used for muscle relaxation during surgery (Heinrich, 2010). In a similar argumental line, 19th century research of phantastica and hallucinogenic substances played a crucial role in the development of psychopharmacolgy/neuropharmacology (Holmstedt, 1967)

An ethnopharmacological approach can include any type of empirical use and'medical testing' of a plant for new purposes. The foxglove, Digitalis purpurea L., Scrophulariaceae, was first employed by an English housewife to cure dropsy, now known as edoema, and was later studied more thoroughly by physician William Withering (1741-1799). In order to develop a medicine employed by conventional medicine, he utilised orally conveyed knowledge of British herbalism. Herbalism was previously more of a clinical practise concerned with the well-being of patients, rather than a scientific study of the applications and chemical qualities of medicinal herbs.

These two historical examples are among the many success stories of an ethnopharmacology driven drug development strategy, albeit the earlier ones were not called so at the time. Numerous other examples could be listed including most recent developments on Galanthus spp./Leucojum spp.(galanthamine), Croton lechleri Muell. Arg. (Crofelemer), Euphorbia peplus L. (Peplin) and Cannabis sativa L. (Sativex®), to name just a few examples (Heinrich, 2010). Clearly, natural products remain one of the most important sources, even maybe the most important one, of new drug leads. More than half of new products commercially launched are natural products, their derivatives or mimetics (Chin et al., 2006).

Similar examples could be found in other medical traditions, but the above examples demonstrate that the coining of the term ethnopharmacology actually provided focus and a clear concept of a field of research interested in the intersection of traditional and local medical use of plants, as well as their biological characteristics. It also superseded several other terminology like as pharmakothnologie, pharmacoetnologia, and aboriginal botany, which were originally used by Tschirch (1910) in his classic 'Handbuch der Pharmakognosie.'

So how did the term and the concept the term represents come about? Even though the term itself is less than 50 years old, in fact its origin is not well known as one would expect. This article is more than anything a call for more research into the short history of this field. A critical appraisal of the term would be well warranted. After its initial use in the context of hallucinogenic plants the term was only occasionally used until 1979, when Laurent Rivier and Jan Bruhn founded the Journal of Ethnopharmacology. With this event, the scope was broadened to “a multidisciplinary area of research concerned with the observation, description, and experimental research of indigenous drugs and their biological activity” (Rivier and Bruhn, 1979). Thirty-five years later, many journals (including the Revista Brasileira de Farmacognosia or Brazilian Journal of Pharmacognosy) publish ethnopharmacological research and give testimony to the thriving research interest in how we humans use plants as medicine, food, as toxins or as a veterinary ailment. A much larger share of articles focus on the biological and pharmacological activity of locally and traditionally used medicinal plants, studies analyzing the local and traditional uses, as well as historical ones, still are an important part of what constitutes ‘ethnopharmacology’.

We continue to have a heated debate about who benefits from this research and how we can best follow ethical guidelines based on the Convention on Biological Diversity (Rio Convention, 1992) and subsequent agreements such as the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization (ABS) to the Convention on Biological Diversity (2010). As

previously said, research in the topic is growing, and there are numerous prospects, perhaps most notably in terms of building a scientific basis for utilising such local and traditional resources.

With this development in mind I need to highlight that, as in all disciplines, the debate also is very much about what constitutes good quality in the field. In this regard we have numerous challenges exacerbated by the multidisciplinary nature of what today constitutes ethnopharmacology. Thus key challenges are often related to scientific precision and accuracy; thus ascertaining that the scientific results are scientifically reliable and reproducible. I just want to remind us of key challenges, and how to achieve them continues to be an essential debate (Heinrich and Verpoorte, 2014):

a. The botanical authenticity and details about how this was achieved needs to be authenticated (e.g. Bennett, 2014; Rivera et al., 2014).
b. Ethnopharmacology is about linking local/traditional uses with biologic and biomedical studies. Therefore, it is crucial to base research on a very sound understanding of these uses and the importance of the plants in a community (Heinrich et al., 2009)
c. No study makes sense, if it is not supported on a chemical and analytical base, and the description of extracts. We have particular challenges and as much information as possible on an extract and its composition is an essential element of all ethnopharmacological studies (e.g. Sheridan et al., 2012)
d. There are many challenges in the context of pharmacology, but again it is crucial that pharmacological research uses state-of-the-art approaches. The models and doses used must be of physiological and/or pharmacological relevance, and the studies have to be conducted based on the existing standards (e.g. Cos et al., 2006; Verspohl, 2002 among others). One could write pages on what constitute minimum standards for pharmacological studies on plants. There are trivial points, we all need to remember: the proper use of positive and negative controls, the use of a dose range which is of pharmacological relevance, and appropriate dosing regiments and modes of application in in vivo studies.

The larger problem is to understand and appropriately explain the botanical and phytochemical characteristics of the medications being examined, as well as to use a strong, state-of-the-art, and fully repeatable approach that is relevant to the topic being asked. To name just one of the many issues raised in the literature, a generic in silico or in vitro assay for antioxidant activity is utilised, and then inferences are drawn about the potential benefits in the case of, say, Alzheimer's disease or other forms of dementia that are chronic. The assays employed in this example have no pharmacological relevance for the conditions being researched, but they do provide broad information about a botanical drug's anti-oxidant activity in general, and hence its edibility. The latter is equally scientifically intriguing, but not in the context of disease treatment.

Finally, one must assess how much mechanistic insight such a study provides, as a more complete understanding of the underlying mechanisms of action and the drug's specific targets provides a much stronger foundation for evidence-based review than a wide screening.

To sum up this brief and very general overview of ethnopharmacology, we will need to pay much more attention to the methodologies we employ as well as the unique obstacles that a multidisciplinary field of research presents. Ethnopharmacology may make significant contributions to research and is of interest in

almost every country on the planet, particularly those undergoing rapid economic development and the cultural and social changes that come with it. As a result, it is our responsibility to make this study valuable and to strive for best practise (Gertsch, 2009). Claude Bernard established these norms more than 150 years ago, and we must continue in his and other researchers' footsteps.

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Purification & Characterization of Benzonitrile Produced By Bacillus Pumillus

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ABSTRACT
Dihalogenate benzonitrile are active compounds in a number of herbicides and poses to have a deleterious health effect. The biocatalyst was applied to the biotransformation of benzonitrile,3-cynopyridine,(R,S)-3-hydroxy -2- ethylene butanenitrile The enzyme involved in the degradation of benzonitrile by bacteria identified as Bacillus pumilus S7a strain which utilized benzonitrile as sole source of carbon and nitrogen were partially purified by ammonium sulphate precipitation of (80%). The GC results revealed that benzonitrile in single step pathway was converted to ammonia with the formation of benzoic acid as an intermediate by enzyme benzonitrilase.In the present study nitrilase enzyme was produced and purified using Bacillus pumilusS7. The purified enzyme was showing maximum activity at a pH 6(35.32 µmole/min) and maximum benzonitrile degradation with free enzyme was observed at temperature 300c (29.27µmole/min).The metal source FeSo4 (40.55 µmole/min) and enzyme stable up to 30 min (45.14 µmole/min) The Vmax is 0.188µg/ml and km is 0.00178µm.The molecular weight of benzonitrilase were found to be 97400 Dalton

Keywords: Biodegradation, Benzonitrilase, Bacteria, Bacillus, Purification.

I. INTRODUCTION

Nitrilase, which are generally highly toxic due their cyno functional group, can be used by some microorganisms as carbon and nitrogen sources. Nitrilase catalyzes the direct cleavages nitrilase to the corresponding acid and ammonia.(kobayshi 1994 ref 2),whereas nit rile hydratase catalyse the hydration of nitriles to amides(Asano1980,Kobayshi 1992).Both the enzymes are involved in biosynthesis of the plant harmone indol 3 –acetic acid in plants(Barteling 1992,Barteling 1994,Bartel 1994).Nitrilase are widely manufactured and extensively used by the chemical industry, and nitrile herbicides are also widely applied in agriculture.

Thiemann and Mahadevan demonstrated that nitrilase (EC 3,5,5,1) purified the hydrolysis of indolacetonitrile to indolacetic acid and ammonia ,several nitriles found and characterized.(Asano 1982) reported that the

formation of nitrile hydretase and amides, and purification and enzymological properties of the former enzyme from Artrobacter Sp.J-1.Only two fungal nitrilase –from Fusarium solani and F.Oxysporum were purified and characterized (Gold lust and Bohak 1989).We improved the production of nitrilase in several species of filamentous fungi by using picolinitrile(Kaplan et al 2006)..(Layh *et al.*1992) isolated several bacterial strains with nitrilase activities from the environment. They were isolated from enrichment cultures using different arylacetonitriles such as 2-methyl- or 2-ethylbenzylcyanide as sole sources of nitrogen. One of these strains, *Pseudomonas fluorescens* EBC191, was able to use different arylacetonitriles (e.g. 2-phenylpropionitrile) as nitrogen sources and converted the nitriles to the corresponding -substituted carboxylic acids. It was demonstrated that strain EBC191 synthesized a nitrilase, which converted *O*-acetoxymandelonitrile preferentially to *R*-acetoxymandelic acid (Layh *et al.*, 1992). The enzyme was subsequently partially purified, biochemically characterized, and the N-terminal and some internal amino acid sequences were determined (Moser, 1996; Layh *et al.*, 1998). This enzyme seems to possess some potential for the enantioselective production of carboxylic acids from racemic nitriles. In the present work, the nitrilase gene was identified in a genomic library of *P. fluorescens* EBC191, expressed in *Escherichia coli* and the recombinant protein biochemically characterized.

The enzymes involved are different from the nitrile –degrading nitrile hydretase and nitrilase,and organic nitriles cannot be degrade by these becteria.Benzonitrile was chosen as a substract,because it is the simplest organic nitrile ,widely used as solvent and an imported environmental polluntant.The results indicates the presence of a specialized group of previously unknown haloalkophilic bacteria capable of growing with acetonitrile as sole substract (Dimitry 2007)

II. MATERIALS AND METHODS

Elective Enrichment and Isolation

1 gm of soil sample was suspended in Basal salt medium containing (KH_2PO_4 1.5 gm; K_2HPO_4 3.5 gm; $Mgso_4.7H_2O$ 0.19 gm; Yeast extract 50 mg; Trace element ; P^H 7.5; Distilled water 1000 ml.) Benzonitrile 0.05% was added aseptically to sterilized and cooled medium. The suspension (100ml) in 250 ml Erlenmeyer flask was incubated at 30^0 C on rotary shaker. After 7 days 2ml of this culture was transferred to 100ml of fresh medium with little rise in benzonitrile concentration. The process was repeated for a total four transfers by step by step raising the concentration of benzonitrile (0.05 to 0.2%). After one month of acclimatization, the last enrichment culture flask was used to isolate microorganisms on basal salt agar containing 0.2% benzonitrile. The colony characterization and gram staining of bacterial cultures were carried out. The pure cultures were maintained on basal salt agar for further studies.

Optimization of cultural condition

All isolates were capable of growing on mineral medium containing benzonitrile as sole source of carbon and nitrogen. Out of these 60 isolates 17 bacterial strains were screened based on maximum production of ammonia. Secondary screening was carried out based on benzonitrile biodegradation at various pH. Three

strains were selected showing maximum biodegradation in terms of ammonia production at basic, acidic and alkaline pH. In These strains the enzyme activity was found to be maximum in cell supernatant as compair to cell lyzate.The strain S15 was used further for optimization of growth parameters. The intact cells of S15 was showing maximum benzonitrile biodegradation at pH 4 and temperature 30^0c incubation for 72 hrs.The presence of casein as a nitrogen source and fructose as carbon source were found to enhance the benzonitrile hydrolysis

Development of inoculam

Basal salt broth containing 0.2% benzonitrile was prepared and it is inoculated with selected bacterial strain S 15 This flask was incubated on rotary shaker at 100 rpm for 72 hrs. After 72 hrs cells were harvested by centrifuging the culture flask at 10,000 rpm for 10 min. washing of cell pallet was carried out using saline. These intact cells were suspended in saline and used further to study growth parameters.

Enzyme production

The crude enzyme was submerged fermentation .The Basal salt medium was prepared (pH 7) inoculated the culture of bacterial and incubated at 30^0c for 72 hrs. After incubation, centrifugation the sample at 10000 rpm for 10 min.The cell free supernatant was taken the phosphate buffer and sonicated .Crude enzyme was prepared

Enzyme Assay

The benzonitrilase assay was performed using both cell supernatant as well as cell free extract The standard reaction mixture consisted of 50, umol of potassium phosphate buffer (pH 8.0), 3 ,umol of benzonitrile, and an appropriate amount of enzyme in a total volume of 0.5 ml. The reaction was started by adding the substrate and was carried out at 30°Cfor various times, the activity was estimated in terms of ammonia production. Protein was determined by the method of Lowry.

Enzyme Unit: One unit of Benzonitrilase was defined as the amount of enzyme which catalyzed the formation of 1 micromole of ammonia per min.

GC analysis method

The isolated strains were cultured aerobically at 28^0c for the 3 days on the isolation medium. The cells were centrifuged, washed with physiological saline and suspended in 0.1M potassium phosphate buffer, pH 7.0.The reaction mixture for the screening of benzonitrile producing strains contained 100 μmole of potassium phosphate buffer, 300 μmole of benzonitrile as substract, washed cells from 3 ml of culture broth in a total volume of 1.0 ml. The reaction was carried out at 30^0c for 1 hr. with moderate shaking and terminated by addition of 0.2 ml of 1 N HCL.

The mixture was determined with a Chemito Gas chromatograph, Model GC -7610 equipped with flame ionized detector. The column used was stainless steel silicon 30, packed with porapack Q (80 to 100 mesh)

operational conditions were: column temperature,200^{0}c; injection and detector temperature 151^{0}c and 201^{0}c.The carrier gas was N_2 at 40 cm^3/min.

Purification of enzyme from bacteria

Step 1 –Ammonium sulphate precipitation

Ammonium sulphate was added to 90% saturation. The crude enzyme prepared was brought to 80% saturation with ammonium sulphate at pH of 6 and kept overnight in cold room. After equilibration, the supernatant was brought to 90% saturation with ammonium sulphate and centrifuged at 8000rpm, at 4^{0}c for 10 min.Then precipitates were collected separately and dissolved in a 0.05 M phosphate buffer at pH 7 stored at 4^{0}c for the purification.

Step 2- Dialysis

The precipitation dissolved in 0.05M potassium phosphate buffer and dialysis .after, dialysis the samples were used for protein estimation and enzyme activity

SDS page analysis

Molecular weight and puriety determinations on the nitrilase were performed by electrophoresis on polyacrylamide gel in the presence of SDS by thin layer techanique that enabled up to 1samples to be analysed simultaneously on the same gel slab .This methods used was based on that described by weber et al (1972) for disc gel electrophorasis .Thin layer gels of 0.2%(w/v) SDS dissolved in 100mM-sodium phosphate buffer,pH7.2 were suitable,and were polymerized by using ammonium persulphate as catalyst and NNN'N-tetramethylenendiamine s accelerator in the usal manner.Sample of standards proteins and of nutrias were prepared for application to the gel in 10mM-sodium potassium buffer,pH 7.0containing 1%(w/v)SDS and 1%(v/v) mercaptoethanol at 100^{0}c.pieces(1.5mm×6mm) of whatmann 3MMchromatography paper were soaked in the sample solution dried to remove superficial moisture and placed vertically in slites along the length of the gel(25cm×12.5cm) on the side adjacent to the cathode.The slite was filled to the surface of the gelwith 10mM-sodium phosphate buffer pH7.2containing 0.1% micropipette .Bromophenol blue was used as the traking dye.The gels were subjectedto transevere electrophorasis on the instrument ,the reserioir buffer,pH 7.2 containing 0.1%(w/v) SDS and 0.1% micro-pipette.Bromophenol blue was used as the traking dye.The gels were subjected to transverse electrophorasis,The reservoir buffer in the cathode compartments beingb 50mM-sodium phosphate buffer,pH 7.2,contaning0.1%(w/v) SDS with voltage of 80-100V and a current of 40-50mA at a tempraturebof 17.5^{0}c,a running time of about 16 hours was required to complete electrophorasis,ie. For the traking dye approach the anodic side of the gel.The position of the dye was then marked with water proof black ink and the gel stained with coomassie brillent blue.The distance migrated by the stained protein bands and the dye was measured and the relative mobilities of the sample proteins with respect to the traking dye were calculated From a plot of the weights of the polypeptide chains of standered proteins against their electophoretic mobility the molecular weight of the subunits of the isolated nutrias enzyme was determined from their relative mobility.in addition to certain of the standered proteins used in proteins used in gel filtration experiment, the following proteins were also used for callibration

Characterization of purified nitrilase parameter

The partially purified enzyme was used for the characterization of nitrilase and optimization of its activity

Optimization of pH

The pH activity profile of the partially purified enzyme (pH range 3 to 10) was studied citrate buffer (pH range 3.0-4.0), Citrate phosphate buffer (pH range 5.0-6.0), Phosphate buffer (pH range 7.0-8.0), Glacial sodium hydroxide (pH range 9.0-10.0). The standard reaction mixture consisted of 50, umol of potassium phosphate buffer (pH 8.0), 3 ,umol of benzonitrile, and an appropriate amount of enzyme in a total volume of 0.5 ml. The reaction was started by adding the substrate and was carried out at 30°Cfor 20 times, the activity was estimated in terms of ammonia production. Protein was determined by the method of Lowry.

Optimization of Temperature

The activity of enzyme was measured at different temperature ranging from10^0c to 80^0c . The standard reaction mixture consisted of 50, umol of potassium phosphate buffer (pH 8.0), 3 ,umol of benzonitrile, and an appropriate amount of enzyme in a total volume of 0.5 ml. The reaction was started by adding the substrate and was carried out at various temperature for 20mintues, the activity was estimated in terms of ammonia production. Protein was determined by the method of Lowry.

Optimization of Metal ion concentration

The standard reaction mixture consisted of 50, umol of potassium phosphate buffer (pH 8.0), 3, umol of benzonitrile, and an appropriate amount of enzyme in a total volume of 0.5 ml as supplementary as metal source like Cr^{2+},$Mg^{2+}$$Fe^{2+}$,$Cu^{2+}$. , Mn^{2+},Zn^{2+},Co^{2+},Cu^{2+}. The reaction was started by adding the substrate and was carried out at various temperatures for 20mintues; the activity was estimated in terms of ammonia production. Protein was determined by the method of Lowry.

Optimization of enzyme stability

The benzonitrilase assay was performed using both cell supernatant as well as cell free extract The standard reaction mixture consisted of 50, umol of potassium phosphate buffer (pH 8.0), 3 ,umol of benzonitrile, and an appropriate amount of enzyme in a total volume of 0.5 ml. The reaction was started by adding the substrate and was carried out at 30°Cfor various times; like 10 min, 20 min….. The activity was estimated in terms of ammonia production. Protein was determined by the method of Lowry.

III. RESULTS AND DISCUSSION

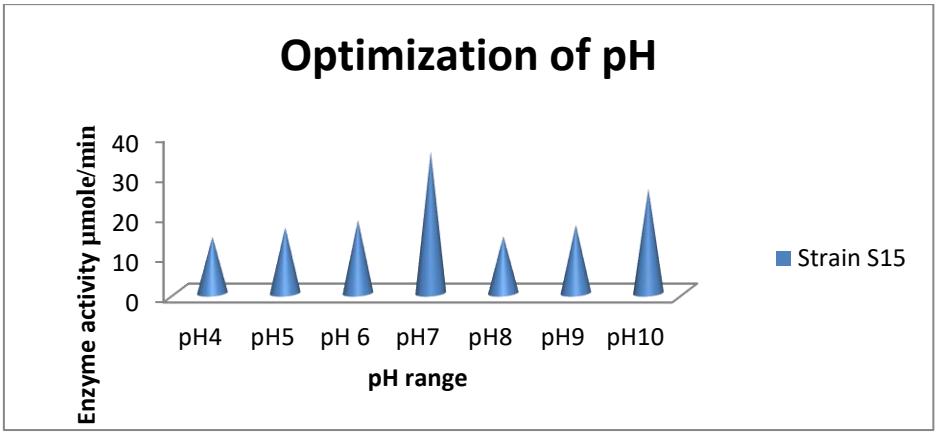
By elective enrichment 60 different bacterial cultures were isolated from soil capable of utilizing benzonitrile as a sole source of carbon and nitrogen.(Heper 1977) show that cultures actively growing on benzonitrile as carbon and nitrogen source were tested for their for their ability to oxidized possible intermediate in the degradation of benzonitrile. The production of ammonia was estimated from culture filtrate of all sixty

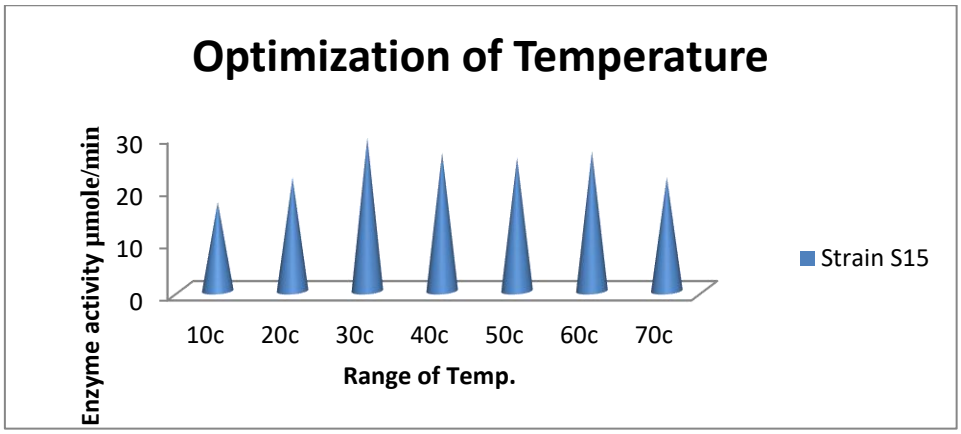
isolates. At primary level 17 isolates were screened out on the basis of maximum production of ammonia as one of the metabolite of degradation.). To study the impact of pH on benzonitrile degradation all 17 isolates were grown at three distinct pH. The results has shown that the strain C8 , S14 and S15 were degrading benzonitrile at high rate in respective pH viz. 7, 9 and 4 (Table 1). Harper (1977) has shown that in Arthobacter sp.J-1 benzonitrile was directly hydrolyzed to benzoic acid and ammonia by nitrilase. In These strains the enzyme activity was found to be maximum in cell supernatant as compair to cell lyzate.The strain S15 was used further for optimization of growth parameters. The intact cells of S15 was showing maximum benzonitrile biodegradation at pH 4 and temperature 30^0c incubation for 72 hrs.

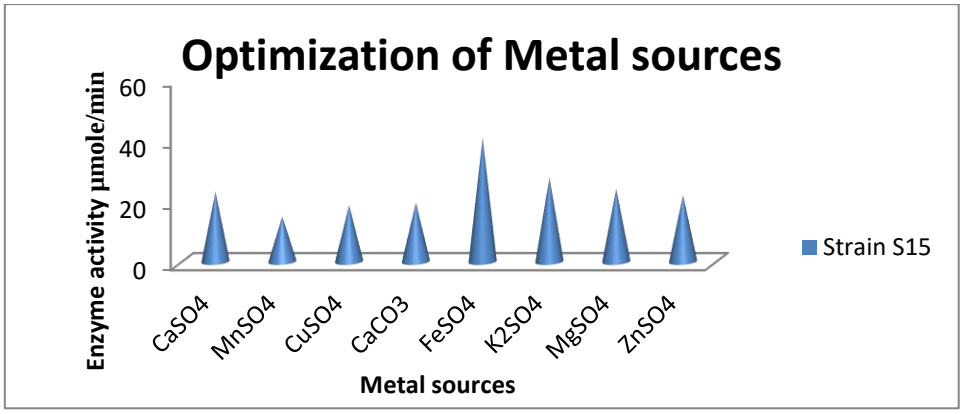
In course of time benzonitrile was degreaded by accumulating benzoic acid and ammonia but benzamide was not detected throughout the cultivation of all three selected strains. Tentatively all three strains are showing the direct degredation of benzonitrile to benzoic acid and ammonia by enzyme nitrilase which was confirmed by Gas chromatography. (Asano 1982) reported that a new enzyme aliphatic nit rile hydretase catalysed the hydration of nitriles to amides in Arthrobacter sp.J -1. The expression of nitrilase was studied by observing enzyme activity in cell supernatant as well as in cell lysates. all these three strains the enzyme activity was more in cell supernatant as compare to cell lysates. Further the strain S15 was showing highest activity which was selected for study on purification and characterization of enzyme.

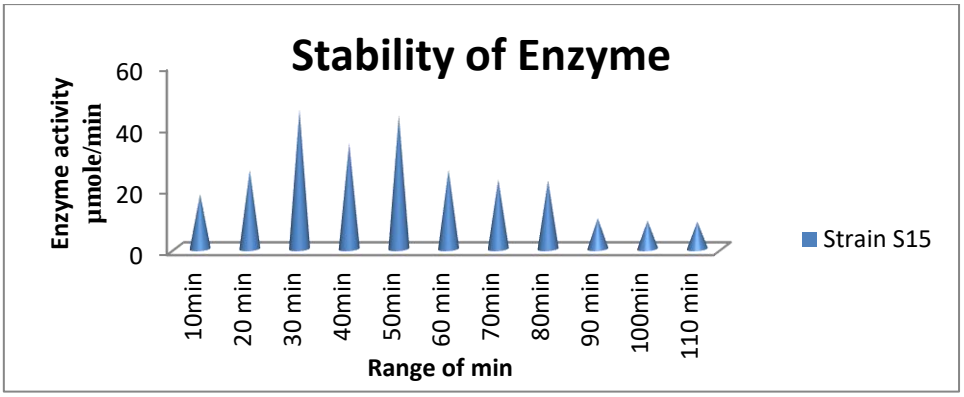
The strain S15 has shown maximum partially Purified enzyme at 80% by ammonium sulphate method.(Dias 2000) reported that different encapsulated matrics were tested for purified cells of *candida guilliermondii* UFMG- Y65 used for acetonitrile degradation.Acetonitrile degradation by free cells and cells immobilized in Ba-alginate,k-carrageenan. The partially purified enzyme was used for the characterization of nitrilase and optimization of its activity. The enzyme activity found at pH 7of phosphate buffer (35.65µmole/min). Similarly the enzyme activity was maximum at mesophilic temperature 30 °c (29.27µmole/min). The enzyme is found to be stable up 30 min(45.14 µmole/min).The metal source $FeSo_4$ (40.55 µmole/min) and The Vmax is 0.188µg/ml and km is 0.00178µm

Characterization of purified nitrilase parameter

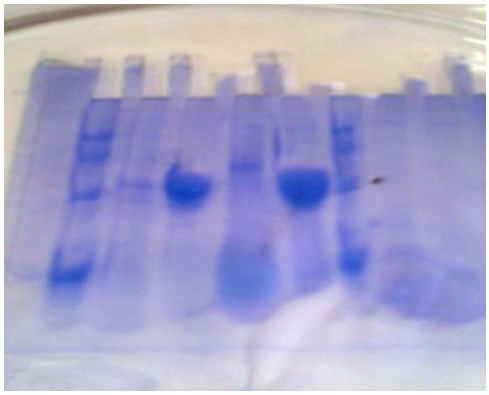








Determination of Vmax and km

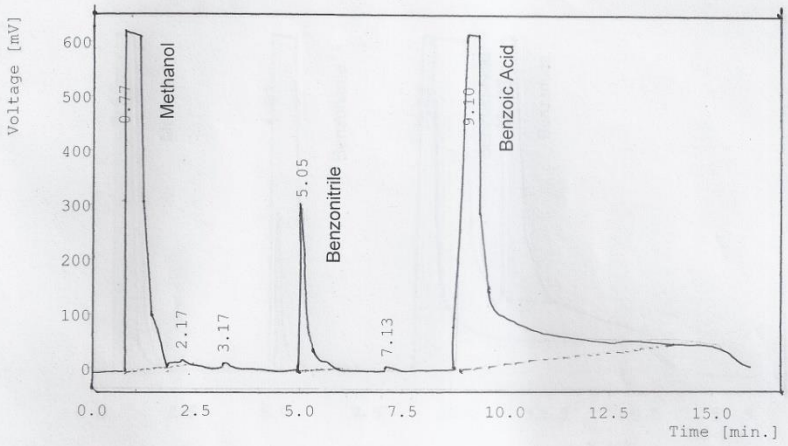


Gas chromatography

Tue, 29th Jun, 2010 22:11:03 S15 Page 1

Sample ID : BacteriaS15 n met
Sample : BacteriaS15 n met
Amount : 2
ISTD Amount : 0
Raw Data : Not Saved
Primary : s15
Project : work4

Analyst : p
Dilution : 1
Inj. Volume : 3
From : Tue, 29th Jun, 2010 21:53:27
Calibration : (none)
Style : report



Result Table - Calculation Method Uncal

Peak No.	Reten. time	Area [mV.s]	Height [mV]	W05 [min.]	Area [%]	Height [%]
1	0.767	20202.5151	622.6774	0.4900	37.4728	39.9809
2	2.167	194.8162	10.3093	0.1533	0.3614	0.6619
3	3.173	80.3208	8.3291	0.1333	0.1490	0.5348
4	5.050	3315.0363	296.6329	0.1333	6.1489	19.0462
5	7.133	56.9882	5.9107	0.1733	0.1057	0.3795
6	9.097	30062.7477	613.5793	0.4867	55.7622	39.3967
-	Total	53912.4244	1557.4387			

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Determination of Acoustical Parameter of Glucose and Its Fe (III) Metal Complex by Ultrasonic Technique

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ABSTRACT
Ultrasonic waves are the vibration waves of frequency above normal hearing range, these type of waves are referred as 'Ultrasonic waves'. Ultrasonic velocity, viscosity and density have been measured in aqueous solution of glucose ligands and their metal complex of Fe(III) in distilled water at 306K. From the experimental data, various acoustical parameters such as adiabatic compressibility(β s),relative association(RA), specific acoustic impedance (Z), free path length(Lf), relaxation amplitude(α /f2), relaxation time(τ) , relative viscosity(Ƞr) etc. have been evaluated, which helps in understanding the molecular interactions occurring in these solutions. The Ultrasonic velocity determined by the equation
Velocity =Wavelength X Frequency
V= λx f
Where λ=2d/n
Key Words: Velocity, Density, Viscosity.

I. INTRODUCTION

In recent years the measurement of ultrasonic velocity has been adequately employed in understanding the nature of molecular interaction in pure liquids and liquids mixtures. Ultrasonic propagation parameters yield valuable information regarding the behavior of liquid systems, because intramolecular and intermolecular association, dipolar interactions, complex formation and related structural changes affect the compressibility of the system which in turn produces corresponding variations in the ultrasonic velocity.
Recently, the researchers have been focused to design Schiff base metalized complexes as better anticancer drugs and chemotherapeutic agents, due to the Schiff base- metal complexes have potent binding nature with DNA [1]. Schiff base derivatives in biological and chemical processes, prompted the researchers towards the design of novelaryl/heterocyclic Schiff base derivatives and the development of the new technologies for an environmentally benign processes (green chemistry) [3], which are both economically and technologically feasible [4,5]
In the present studies, the ultrasonic velocity and density in solutions of new glucose and their metal complex ofFe(III)) have been measured and various acoustical parameters have been calculated in aqueous medium at 306K.Ultrasonic velocity gives properties of basic importance to sound velocity in molecular theory of liquid.

Number of workers such as "Satyawati [6], Ramchandra [7], Prakash and Shrivastava [8], Marks [9], Agrawal and Bhatnagar [10] made their contribution to ultrasonic study of electrolyte solution and discussed about the variation of ultrasonic velocity with ion concentration.

II. METHODOLOGY

Acoustical properties: The computation of ultrasonic properties require the measurements of ultrasonic velocity (U), viscosity (η) and density (ρ). The densities of pure solvent, their solutionof ligand and their metal complex were measured by using a single capillary pyknometer, made of borosil glass having a bulb capacity of 10 ml. The ultrasonic velocity of pure solvent and their solutions of ligand and their metal complexes were measured by using single crystal variable path Ultrasonic Interferometer operating at 2 MHz. The accuracy of density and velocity are ±0.0001 g/cm3 and ±0.1% cm/sec respectively. Viscosity was measured with the help of calibrated Ostwald's viscometer (corning made) at 33 ± 0.01°C. Uncertainties in the measured viscosities were within ± 0.03%. Viscosity data were analyzed using Jone's Dole equation and Vand's equation. All the measurements were carried out at 306K. The uncertainty of temperature is ± 0.1 K. From the experimental data of density, viscosity and ultrasound velocity of pure solvent and solutions, various acoustical parameters were calculated using following standard equations reported earlier.

1) ADIABATIC COMPRESSIBILITY (βs)

From the ultrasonic velocity (U) and density (d) the isentropic compressibility can be calculated from the following equation.

$\beta s = 1/(U^2 d)$, $\beta^\circ s = 1/(U_0^2 d_0)$

2) RELATIVE ASSOCIATION(R_A)

The relative association expressed in terms of density of solution (d_s) and solvent (d_0) and also ultrasonic velocity of solution (U_s) and solvent (U_0). The relative association calculated by the relation.

$R_A = d_s/d_o (U_o/U_s)^{1/3}$

3) SPECIFIC ACOUSTIC IMPENDENCE (Z)

It is also determine the solvation of solute. It is expressed in terms of ultrasonic velocity of solution and density of solution. It is given by the formula.

$Z = U_s . d_s$

4) FREE PATH LENGTH (L_f)

Free path length is responsible to determine the interaction between the ion and the solvent molecule. The free path length was calculated using the equation.

$L_f = [M \times m / V] \times \eta_r \times 293$

5) RELAXATION AMPLITUDE (α/f^2)

The relaxation amplitude is expressed in terms of viscosity (ηs), density (ρ) and ultrasonic velocity of solution. It is denoted by (α/f2) and measured in sec2/m.

$(\alpha/f^2) = 8 \pi^2 \eta_s / 3 \rho U^2$

6) RELAXATION TIME (τ)

The relaxation time is expressed in terms of viscosity (ηs), density (ρ) and ultrasonic velocity of solution. It is denoted by τ and measured in sec.

$\tau = 4\,\eta_s / 3\,\rho\,U^2$

7) RELATIVE VISCOSITY (ηr)

Relative viscosity (ηr) of various amino acids have been determined from density measurement and viscometric measurement using relation,

$\eta_r = d_s \,.t_s / d_0 \,.\, t_0$

Oswald's Viscometer: The Oswald's viscometer used for measuring viscosity by theabove method. It is first thoroughly cleaned with chromic acid mixture and dried. The co-efficient of the solutions are determined with a Canon-Fenske viscometer. It is a special kind of Oswald viscometer and the principle used is the same. Relative viscosity of each solution is determined by following empirical formula.

$$\eta r = \frac{ds \times ts}{dw \times tw}$$

III. RESULTS AND DISCUSSION

Table-Ultrasonic properties of glucose and their Metal complexes in DMSO solvent at 306K

Acoustic properties		Ultrasonic properties of glucose in water solvent at 306K			Ultrasonic properties of glucose & Fe(III) complexes in water solvent at 306K		
Sr. No.	Concentrations	0.1M	0.01M	0.001M	0.1M	0.01M	0.001 M
1	Density (gm/cm3)	1.011	1.010	1.003	0.9809	0.9806	0.9761
2	Viscosity (Ƞ)(m/s)	0.7560	0.7558	0.6669	0.8459	0.8020	0.7075
3	Ultrasonic Velocity (U)	1.5518	1.4490	1.3708	1.7337	1.5940	1.4408
4	Relative Association (RA)	0.7208	0.7008	0.7792	0.7180	0.8185	0.6873
5	Adiabatic Compressibility (βs)	1.3534	1.3898	1.4088	1.3378	1.3699	1.3944
6	Free path length (Lf) A0	1.6135	1.5268	1.3032	1.7046	1.5522	1.2028
7	Specific acoustic impedance (Z) (m/sec.gm/cm3)	988.12	90.61	8.5625	1898.02	172.858.	17.189
8	Relative viscosity(Ƞ r) (m/s)	0.9078	0.8825	0.9828	0.8945	1.0052	0.8498
9	Relaxation amplitude (α/f2)	30.401	30.001	23.002	34.426	23.989	32.012
10	Relaxation Time (τ)	1.4979	1.4856	1.1621	1.7493	1.6066	1.2532

In the present work, acoustic parameters such as, adiabatic compressibility (βs), relative association (RA), free length (Lf), acoustic impedance (z), relaxation amplitude (α/f2) and relaxation time (τ) have been calculated

for glucose and its metal complexes at different concentrations. All these parameters are studied at constant temperature and at a different concentrations of solution. The adiabatic compressibility of solution is less than water this indicate there is a presence of solute solvent interaction decreases concentration in glucose solution. Relative association value in case of glucose water increases with increase in concentration of glucose; this is due to the electrolytic interaction increases with the increasing concentration.

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A Physicochemical Study of Substituted Pyrazolines Derivatives

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ABSTRACT
Pyrazole is a five membered heterocyclic ring compound containing two adjacent nitrogen as hetero atoms. The dihydroderivative of pyrazole is known as pyrazoline. A series of some new pyrazolines were prepared by the conventional Claisen-Schmidt condensation method under mild reaction condition. Pyrazolines have been widely investigated for their diverse properties. They were formerly considered intermediates in the synthesis of pyrazoles but they have come to notice for their use effective bleaching agents, dyes, luminesent and fluorescent and as oxidized forms in the development of cine films. All the synthesized products were characterized analytical measurements. Furthermore, all the synthesized compounds were study for physicochemical study

Keywords: Pyrazolines, Conductivity, pHmeter, Density.

I. INTRODUCTION

Pyrazolines are important nitrogen-containing five memberd heterocyclic compounds. Several pyrazolines derivatives have important pharmacological activities and therefore they are useful materials in drug research as well as are extensively useful synthons in organic chemistry. Pyrazolines are known to have bactericidal, fungicidal, insectisidal and antiviral properties and they also have come to notice for their use an effective bleaching agents, dyes, luminesent and fluorescent and as oxidized forms some of the pyrazolines showed remarkable depressant, antiarrhythmic and analgesic activities in mice and rats. Moreover, these compounds usually exhibited moderate hypotensive, bradycardic and anti-inflammatory activities in rats. Some pyrazolines were synthesized and evaluated for in *vitro* cytotoxic activity against a panel of human cancer cell lines(1-7) .It is also reported that, pyrazole derivatives are gained synthetic interest in recent years due to their broad spectrum of biological properties like anti-inflammatory, analgesic, antibacterial, and antifungal activities.

II. RESULT AND DISCUSSION

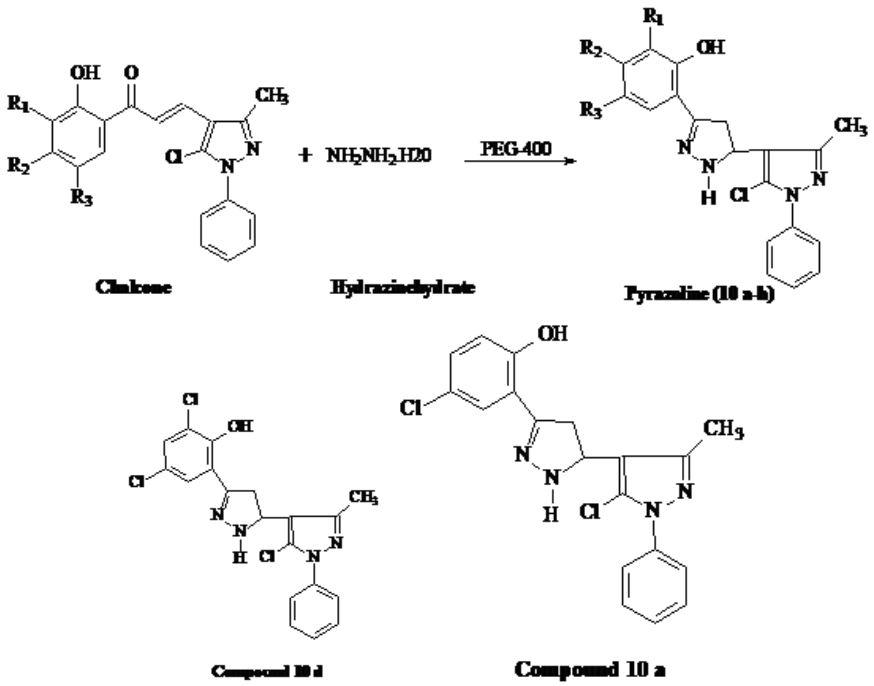
General method for the synthesis substituted pyrazolines

A mixture of chalcone (0.372 gm 1 mmol) and hydrazine hydrate (99%) (0.100 gm 2 mmol) in Polyethylene glycol (PEG-400) (15 mL) was refluxed for 2 hours. After completion of the reaction (TLC), the reaction mixture was cooled at room temperature and poured in ice cold water (100 mL). The separated solid was filtered, washed and recrystallized from ethanol. Substituted Pyrazolines derivatives are conveniently synthesized [8-16].However literature survey reveals that very less work has been done to study the physicochemical properties such as density, solubility, conductance, dissociation constant of Pyrazolines. These physical properties such as density, molecular mass and specific volume is very useful in the evaluation of various thermodynamics properties of chemical materials.

Entry	Product	Mol. Formula	Yield %	M.P. °C
1	R1	C19H16ON4Cl2	82	155
2	R2	C19H15ON4Cl2I	89	148
3	R3	C19H15ON4Cl2Br	85	144
4	R4	C19H15ON4Cl3	90	157
5	R5	C20H18ON4Cl2	80	177

Table 1 Physical data of pyrazolines compounds R1-R5 Compounds.

SCHEME



Physicochemical studies: All the synthesized pyrazolines were recrystalized from Solvents such as chloroform and alcohol were used for the physicochemical studies. All these solvents were purified by standard methods. Pyrazolines was found to be 99.99%. For the determination of dissociation constant, $CHCL_3$ water binary mixture was used. The selection of solvents in different physicochemical study is due to solubility and other practical problems.

Conductance: Solutions of different concentrations were made in alcohol and CHCl3 of all the synthesized compounds. The conductance of pure solvents and of solutions was measured using Equip-tronics conductivity meter (Model No. 664) at 308.15 K. The cell constant was 0.1 cm^{-1} at 308.15K.

Density measurements: Solutions of different concentrations were made in Chloroform and alcohol of all the synthesized compounds. The density of pure solvents and of solutions were measured at 308.15 K by pyknometer . The uncertainty of temperature was ± 0.1^0C and that of density ± 0.0001 g/cm^3

Density: The density of each compound was evaluated using the following relation: $1/\rho12 = g1/\rho1 + g2/\rho2$ where ρ1, ρ2 and ρ12 are the density of pure solvent, pure solute (i.e., synthesize compound and solution respectively. g1 and g2 are the weight fractions of solvent and solute respectively. The slope of plot of $1/g1\rho12$versus g1/g2 gives$1/\rho2$. Density of compounds can be evaluated theoretically by using the equation:$\rho = KM/N_A\sum\Delta Vi$

Where ρ the density of the compound, K is packing fraction (0.599), M is the molecular weight of the compound, N_A is the Avogadro's number and ΔV_i is the volume increment of the atoms and atomic groups present in the compound. Table 1 shows the experimental and theoretical values of density.

Table -2

Compound Code	Experimental density/.cm^3		Theoretical density/cm^3
	C_2H_5OH	$CHCl_3$	
R1	1.13	1.12	1.17
R2	1.14	1.34	1.75
R3	1.15	1.38	1.67
R4	1.18	1.36	1.16
R5	1.58	1.38	1.18

This variation of different values in different solvents suggests that interactions between solute and solvent molecules play an important role. In solutions, molecular interactions exist which differ in different solvents. Further, these interactions differ due to different substitutions in compounds It is observed from this that there is deviation between experimental and theoretical density values. Further, for the same compound, density in the two solvents is different. These values are much higher in chloroform than in ethyl alcohol. Due to these interactions, there may be some changes in volume, which affects density. Thus, different

density values in different solvents and deviation between experimental and theoretical density values suggest the presence of intermolecular interactions between solute and solvent molecules.

PH metric Studies.Thus, total volume of each set of solution was25 ml and ethyl alcohol: water ratio was90:10(v/v). For each set of solution, pH was measured after each addition of 0.1 ml NaOH till there was no change in absorbance. A Equiptronic pH meter (Model No. EQ 664) was used for the pH determination. pH meter was calibrated by known buffer solutions. The glass electrode and a saturated calomel electrode were used as indicator and reference electrodes respectively.

For all the synthesized compounds, following two sets of mixtures were prepared

(1) 2 ml HNO_3 (0.01 M) + 4 ml $NaNO_3$ (0.01 M) + 19 ml alcohol

(2) 2 ml HNO_3 (0.01 M) + 4 ml $NaNO_3$ (0.01 M) + 2 ml

ligand solution (15 ppm) + 17 ml alcohol

Conductance: (λc) $\Lambda c = 1000.k / C$

Conductance measurements of all the Pyrazolines solutions is carried out, was corrected by subtracting the conductance of pure solvent. Using corrected conductance (k), specific conductance (κ) and equivalent conductance (λc) were evaluated. The equations used for calculating specific conductance (κ) and equivalent conductance C is the concentration (g. equi./lit) of solution. K is specific conductance and Λc is equivalent conductance.

Figure 1 shows the variation of conductance with concentration for both the solvents.

Figure shows variation of conductance with concentration of both the solvents Figure -1

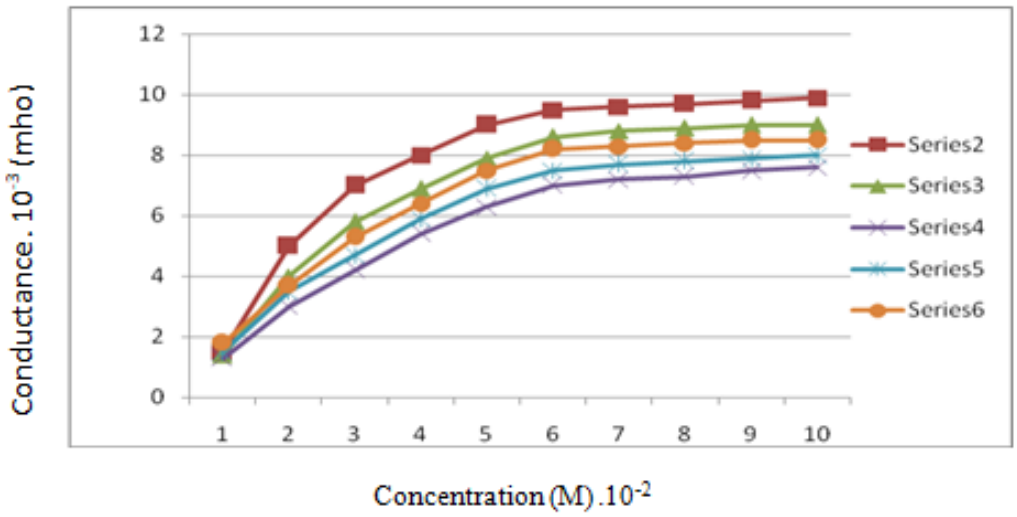


Figure-1 shows variation of conductance with concentration for both the solvents. It is clear from the figure that there is increase in conductance of the solution with concentration and values are slightly less in ethyl alcohol then in chloroform and also at lower concentration there is slight increase in conductance and as concectration is higher slow increase in conductance is observed Figure-2

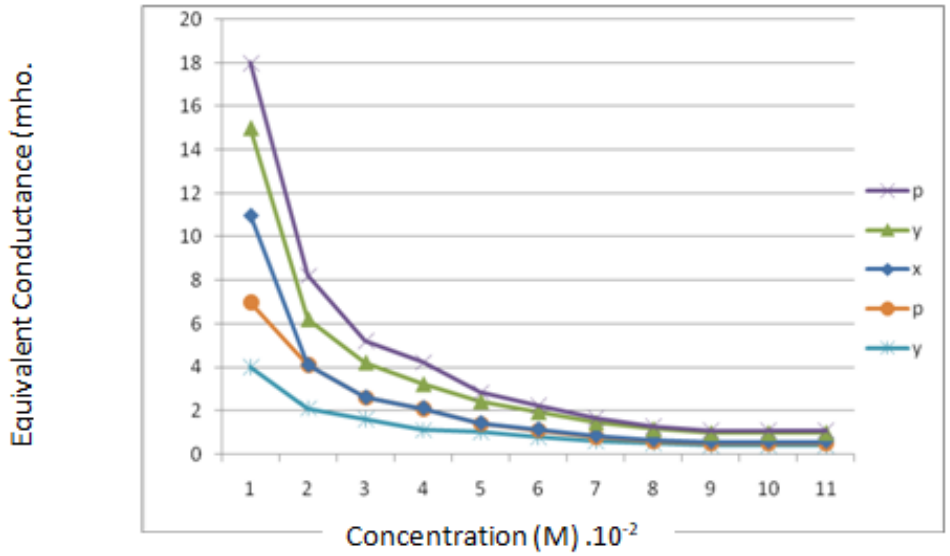


Figure-2 shows variation of equivalent conductance with squre root of concentration for ethyl alcohol and chloroform it is clear that the compounds showa variation in behavior with chnge in concentration of solvents It is observed that for all electrolytic in nature in alcohol. However, in CHCl3 strong electrolytic behavior is observed. Different thermodynamic parameters were determined for these synthesized chalcones solutions Such as ΔH_S is the heat of solution and The change in Gibb's free energy during solubility process can be calculated by intercept of the plot of lnx versus 1/T by following equation:

ΔG = -RT* intercept

Finally, the entropy of solution (ΔS_{sol}) was obtained from these evaluated ΔH and ΔG values at Thm [31]. $\Delta S = (\Delta H - \Delta G) / T$

All the thermodynamic parameters are given in Table 3. It is evident from tablets that for

Table - 3

Compund Code	C_2H_5OH			$CHCl_3$		
	ΔH (cal/.mol)	ΔG (kcal/mol)	ΔS (cal/mol)	ΔH (cal/mol)	ΔG (kcal/mol)	ΔS (Cal/mol)
R1	250.93	3.7552	-10.243	240.83	2.3453	-9.5781
R2	271.44	4.5403	-12.654	251.48	3.4173	-10.4751
R3	238.43	4.1292	-10.387	258.73	3.1763	-9.1932
R4	245.19	5.6712	-13.753	260.88	3.7880	-10.160
R5	233.22	5.8213	-15.897	272.13	3.8891	-17.870

In this table allthe thermodynamic parameters are given for the Pyrazolines compounds which are synthesized from conventional method the it is observed that ΔHsand ΔG values is positive whereas ΔS values are negative. It is because stronger bonds are broken and weaker bonds are formed, energy is consumed and

so, ΔH_S become positive This indicates endothermic dissolution of compounds where the enthalpy term contributes to an unfavorable positive value of ΔG. Therefore positive values of ΔG indicate that the dissolution process is not spontaneous and also negative value of entropy which is measure of randomness indicates less randomness in solutions

Dissociation Constant: By measuring pH values the dissociation constant can be determined by equation

pKa = pH+ log [BH +]/ [B]

Rearrangement of above equation gives Log[BH+]/[B] = pH-pka

A plot of left hand side versus pH will yield a straight line and pH=pKa when ratio of

log $[BH^+]/[B]$ =0. [44].

The concentrations of BH^+ and B can be determined spectrophotometrically by measuring the absorbance at particular wavelength.

Table -4 shows pka values of different compounds under study

Table - 4

Compound code	Average Pka Values
R1	10.98
R2	10.72
R3	10.88
R4	10.45
R5	10.66

Table 4shows the pK_a values for the studied compounds. It is observed that substitution group affects the dissociation constant as expected. It is observed that the because of the presence hydroxyl contain nitro group compounds are having basic character.

III. CONCLUSION

In this paper we studied conductivity,density, Pka values which provides useful information about the reactivity of pyrazolines such as variation in experimental and theoretical value of density. Physicochemical parameter of different synthesized substituted Pyrazolines such as Conductance measurement is also a easy way to know about the reactivity of Pyrazolines along with these different thermo dynamical parameters were determined.

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Review on Molecular Docking Computational Methods for the Molecular Dynamics and Simulations Research

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ABSTRACT

Molecular docking is a method for simulating molecule complexes. Docking predicts three-dimensional structures. Drug-improvement software based on docking. This critical mechanism allows access to molecular and structural databases. Molecular Docking provides tools for drug design and analysis. Simple molecular prediction and structural databases are required by medicinal chemists. The primary application of docking is virtual screening. Docking programmes visualise the molecule's 3-D structure, and docking gain can be computed. Molecular docking is used in structural molecular biology and drug design. Docking can be used to conduct virtual screening on large compound libraries, rank the results, and propose structural hypotheses for how ligands reduce the target. Computer-aided drug design and discovery has proven to be effective.

Keywords: - Computer aided drug design and discovery (CADDD), Molecular docking, ADMET, Binding, Conformations, ADMET: Absorption, Distribution, Metabolism, Excretion and Toxicity; PDB: Protein Data Bank; 3D: Three Dimensional; SBDD: Structure-Based Drug Design; SBVS: Structure-Based Virtual.

I. INTRODUCTION

Academic institutions and pharmaceutical companies both use computerised drug lead discovery. Proteomics, genomics, and structure informatics are all used in contemporary drug discovery. A virtual screening method called molecular docking uses structure to place small molecules in a target structure. Docking has a wide range of uses. Structure-based drug design, lead optimization, and evaluation recognition are common strategies. There are drug docks. New molecular modelling methods have benefited computer-assisted drug design. Three docking applications are covered in this article. First, we use molecular and quantum mechanics to look into the enzymatic mechanism of a flavoprotein. We will then examine the synthesis of anti-infective agents with structural motivation. We conclude by talking about the implications of drug design for protein-

protein complexes. This review describes how to use solvent to investigate large drug discovery systems[1], [2].

Molecular docking is a methodology for determining the preferred orientation of a ligand against a receptor (Protein) in order to form a stable complex[2]. Using scoring functions, preferential orientation could be used to predict the strength of the bond or binding affinity between the ligand and protein. Docking is frequently used to predict the binding orientation of drug candidates against protein targets in order to forecast the affinity and activity of a drug (Figure a). Therefore, docking is crucial for the development of new drugs[3] . In order to lower the overall system's free energy, molecular docking's primary goals are to achieve an optimized conformation and computationally simulate the molecular identification process[4]–[6]. Discovering a new drug is a very difficult process. An in-silico-Chemico-biological approach is the main pillar of the contemporary drug discovery process. The use of computer-aided techniques in the drug discovery and development process is growing in acceptance, popularity and use[7], [8].

A. CADD Involves

a. Utilization of computation to speed up the drug discovery and development process.
b. Utilizing chemical and biological knowledge of ligands and/or targets to find and improve new drugs.
c. The creation of in-silico filters to eliminate chemical compounds with undesirable characteristics (poor activity and/or poor ADMET, or absorption, distribution, metabolism, excretion, and toxicity) and choose the most promising candidates.
d. Finding new drug targets and retrieving them from target protein structure databases, such as the Protein Data Bank (PDB) at www.pdb.org. To find hits (drug candidates), CADD (Figure-a) is used.
e. By looking through databases, virtual screening is used to identify new drug candidates from a variety of chemical scaffolds[9], [10].

B. Different Kinds of Interactions: Interaction forces are classified into four types.:

a. Dipole-dipole, charge-dipole, and charge-charge electrostatic forces.
b. Forces of electrodynamics - Interaction of Van der Waals.
c. Steric forces –Due to entropy.
d. Forces associated with solvents - Interactions between hydrogen bonds and hydrophobic molecules[11], [12].

II. MOLECULAR DOCKING

Molecular docking is divided into two categories.The algorithm should generate the greatest number of configurations that allow for the experimentation method of determining binding modes. Point complementary, Monte Carlo, Fragment-based, Genetic algorithms, Systematic searches, Distance geometry, and other algorithms are used for docking analysis [13], [14].Molecular docking is shown in following figure 1 as

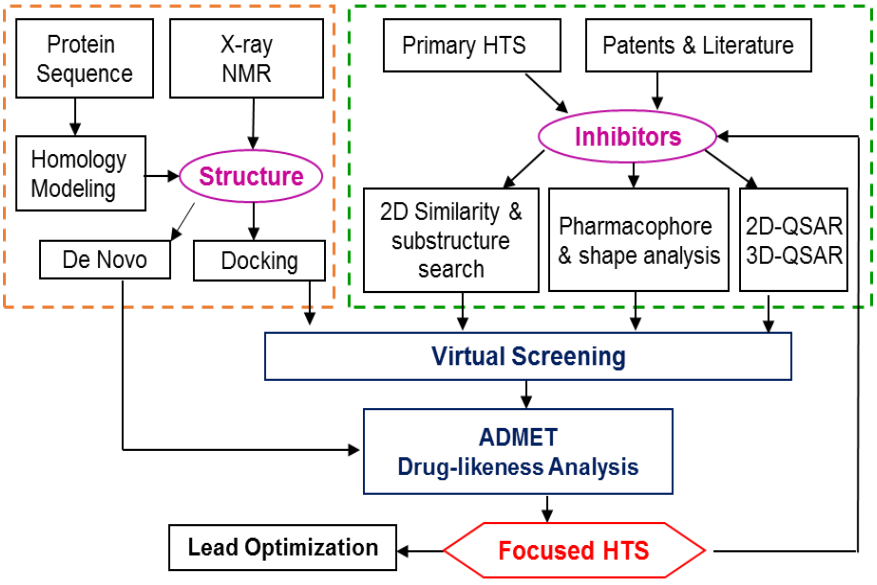

Figure (1): Computer Added Drug Discovery

A. Function of Scoring

The scoring function provides a way to rank the positioning of ligands in relation to one another. To ensure that the highest scoring ligands are also the highest binders, the score should, in theory, directly reflect the ligand's binding affinity for the protein. Scoring criteria can be based on molecular mechanics, knowledge, or empirical methods. Scoring is made up of three different expressions that are relevant to docking and drug design.

a. Ranking of generated configurations based on docking search.
b. Comparing various ligands to proteins (virtual screening).
c. A ligand or ligands ranked by their affinity for binding to various proteins (selectivity and specificity)[15]–[18]

B. Different kinds of docking

The following are the most common docking techniques.

a. Key and Lock Rigid Docking: The receptor and ligand are both kept stationary while docking is done.
b. In induced fit flexible docking, the ligand and the receptor are both conformationally flexible.The surface cell occupancy and energy are calculated for each rotation, and the best pose is then chosen[19].

III. THE PRIMARY STEPS IN THE MECHANICS OF MOLECULAR DOCKING

In order to have a stable complex, Molecular Docking predicts the preferred orientation of the ligand against the receptor (Protein)[20]. Favored orientation possibly utilized to predict the strength of connection or binding affinity among ligand and protein by utilizing scoring functions. Docking is frequently used to

forecast how drug candidates will bind to protein targets in order to forecast their affinities and activities. Consequently, docking is essential to the process of developing new drugs[3]. The main aim of molecular docking is to computationally simulate the molecular identification process and accomplish an optimized conformation so that the free energy of overall system is minimized. The process of discovery of a new drug is a very difficult task. Modern drug discovery is mainly based In-silico–chemico biological approach. The acceptance, use, and popularity of computer-aided techniques in the drug discovery and development process are rising quickly. There are 2 types of docking; 1. Flexible docking 2.Rigid docking

A. Adjustable Docking

Our goal is to find the confirmations of the receptor and ligand molecules as they emerge in complex systems by first considering molecule flexibility and then adding transformation[21], [21].

B. Inflexible Docking

If we assume that the molecules are rigid, then we search for a conversion of one of the molecules into three-dimensional space that will make it the most compatible fit with the other molecules according to a scoring function. In the presence of receptor binding activity or in the absence of a receptor, the ligand may generate a particular conformation.

IV. DIFFERENT MOLECULAR DOCKING APPROACHES

There are number of approach survive for docking as follows –

A. Method of Convergence

These strategies emphasise complementarity. The site's "best" position for the ligand atom results in the creation of a ligand receptor. An optimization-related configuration.

B. Ligand-Fit Methodology

Small molecule ligand docking into protein active sites using the ligand robust term provides a quick, accurate protocol that takes shape complementarity between the ligand and protein active sites into consideration.

C. Complementary PointApproach

These techniques are based on evaluating the shape and/or chemical complementarity of molecules that interact.

D. Blind Docking

It was developed to scan the entire surface of protein targets to find potential binding sites and peptide ligand binding modes.

E. Inverse Docking

a. In this application of a computer technique for decision-making, a small molecule's protein targets are toxicities and side effects.
b. Understanding these targets and proteomics' pharmacokinetic profile can help with the evaluation of potential toxicities and side effects of drug candidates.
c. For docking studies of a specific ligand, one of these protocols is chosen[22].

F. Monte Carlo Approach

a. It creates a ligand's initial configuration in an energetic site, which consists of random conformation, conversion, and rotation.Initial configuration gets a score. Then a new arrangement is generated and scored.
b. It decides whether to keep the new configuration using the Metropolis criterion.

G. Metropolis Criterion

A new solution is instantly accepted if it receives a higher score than the previous one. If the configuration is not new, a Boltzmann-based prospect function is useful. If the possibility function test is passed, the solution is determined; if not, the configuration is undesirable [2], [4].

H. Method Based on Fragments

Fragment base method can be described as separating the ligand into divide protons or fragments, docking the fragments & finally connecting these fragments together.

I. Measurement of Distant Objects

There are many different kinds of structural sequences that can be described as intra- or intermolecular distances. These detachments can be assembled using the distance geometry formalism, and 3D structures dependent on them can be taken into consideration.

V. MECHANISM OF DOCKING

A. The first requirement is an organisation of the attention protein in order to produce a docking screen. Typically, a biophysical technique such as x-ray crystallography or, less frequently, NMR spectroscopy has been used to maintain the structure A docking agenda receives this protein organization and a collection of ligands as input[2], [23].
B. A docking program's success is dependent on two mechanisms, including the search algorithm and scoring function. All potential protein orientations and conformations are included in the study space. together with ligand[1], [24], [20]. With current computing capabilities, it is impossible to fully identify the research domain that would list every possible molecule distortion as well as every possible

rotational and translational orientation of the ligand relative to the protein at a predetermined level of granularity.

C. The majority of docking programmes currently in use take bendable ligands into account, and many are attempting to model a flexible protein receptor[1].

D. The process used in Insilica to study the intermolecular announcement between two molecules is known as molecular docking. The macromolecule in this improvement is the protein receptor.The ligand molecule, which is the small particle, can act as an inhibitor[3].

The process used to study the in-silico intermolecular interaction between two molecules is called molecular docking. The macromolecule serves as the protein receptor in this process. The ligand molecule, which can function as an inhibitor, is a micromolecule. Thus, the following are theMajor Steps Involved in Mechanics of Molecular Docking:

Step I – ProteinPreparation for docking: Protein data bank (PDB) should be used to retrieve the three-dimensional structure of molecules from the cavity, stabilising charges, adding missing residues, generating side chains, etc.

Step II – Prediction of active site : The protein's active site needs to be predicted after it has been prepared. Even though the receptor may have numerous active sites, only the one that is of concern should be chosen. When present, hetero atoms and most water molecules are removed[25], [26].

Step III – Ligand Preparation : Ligands can be found in a number of databases, including Zinc and Pub Chem, or they can be sketched using the Chem sketch tool. The Lipinsky's rule should be applied when selecting the ligand. The Lipinski rule of five helps distinguish between candidates who don't use drugs and those who do these already well discussed by earlier researchers[27]. Due to drug similarity, it promises a high chance of success or failure for molecules that follow two or more of the rules. For selecting a ligand that adheres to Lipinsky's Rule:

a. Less than five hydrogen bond donors
b. Less than ten hydrogen bond acceptors
c. Molecular mass less than 500 Da
d. High lipophilicity (expressed as LogP not over 5)
e. Molar refractivity should be between 40-130

Step IV- docking: The ligand is docked to the protein, and the interactions are investigated. The scoring function assigns a score based on the best docked ligand complex that is selected.

VI. VARIOUS DOCKING SOFTWARES

Various docking programmes have been developed over the last two decades. Table (1summarises the key characteristics of the docking tools currently in use, including endorsed platforms, licence terms, algorithms, and scoring features.

Sr.No.	Tool Name	Docking Method	Scoring function
1	Auto Dock Vina	Genetic algorithm, Lamarckian genetical agorithm, Simulated Annealing	Auto Dock (force-field methods)
2	DOCK	Shape fitting (sphere sets)	Chem Score, GB/SA solvation scoring, other
3	Flex X	Incremental Construction	FlexXScore, PLP, Screen Score, Drug Score
4	FRED	Shape fitting (Gaussian)	Screen Score, PLP, Gaussian shape score, user defined
5	Glide	Monte Carlo Sampling	Glide Score, Glide Comp
6	GOLD	Genetic Algorithm	Gold Score, Chem Score user defined
7	LigandFit	Monte Carlo Sampling	Lig Score, PLP, PMF

Table (1): Basic features of currently available docking tools.

VII. MOLECULAR DOCKING APPLICATIONS

Molecular docking interactions can cause protein activation or inhibition, whereas ligand binding can cause agonism or antagonism. Molecular Docking could be used to:

A. Hit attribution(Virtual Screening)
B. Lead Optimization (Drug discovery)
C. Bioremediation
D. KA prediction (Biological activity)
E. Binding site prediction (Blind docking)
F. Protein de-orphaning
G. Interactions between proteins and nucleic acids.
H. Looking for potential protein targets' lead structures
I. Structure-function studies
J. Enzymatic catalytic reaction mechanisms
K. Modifying proteins

VIII. DISCUSSION & CONCLUSION

Molecular Docking offers a variety of useful tools for drug design and analysis. The desktop of a medicinal chemist now must have easy access to structural databases and simple molecule visualization. The core user interface of commercial software programmes is constantly evolving. Variousabove mentioned docking software programmes for studying molecular docking patterns of drugs and complexes.New algorithms developed in industry and academia are quickly integrated into high-end packages. Public domain software is

becoming more stable and functional, rivalling some commercial offerings. Every year and a half, computer speed doubles, while graphic displays become more sophisticated and intuitive. All of these factors combine to make molecular docking an essential component of drug design. It's becoming increasingly important in cutting-edge fields like computational enzymology, genomics, and proteomic search engines.

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Synthesis, Characterization and Antimicrobial Screening of Some Selected 3D Transition Metal (Fe(iii), Co(ii), Ni(ii), Cu(ii) & Zn(ii)) Complexes Derived from (12e)-N-((6-Chloro-4-Oxo-4h-Chromen-3-Yl) Methylene)-4-Methyl-1,2,3,-Thiadiazole-5-Carbohydrazide

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ABSTRACT
A novel Schiff base (12E)-N-((6-chloro-4-oxo-4H-chromen-3-yl)methylene)-4-methyl-1,2,3,-thiadiazole-5-carbohydrazide obtained by the condensation of 6-chloro-4-oxo-4H-chromene-3-carbaldehyde and 4–Methyl-1,2,3,-thiadiazole-5-carbohydrazide and and the synthesized schiff base was characterized by various analytical technique such as I.R., 1H-NMR, 13C-NMR and. Further it used for the complexation with different transition metal ions such as Fe (III), Co(II), Ni (II), Cu(II) and Zn (II) by using molar ratio of metal to ligand as 1: 2. The prepared metal complexes were identified with the help of FT-IR, elemental analysis, and TGA methods. The spectral data reveal that the ligand acts as bidentate, tridentate in ML complexes. The effect of these metal complexes on bacterial and fungal species was studied and compared with those of free ligand. The results of antimicrobial studies show enhanced activity in comparison to the free ligand.

Keywords: NO,ONO donor Schiff base; Fe(III),Co(II), Ni(II), Cu(II) and Zn(II) complexes; spectroscopic analysis; antimicrobial activity.

I. INTRODUCTION

Chromone hydrazones are extremely promising ligands in coordination chemistry [1]. They are also important in catalysis and in medicine as antimicrobial, antioxidant and anticancer agents [2]. Metal complexes of hydrazone ligands have been widely studied over earlier periods.Variety of hydrazones which can be prepared by condensation of different kinds of hydrazides and carbonyl compounds, hydrazones derived from chromone compounds have been the center of attraction for numerous workers in current scenario. The chromone moiety execute as the vital constituent in lots of pharmacophores of biological active molecules of synthetic as well as natural origin and many of them have useful medicinal applications .

chromone resides in an exclusive position for two reasons. They are carrying a substantial biological activity and they are prominent synthetic intermediates [3-5]. The notable biological properties, proton affinities, optical properties and the degree of aromaticity of the chromones have paying attention from both theoretical and experimental point of views. The 3-formylchromones have several applications. They are used as adaptable synthons in heterocyclic chemistry[6-10] . In the pharmaceutical area, the effectiveness and selectivity of derivates of 3-formylchromones, provides a novel pharmacophore for the design of drugs for the treatment of type II diabetes and obesity[11-12]. Work has shown that some drugs are evidence for improved action when administered as metal chelates rather than as organic compounds and that the coordinating power has been enhanced by condensing with a variety of carbonyl compounds.

II. EXPERIMENTAL

2.1 Materials

All the purchased chemicals were analytical grade and used without further purification. Solvents were purified and dried according to literature method[13-14]. All chemicals were obtained from Sigma–Aldrich chemical used without purification. They included 6-fluoro-4-oxo-4H-chromene-3-carbaldehyde and 4–Methyl-1, 2,3,-thiadiazole-5-carbohydrazide, remaining all chemical solvents were purchased from spectrochem ltd.

2.2 Physical measurements

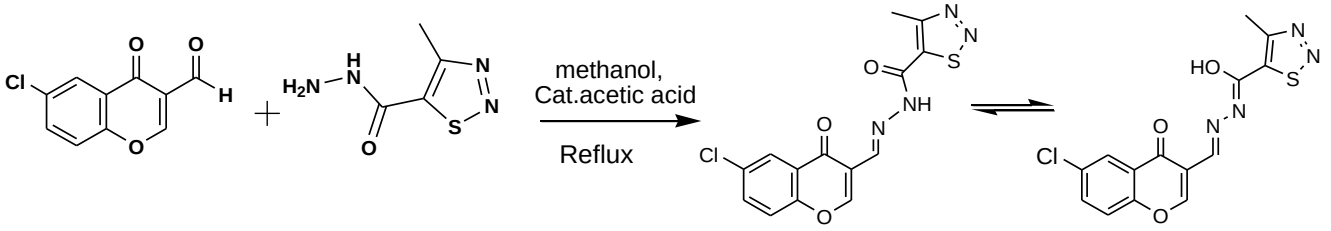
Elemental analysis (C, H, N,) was performed using Perkin Elmer CHN analyzer. IR spectra of the ligands and their metal complexes were recorded on Bruker spectrometer within the range of 4000–400 cm^{-1}. Thermal studies of the complexes were carried out on a Perkin Elmer diamond TGA instrument. ^{1}H-NMR and ^{13}C-NMR spectra of the ligands were recorded on Bruker spectrometer using DMSO-d6 as a solvent and TMS as internal standard. Mass spectra were recorded on water, Qt of micromass (ESI-MS).

2.3 Synthesis of the Schiff base ligand

The Schiff base ligand was prepared by condensation of 6-chloro-4-oxo-4H-chromene-3-carbaldehyde (1.00 mmole) and 4 – Methyl-1,2,3,-thiadiazole-5-carbohydrazide (1.00 mmole) in absolute ethanol (20 ml), 3-4 drops of acetic acid. The mixture was refluxed for 6-7 hr with continuous stirring. The progress of reaction was monitored by TLC and after completion of the reaction; the mixture was poured on crushed ice and filtered off. The obtained product was recrystallized in absolute Methanol.

2.4 Spectral data of ligand:

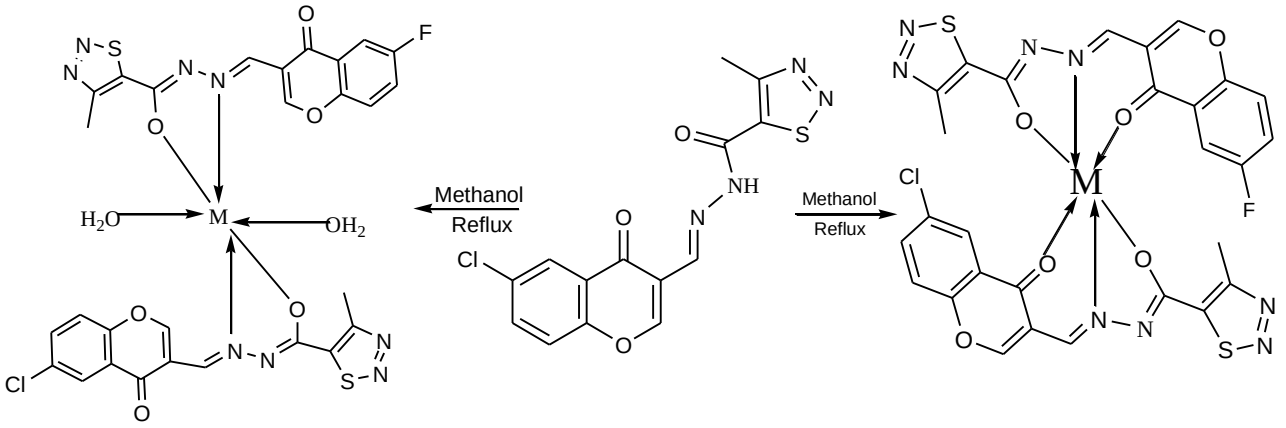
Color: Spongy white , Yield: 77 %, M.P.: 278 °C, Selected FT-IR bands (KBr, cm^{-1}) : 3191.92 ν (NH), 1665 ν(C=O chromone), 1625 ν (C=O hydrazonic), 1574 ν(C=N); ^{1}H- NMR (DMSO-d6, δ ppm) 12.36 (1H,s, iminolic -OH); 8.47 (S, 1H, HC=N), 6.94-8.26 (m, 4H, Ar-H); 2.98 (S, 3H, $-CH_3$); ^{13}C- NMR (DMSO-d6, δ ppm) 163.63 (C=O chromone), 160.38 (C=O hydrazone), 155.98 (-HC=N), 15.39($-CH_3$);



Scheme: The schematic route for synthesis of Schiff base (L)

2.5 Synthesis of metal complexes

The Schiff base ligand L (0.01 mol) is dissolved in hot methanol solution of corresponding salts (0.005 mol) MX2 [where M= Fe(III),Co(II), Ni(II), Cu(II), and Zn(II)] were mixed together and refluxed with constant stirring for 6–8h at refluxing temperature. On cooling colored solids were precipitated out. The products were filtered, washed with cold methanol, dried in air and in desiccator over anhydrous $CaCl_2$ and stored in an airtight sample bottle. All the compounds are colored and are stable to air and moisture.



M= Fe(III),Ni(II) **L** M = Co(II), Cu(II), Zn(II),

III. RESULTS AND DISCUSSION

The analytical data and physical properties of the ligand and its metal complexes are listed in Table 1. The Schiff base ligand (L) is soluble in common organic solvents. The resultant Schiff base complexes are partially soluble in MeOH and $CHCl_3$ but freely soluble in DMF and DMSO. The analytical data indicate that the metal to ligand ratio is 1:2 in all the metal complexes.

Compound	Mol. Formulae (F.W.)	M.P. ℃	Colour	Elemental analysis found (calculated.)%			
				% C (cal.)	% H (cal.)	% N (cal.)	% M (cal.)

Ligand (HL)	$C_{14}H_9FN_4O_3S$ (314.05)	256°C	Brown	58.98 (50.60)	2.68 (2.73)	16.08 (16.86)	-
$[Fe(HL)_2(H_2O)_2]$	$C_{28}H_{20}Cl_2FeN_8O_8S_2$	>280 °C	Green	44.88 (46.61)	2.98 (2.24)	15.10 (15.54)	7.78 (8.18)
$[Co(HL)_2]$	$C_{28}H_{16}Cl_2CoN_8O_6S_2$	>280 °C	Coffee	45.33 (46.61)	2.06 (2.24)	14.56 (15.53)	7.66 (8.14)
$[Ni(HL)_2 (H_2O)_2]$	$C_{28}H_{20}Cl_2NiN_8O_8S_2$	>280 °C	Brown	42.14 (44.41)	2.40 (2.66)	14.12 (14.85)	7.10 (7.78)
$[Cu(HL)_2$	$C_{28}H_{16}CuCl_2N_8O_6S_2$	>280 °C	Brown	44.35 (46.31)	2.10 (2.22)	14.68 (15.43)	8.30 (8.76)
$[Zn(HL)_2$	$C_{28}H_{16}Cl_2ZnN_8O_6S_2$	>280 °C	Brown	45.77 (46.20)	2.06 (2.22)	14.68 (15.39)	8.38 (8.88)

Table-1: Physical and analytical data of L and its metal complexes.

3.1 FT-IR spectra

The IR spectra containing relevant vibrational bands of the ligands and their metal complexes are listed in Table 2.

Compound Name	ν(C=O) Chromone	ν(C=O) hydrozonic	ν(C=N)	ν(M-O)	ν(M-N)
L	1665	1625	1505	-	
$[Fe(L)_2 (H_2O)_2]$	1656	1603	1533	522	416
$[Co(L)_2]$	1658	1612	1537	528	450
$[Ni(L)_2 (H_2O)_2]$	1659	1605	1562	538	460
$[Cu(L)_2$	1661	1604	1565	518	470
$[Zn(L)_2$	1656	1603	1536	546	426

Table-2: The selective Infrared frequencies of ligand (HL) and its metal complexes

The ligands showed a band at 1665 cm^{-1} which is due to ν (C=O) group of the chromone moiety. This band was shifted to lower wave number region 05–10 cm^{-1} in their corresponding metal complexes, indicating the coordination of oxygen atom of carbonyl group of the chromone moiety. The stretching vibration of the azomethine group (C=N) was observed at 1505 cm^{-1} in the ligand. This band was shifted to lower wave number region 20-40 cm^{-1} in their metal complexes, indicating the participation of nitrogen atom of azomethine group in coordination to the metal ion. An appearance of new broad band in the region 3253-3397 cm^{-1} indicates the presence of coordinated water in Fe(III),Ni(II), metal complexes. The coordination of nitrogen and oxygen atoms was supported by the appearance of a non-ligand bands in the range 500-550cm^{-1} and 416-470 cm^{-1} region due to the ν(M–O) and ν(M–N), respectively. From the above spectral data, it was concluded that schiff base ligand acts as bidentate in Fe(III) and Ni(II) metal complexes due to coordination of

two water molecule and tridentate ligands in Cu(II), Co(II), and Zn(II) metal complexes with ONO donor sites.

3.2 ^{1}H-NMR spectra

The ^{1}H-NMR and ^{13}C- NMR spectrums of ligand was recorded in DMSO-d6 ^{1}H- NMR (DMSO-d6, δ ppm) 12.36 (S, 1H, NH); 8.47 (S, 1H, HC=N), 6.94-8.26 (m, 4H, Ar-H); 2.98 (S, 3H, -CH_3); ^{13}C- NMR (DMSO-d6, δ ppm) 163.63 (C=O chromone), 160.38 (C=O hydrazone), 155.98 (-HC=N), 15.39(-CH_3);

3.3 Thermogravimetric analysis

Thermal analysis was used mainly for the confirmation of the water molecule or solvent associated with being in the sphere of coordination or in the outer sphere of the complex [15-16]and the information about its properties, the nature of the products intermediate and final thermal decomposition. From the TGA curves, the weight loss was calculated for the different steps and compared with the theoretically calculated weight for the suggested formulas based on the results obtained from the elemental analyzes. Thermal stability of the synthesized metal complexes was done up to 900 °C at a heating rate of 10 °C/min in nitrogen atmosphere. Metal complexes exhibit similar decomposition pattern as evident from their TGA graphs. The TGA graph shoes that decompose of Fe metal complex in three steps within temperature range of 10–700 °C. First step corresponds to the loss of two coordinated water molecules (Found 03.98 %, calcd. 04.77 %) in temperature range of 10–160 °C. The second step corresponds to the loss of $(C_{11}H_6ClN_2O_2)_2$ (Found 56.78 %, calcd. 57.82 %) in temperature range of 160–400 °C. A peak corresponding to mass loss of (25.36% calcd.27.50 %) at 400-650 °C was due to the loss of $(C_3H_3N_2S)_2$in the third step and as a final product, it leaves FeO as residue. Similar behavior was observed in the TGA curve of metal complexes 3-4. Thermal analysis data of all metal complexes (2-4) collectively given in Table 3.

Comp .no.	Molecular formula	Stages	Temp (°C)	Possible evolved species	Residual species	Mass loss	
						Found	Calc.
1	$[Fe(L)_2(H_2O)_2]$	1st 2nd 3rd	10-160 °C 160-400 °C 400-600 °C	2 H_2O $(C_{11}H_6FN_2O_2)_2$ $(C_3H_3N_2S)_2$	FeO	03.98 56.78 25.36 09.10	04.77 57.82 26.25 09.41
2	$[Co(L)_2]$	1st 2nd	10-320 °C 320-650 °C	$(C_{11}H_6FN_2O_2)_2$ $(C_3H_3N_2S)_2$	CoO	59.14 25.68 09.22	60.55 27.50 10.27
3	$[Ni(L)_2(H_2O)_2]$	1st 2nd 3rd	10-190 °C 190-400 °C 400-700 °C	2 H_2O $(C_{11}H_6FN_2O_2)_2$ $(C_3H_3N_2S)_2$	NiO	4.14 56.28 25.44 9.10	4.76 57.60 26.19 09.65

Table 3: Thermal analysis data of metal complexes

3.4 Antimicrobial activity

The in vitro antimicrobial screening of synthesized ligand and metal complexes was tested against four bacteria (*S. Aureus, S. Pyogenes, E. Coli & S. Typhi*) and two fungi (*C. Albicans & T. Rubrum*) by petri-plate containing 30 ml potato dextrose agar and nutrient agar medium, the plates were incubated for 20-24 hr and 24-48 hr for bacteria and fungi stains, respectively. The activities were measured in terms of zone of inhibition in mm. Cefotaxime, Azithromycin and Clotrimazole were used as standard drugs for bacteria and fungi, respectively at 500 ppm concentration of sample as well as drugs. The results of antimicrobial activity of ligand and metal complexes are shown in Table 4.

The metal complexes exhibit higher inhibition against tested microorganism compared to the free ligand[17-18]. The value in the above table indicates that the activity of the Schiff base ligand became more pronounced when coordinated with the metal ions. The presence of azomethine moiety and chelation effect with central metal enhances the antibacterial activities. This enhancement in antibacterial activity of these metal complexes can be explained based on the chelation theory[19-21].

When a metal ion is chelated with a ligand, its polarity will be reduced to a greater extent due to the overlap of ligand orbital and the partial sharing of the positive charge of the metal ion with donor groups. Furthermore, the chelation process increases the delocalization of the π-electrons over the whole chelate ring, which results in an increase in the lipophilicity of the metal complexes. Consequently, the metal complexes can easily penetrate into the lipid membranes and block the metal binding sites of enzymes of the microorganisms. These metal complexes also affect the respiration process of the cell and thus block the synthesis of proteins, which restrict further growth of the organism. The results of antimicrobial activity of ligand and metal complexes are shown in factors. They are the chelate effect, nature of coordinated ligand, total charge of complex, nature of the ion neutralizing the ionic complex and nuclearity of the metal center in the complex[22-24].. The increased activity of the metal complex than the free ligand can also be explained on the basis of chelation theory.

Compounds	Zone of Inhibition in mm					
	Gm +ve bacteria		Gm -ve bacteria		Antifungal activity	
	S. Aureus	S. Pyogenes	E. Coli	S. Typhi	C. Albicans	T.Rubrum
Ligand (HL)	7	6	8	9	-	-
$[Co(HL)_2]$	12	14	8	10	16	14
$[Ni(HL)_2(H_2O)_2]$	-	-	11	12	-	-
$[Cu(HL)_2]$	14	16	8	10	14	16
$[Zn(HL)_2]$	9	12	10	11	11	10
Cefotaxime	-	-	26	22	-	-
Azithromycin	26	24	-	-	-	-
Clotrimazole	-	-	-	-	16	15

Table 4: Results of antimicrobial activity of synthesized compounds

IV. CONCLUSION

In the present work, Fe(II), Co(II), Ni(II) ,Cu(II),and Zn(II) complexes were prepared from 6-fluoro-4-oxo-4H-chromene-3-carbaldehyde and 4- Methyl-1,2,3,-thiadiazole-5-carbohydrazide These Schiff base are characterized using various spectral techniques. IR spectra revealed coordination of Schiff base ligand with metal ion through azomethine nitrogen, carbonyl oxygen of chromone moiety and carbonyl oxygen of hydrazide moiety. The structural elucidation studies by various spectral techniques (IR, and ^{1}H NMR) suggested the nature of ligand is bidentate in Fe(III) and Ni(II) metal complexes due to coordination of two water molecule and tridentate ligands in Cu(II), Co(II), and Zn(II) metal complexes with ONO donor sites tridentate and geometry of the metal complexes are octahedral. Thermogravimetric analysis studies demonstrate the stability of complexes as well as provided the number of coordinated water molecules. Antimicrobial studies suggest that Schiff base and its complexes play a vital role in developing a new class of antibiotics.

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Antimicrobial Properties and Phytochemical Studies of Lemongrass (Cymbopogon Citratus) Leaves Essential Oil

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ABSTRACT
The phytochemicals detected in lemongrass leaves essential oil were flavonoids, tannins, saponins, steroids, terpenoids andcoumarins. The antibacterial activity of Lemongrass leaves essential oil was tested against five potential pathogens by agarwell diffusion method and the results depicted that lemongrass essential oil generated the inhibition zones of 33.0±0.74, 47.0±1.04 andagainst all twogram positive pathogens viz. Staphylococcus aureus, Bacillus subtilis respectively, whereas and no inhibition zone was observed for Pseudomonas aeruginosa as well as Escherichia coli and Salmonella typhi. The zone of inhibition produced by lemongrass oil against Bacillus subtilis was significantly ($P<0.05$) higher, followed by Staphylococcus aureus. Moreover, it was observed that the zone of inhibition produced by lemongrass oil against Bacillus subtilis, Staphylococcus aureus and were significantly ($P<0.05$) higher than the corresponding inhibition zones produced by the antibiotic i.e., Azithromycin (200 mg/ 5 ml) suspension (positive control).
Keywords: Phytochemical, essential oil, antibacterial, lemongrass, Cymbopogon citratus

I. INTRODUCTION

Cymbopogon citratus, commonly known as West Indian lemon grass or simply lemon grass(plants.usda.gov). is a tropical plant native to Maritime Southeast Asia and introduced to many tropical regions. [Plants of the world online)Cymbopogon citratus is often sold in stem form. While it can be grown in warmer temperate regions, such as the UK, it is not hardy to frost.Cymbopogon citratus is part of the grass family, Poaceae. They contain simple, bluish-green leaves with entire margins and are linear in shape. The blades tend to be 18–36 inches long. Like other grasses, the leaves also have parallel venation. (Shah et al., 2011)

Cymbopogon citratus is native to Island Southeast Asia (Malesia). It has been introduced extensively to South Asia since precolonial times. After the World War I, lemongrass was introduced to Madagascar, South America, and Central America. It has now been naturalized throughout the tropics and subtropics worldwide.(Oyen et al., 2019)

In its native range, Cymbopogon citratus is known as sereh, serai, or serai dapur in Indonesia and MalaysiaCymbopogon citratus is abundant in the Philippines and Indonesia where it is known as tanglad or sereh. Its fragrant leaves are traditionally used in cooking, particularly for lechon and roasted chicken.(Market Manila. 2006). The dried leaves can also be brewed into a tea, either alone or as a flavouring

in other teas, imparting a flavour reminiscent of lemon juice but with a mild sweetness without significant sourness or tartness.In Sri Lanka, lemongrass is known as sera. It is used as an herb in cooking, in addition to its use for the essential oils. (www.srilankanspices.com. 2011)

Lemongrass in Thailand is called takhrai. It is the essential ingredient of tom yam and tom kha kai. Fresh thin slices of lemongrass stem also used in miangpla, as a snack food.The leaves of Cymbopogon citratus have been used in traditional medicine and are often found in herbal supplements and teas. Evidence of effective Cymbopogon citratus essential oil anti-protozoa activity against Leishmania amazonensis.(Santinet al., 2009)

Lemon grass oil contains 65–85% citral in addition to myrcene, citronellal, citronellol, linalool and geraniol.(*Shaikh,et al., 2019, Baby et al., 2007)*Hydrosteam distillation, condensation, and cooling can be used to separate the oil from the water. The hydrosol, as a by-product of the distillation process, is used for the production of skin care products such as lotions, creams, and facial cleansers. The main ingredients in these products are lemon grass oil and "negros oil" (mixture of lemon grass oil with virgin coconut oil) used in aromatherapy.(Inquirer.net 2008)

Citronellol is an essential oil constituent from Cymbopogon citratus, Cymbopogon winterianus, and Lippia alba. Citronellol has been shown to lower blood pressure in rats by a direct effect on the vascular smooth muscle leading to vasodilation.(Bastos et al., 2010) In a small, randomized, controlled trial, an infusion made from C. citratus was used as an inexpensive remedy for the treatment of oral thrush in HIV/AIDS patients.(Wright et al., 2008)

Laboratory studies have shown cytoprotective, antioxidant, and anti-inflammatory properties in vitro.(Figueirinha et al., 2009, Lee et al., 2008, Tiwari et al., 2010)

In the folk medicine of the Krahô people of Brazil, it is believed to have anxiolytic, hypnotic, and anticonvulsant properties. (Blanco et al., 2009,Rodrigues et al., 2006)

In traditional medicine of India, the leaves of the plant are used as stimulant, sudorific, antiperiodic, and anticatarrhal, while the essential oil is used as carminative, depressant, analgesic, antipyretic, antibacterial, and antifungal agent.

Beekeepers sometimes use lemon grass oil in swarm traps to attract swarms. Lemon grass oil has also been tested for its ability to repel the pestilent stable fly,which bite domestic animals. (Baldacchino et al., 2013)which bite domestic animals.

II. MATERIAL AND METHODS

Materials

Lemongrass (Cymbopogon citratus):

Grown in the Botanical Garden of Dr. Babasaheb Ambedkar Marathwada University was used for the study. Phyto-chemical screening of lemongrass leaves essential oil: The various screening tests to detect the presence of Phyto-chemicals (i.e. flavonoids, alkaloids, tannins, phlobatannins, saponins, steroids, terpenoids, glycosides, cardiac-glycosides, proteins and amino acids, carbohydrates, reducing sugars, quinones, anthraquinones, anthocyanins, leucoanthocyanins and coumarins) through qualitative analysis were

performed using procedures described by Kokate et al. (2008) and Evans (2009) with slight modifications. Freeze dried cultures of pathogenic bacteria: The freeze-dried cultures of two-gram positive pathogenic bacteria viz. Staphylococcus aureus, Bacillus subtilis, and three-gram negative pathogenic bacteria viz. Pseudomonas aeruginosa, Escherichia coli, Salmonella typhi.

Methods Preparation of lemongrass essential oil

The essential oil was extracted from lemongrass leaves by steam distillation process using vertical steam distillation unit, consisting of a hot plate, boiling flask, biomass flask, still head, condenser and receiver. The lemongrass leaves were chopped into small pieces of size 1-2 cm and transferred into biomass flask whereas distilled water was added to the boiling flask. Biomass flask was set over the top of boiling flask and the distilled water in boiling flask was heated with the help of hot plate. The steam thus produced in the boiling flask travelled upward into the biomass flask where essential oil and water-soluble compounds were extracted into the vapour stream. The vapours passed through the still head and condenser was collected in the receiver as condensatecomprising two separate layers i.e., essential oil and water from which the essential oil layer was carefully transferred into a clean dry beaker.

III. RESULTS AND DISCUSSION

Phyto-chemical screening of lemongrass leaves essential oil The Phyto-chemical screening tests results are given in Table 1. The phytochemicals detectedin lemongrass essential oil were flavonoids, tannins, saponins, steroids, terpenoids and coumarins.The results obtained in present research are supported by the studies conducted by different scientists regarding Phyto-chemicals screening of lemongrass (C. citratus) leaves.(Balakrishnan etal., (2015) performed phytochemical analysis of lemongrass oil and confirmed the presence of tannins, saponins, flavonoids and phenols whereas terpenoids, cardiac glycosides, steroids and phlobatannins were reported to be absent, however results (Table 1) of present study revealed the presence of flavonoids, tannins, saponins, steroids, terpenoids and coumarins in lemongrass essential oil. The above variations in phytochemicals are due to a number of environmental factors e.g., climate, altitude and rainfall (Refaat and Balbaa, 2001; Mirza et al., 2003; Assous et al., 2013; Gazwi, 2020).

Table 1: Phyto-chemical screening of lemongrass leaves essential oil

Phyto-constituents	Name of the test	Observation
Flavonoids	Alcohol-acid test	+
Tannins	Braymer's test	+
Phlobatannins	Precipitation test	-
Saponins	Emulsion Formation	+
	Foam Formation	+
Steroids	Salkowski test	+
Terpenoid	Salkowski test	+

Cardiac-glycosides	Keller-Kiliani test	-
Coumarins	Alkaline solution	+
Representations: + = Present, – = Absent or not detectable		

Antibacterial activity of lemongrass leaves essential oil

Antibacterial activity of lemongrass leaves essential oil was tested against five potential pathogens by agar well diffusion method. The in-vitro antibacterial activity was evaluated against two-gram positive pathogenic bacteria viz. Staphylococcus aureus, Bacillus subtilis and three-gram negative pathogenic bacteria viz. Pseudomonas aeruginosa,Escherichia coli andSalmonella typhiby measuring the diameter (mm) of zone of inhibition (i.e., no microbial growth produced by the sample) against the test organisms. The results are presented in Table 2.

Table 2: Antibacterial activity of lemongrass leaves essential oil

Sr. No	Microorganism	Zone of inhibition (mm)*		
		Lemongrass leaves essential oi	Positive control	Negative control
1	Bacillus subtilis	47.0± 1.06dB	22.0± 0.91cA	-
4	Staphylococcus aureus	31.0 ± 0.76cB	28.0± 0.87dA	-
2	Escherichia coli	-	20.0± 1.03b	-
3	Pseudomonas aeruginosa	-	18.0± 0.82a	-
5	Salmonella typhi	-	21.0± 0.99abA	-

The results given in Table 2 depicted that lemongrass essential oil has generated the inhibition zones of 47.0 ± 1.06and31.0 ± 0.76 mm against all two-gram positive pathogens viz.Bacillus subtilis, Staphylococcus aureusrespectively, whereas no inhibition zone was observed for Escherichia coli, Pseudomonas aeruginosa as wellas Salmonella typhi. The zone of inhibition produced by lemongrass oil against Bacillus subtilis was significantly ($P<0.05$) higher, followed by Staphylococcus aureus. Moreover, it was observed that the zone of inhibition produced by lemongrass oil against Bacillus subtilis, Staphylococcus aureus were significantly ($P<0.05$) higher than the corresponding inhibition zones produced by the antibiotic i.e., Azithromycin (200 mg/ 5 ml) suspension (positive control). The results of Table 2 revealed that lemongrass leaves essential oil sample possess antibacterial potential as indicated by the formation of zone of inhibition. Manyscientists had reported the antibacterial activity of lemongrass oil against a diverse range of microorganisms comprising gram positive and gram-negative microorganism, yeast and fungi (Helal et al., 2006, Bassole et al., 2011; Singh et al., 2011, Falcao et al.,2012). In literature, it has been cited that lemongrass essential oil exhibits antibacterial properties and inhibits a host of microorganisms including Staphylococcus aureus, Enterococcus faecalis, Escherichia coli, Acinetobacter baumanii, Klebsiella pneumoniae, Aeromonas veronii, Candida albicans, Salmonella enteric serotype typhimurium, Enterobacter aerogenes,Serratia

marcesens, Corynebacterium equii and Proteus vulgaris (Onawunmi et al., 1984; Ogunlana et al., 1987; Baratta et al., 1998; Cimanga et al., 2002; Pereira et al., 2004)and shows antifungal effects against Epidermophyton floccosum, Trichophyton rubrum, T. mentagrophytes, and Microsporun gypseum, ringworm fungi (Shadab et al.,1992). Many other studies have reported the antimicrobial activity of essential oil of lemongrass plant against pathogenic bacterial strains and found that Enterococcus fecalis was the most sensitive microorganism, while P. aeruginosawas most resistant (Yazdani et al., 2003; Olivero-Verbel et al., 2010; Bassole et al., 2011). In another study, Kumar et al., (2017) tested the antimicrobial potential of lemongrass, clove and cinnamon essential oils against nine common food spoilage and pathogenic microorganisms by using zone inhibition assay and revealed maximum zone diameter (mm) of lemongrass oil for Staphylococcus aureus followed by Listeria monocytogenes, Vibrio parahaemolyticus and Klebsiella pneumonia showing strong activity against gram positive bacteria. Similarly, Srivastava et al., (2015)investigated the antibacterial activity of essential oils extracted from leaves of 16 aromatic plants (including Cymbopogon citratus) by discdiffusion method and stated that highest zone of inhibition was formed by C.citratus essential oil which showed complete inhibition of B. subtilis and 35.67, 40.33, 32.33 mm zone of inhibition was recorded against E.coli, S.aureus, S.flexneri,respectively, theseresults are in partial agreement with the results of present investigation wherein highest zone was observed against B. subtilis (48 mm) followed by S. aureus (32 mm) but no zone was observed against E. coli. Further, the authors reported that lemongrass oil was effective against both gram positive and gram-negative bacterial strains but gram-positive strains were found more susceptible which supports the results of present study. (Aiemsaard et al., (2011) investigated the antibacterial activity of lemongrass oil and its major components (citral, geraniol and myrcene) against four strains of clinically isolated bovine mastitis pathogens and demonstrated that Streptococcus agalactiae and Bacillus cereus were more susceptible to lemongrass oil, citral and geraniol than Staphylococcus aureus and Escherichia coli, concluding that citral and geraniol to be major antibacterial compounds in lemongrass oil and thus confirms the findings of present research. Additionally, the observations of present investigation are in concurrence with the results obtained by Naik et al. (2010) [27] who reported that except P. aeruginosa, the lemongrass (C. citratus) essential oil was effective against all other tested organisms (B. subtilis, B. cereus, S. aureus, K. pneumoniae) and they also mentionedthat gram positive organisms were more susceptible to oil than gram negative organisms.

IV. CONCLUSION

It could be inferred that the antimicrobial properties demonstrated by lemongrass (C. citratus) samples in present study were because of the presence of phytochemicals in the leaves since the antibacterial activity of lemongrass is allegedly because the leaves have bioactive compounds such as alkaloids, flavonoids, tannins and phenolic compounds. From the presentstudy, it is clear that lemongrass leaves essential oil possess a promising antibacterial activity against the test organisms and the comparative effects of lemongrass oil with the standard antibiotic (positive control) on various test pathogens are demonstrable indications of the lemongrass leaves essential oil as an antibacterial agent.

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Algal Flora of Lonar Lake : An Overview

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ABSTRACT
Lonar lake is a meteoritic impact crater, situated in Buldhana district of Maharashtra in India. It is a natural water body with alkaline and saline water. Present paper deals with a thorough discussion on ecological study, physicochemical analysis, diversity and abundance of algae of Lonarlake. Algal flora of Lonarlakeis rich and it is found in diverse form. Alkaline and saline water of Lonar lake favours growth of particular algaeespeciallyCyanophycean algae.Species of Arthrospira, Spirulina, Oscillatoria, Gloeocystis, Chlorella, Fragilaria and Nitzschiawere found abundant in Lonarlake. Seasonal variation study of algal florareveals that winter and summer season are found more suitable for luxuriant growth of algae.
Key words: Algal flora, Lonarlake, alkaline and saline water, Cyanophycean algae. Seasonal variation.

I. INTRODUCTION

Lonar lake is a natural water body with alkaline and saline water. It is situated (North Latitude 19o 55' 45'' and East Longitude 76o 34' 00'') in Buldhana district of Maharashtra State in India. It is the biggest meteoritic impact crater in the world which is originated about 50,000 to 60,000 years ago(Bealset.al. 1960, Nayak 1972 and Hagerty and Newson 2001).The presence of alkaline and saline water having pH9 to 11 around to is a unique feature of this ecosystem. The Lonar lake waterappears to be saline due to high concentration of dissolved solids and total suspended solids. Many microecosystems are found in this lake (Dabhadeet.al. 1998, Mahajan 2005 andKanekaret.al. 2007). Alkaline and saline water of Lonar lake supports growth of particular algae especially Cyanophycean algae (Jadhavet.al. 2007). The lake water is observed blue green in colour throughout the year due to dominance of blue green algae especiallyArthrospira, Spirulina, OscillatoriaandPhormidium. Dominance of Cyanophycean algae inLonarlakereveals that alkaline saline water of lake favours luxuriant growth of Cyanophycean algae.

II. ECOLOGICAL STUDIES ON LONAR LAKE WATER

Earlier many research workers have conducted ecological experiments on Lonar lake water. Jhingran and Rao (1954) studied saline nature of Lonar lake water. Chaudhary and Handa (1978) worked on some aspects of geochemistry of Lonar lake water. Dabhade et.al. (1998) and Dabhade (2006, 2013) worked on limnological,

ecological aspects and observed eutrophication to be at peak level. Kanekaret.al. (1999) isolated alkaliphilic bacteria from Lonarlake and utilized for bioremediation of phenol. Malu (2001) conducted preliminary study on phytoplankton of Lonarlake. Mohd. et.al. (2001) studied microbial diversity and ecology of Lonarlake.Wani et.al. (2006) studied molecular analysis of bacteria isolated from Lonar lake water.
Jadhavet.al.(2007) conducted preliminary study on algal flora of Lonar lake reported 35 taxa of algae belonged to Chlorophyceae, Bacillariophyceae, Euglenophyceae and Cyanophyceae. They have reported dominance ofArthrospira platensis, Spirulina labyrinthiformis, Spirulina major, Oscillatoriaobscura, Aphanothecenidulans, Chlorella vulgaris and Nitzchiapalea.Satpathyet. al. (2007) carried out some limnological experiments on Lonarlake. Siddiqui (2008) and Satyanarayanaet. al. (2008) conducted detailed limnological study. Pawar (2010) studied seasonal variation in physico-chemical parameters.Mohite and Wakte (2011) worked on factors influencing growth and phycocyanin production of Arthrospira platensis isolated from water of Lonarlake. Yannawar and Bhosle (2013) performed environmental analysis in order to study eutrophication of Lonarlake.Khobragade and Pawar (2015, 2016) studied diversity and ecological status of serpent fauna, physico-chemical and microbiological analysis.

III. RECENT WORK ON ALGAL FLORA OF LONAR LAKE

Khan and Jadhav (2022) extensively worked on algal flora of Lonarlake. They have systematically and scientifically studied algal flora for two consecutive years i.e. October 2015 to September 2017 by selecting 10 sites of Lonarlake. Algal samples were collected at monthly intervals. They have recorded 79 species of algae under 39 genera of these 11 species under 10 genera belonged to Chlorophyceae, 15 species under 8 genera belonged to Bacillariophyceae, 2 species under 1 genus belonged to Euglenophyceae and 51 species under 20 genera belonged to Cyanophyceae. (Table 1). The species composition of Cyanophycean algae was greater as compared to other groups of algae.Cyanophycean algae were found dominant followed by Bacillariophyceae, Chlorophyceae and Euglenophyceae. Andreas et.al. (2005), Jadhav et.al. (2007), and Satyanarayana et.al. (2008), reported dominance of Cyanophycean algae in saline and alkaline water. Among CyanophyceaeArthrospira platensis, Aphanothecenidulans, Spirulina labyrinthiformis, Spirulina laxissima, Spirulina major, Spirulina subtilissima, Oscillatoriaacuta, Oscillatoriaamphibia ,Oscillatoriaquadripunctulata, Oscillatoriaobscurawere found dominant. Similar kind of observations were made by Jadhavet.al.(2007).
Among ChlorophyceaeGloeocystisgigas, Gloeocystis major, Chlorella vulgaris andCoelastrummicroporum were dominant. Satyanarayanet.al. (2008) reported dominance of Ankistrodesmusand Selestrastrum. In lonar lake diatoms Fragilariabrevistriata, Fragilariaconstruens, Naviculacapsidata,Nitzschiaclosterium, Nitzschiafonticola, Nitzschiapaleawere found dominant.Rath and Adhikary (2005) reported abundance of diatoms from Chilkalake. Khan and Jadhav (2022) also studied seasonal variation of algal flora of Lonarlake and reported that winter and summer seasons are found more suitable for luxuriant growth of algae.

Sr. No.	Class	Species	Genera
1	Chlorophyceae	11	10

2	Bacillariophyceae	15	08
3	Euglenophyceae	02	01
4	Cyanophyceae	51	20
Total		79	39

Table 1: Total number of algal genera and species recorded from selected sitesof Lonar crater lake

Sr. No.	Name Of Algae	Selected Sites									
I	CHLOROPHYCEAE	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10
1	Gloeocystisgigas(Kuetz) Lagerhein	+	-	-	-	+	+	+	-	-	-
2	Gloeocystis major Gerneck et Lemmermann	-	+	+	+	+	+	-	-	-	-
3	TetrasporalamellosaPrescott	+	-	-	-	+	-	-	-	-	-
4	Chlorococcumhumicola(Naeg.)Rabenhorst	-	+	-	+	-	-	-	+	-	-
5	Trebouxiahumicola(Treboux) West et Fritsch	+	-	-	-	+	-	-	-	-	-
6	Trochisciaaspera(Reinsch) Hansgirg	+	-	-	-	+	-	-	-	-	-
7	Chlorella vulgaris Beyerink	-	+	+	-	+	+	-	-	+	-
8	Ankistrodesmusfalcatus(Corda) Ralfs	-	-	+	-	-	-	+	+	-	-
9	Crucigeniatetrapedia (Kirch) West &West	-	-	+	-	+	-	+	-	-	-
10	Cosmariumsp.Corda	+	-	-	-	-	-	-	-	-	-
11	CoelastrummicroporumNaegeli	+	-	+	-	+	-	-	-	-	-
II	BACILLARIOPHYCEAE										
1	Amphora sp. Ehrenberg.	+	-	-	-	-	-	+	-	-	+
2	FragilariabrevistriataGrun V. vidharbhensis V. Nov.	+	-	-	+	-	+	-	-	-	-
3	Fragilariaconstruens(Hhr.)Grun.V.venterGrun	+	-	-	-	-	-	-	-	+	+
4	NaviculacapsidataKuetz.	+	+	-	+	-	+	-	-	-	-
5	NaviculacapsidataVar.donaiceGrun.	-	-	-	-	-	-	-	-	+	-
6	NaviculahustedtiiKrasske	+	-	-	-	-	-	-	-	-	-
7	Naviculasalinarum(Grunow) Kuntz	+	-	-	-	-	-	-	-	-	-
8	Cymbellaaspera(Ehr.) cleve	+	-	-	-	-	-	-	-	+	+
9	NitzschiaclosteriumW.Smith	+	-	-	+	-	-	-	-	-	+
10	NitzschiaobtusaW.Smith v. scalpelliformisGrun.f, Parva.Husdet.	+	-	-	-	-	-	-	-	-	-
11	Nitzschiapalea(Kuetz) W. Smith	+	-	-	+	-	+	+	-	-	-
12	NitzschiafonticolaGrun.	-	-	-	-	-	-	+	-	+	+
13	Gomphonemasp. Agardh	+	-	-	-	-	+	-	-	-	-

14	Surirella ovata Kuetz.	-	-	-	-	-	-	-	-	-	+
15	DiatomavalgarisKuetz.	+	-	+	-	-	-	-	-	-	+
III	EUGLENOPHYCAEA										
1	Euglena acusEhrenberg	+	+	-	-	-	-	-	+	-	-
2	Euglena polymorphaDangeard	+	-	-	-	-	-	-	-	-	-
V	CYANOPHYCEAE										
1	Microcystis aeruginosa Kützing	+	-	-	-	-	+	+	-	+	-
2	Microcystisrobusta(Clark)Nygaard	-	-	-	-	-	+	+	-	+	-
3	Chroococcuscoharens(Breb.) Naegeli	-	+	-	-	-	-	-	-	-	-
4	Chroococcus minor (Kuetzing) Naegeli	-	-	-	-	-	-	+	+	-	-
5	Chroococcusminutus (Kuetzing) Naegeli	-	+	+	-	-	-	-	-	-	-
6	Chroococcusturgidus (Kuetzing) Naegeli	-	+	+	-	-	-	+	-	-	-
7	Gloeothecepalea(Kuetz.) Rabenh	+	+	-	+	-	+	-	-	-	-
8	Aphanocapsapulchra(Kuetz.) Rabenhorst	+	-	-	-	-	-	-	-	-	-
9	AphanothecenidulansRichter	+	+	+	+	+	+	+	+	+	+
10	AphanothecesaxicolaNag.	+	+	+	-	-	-	+	-	-	-
11	SynechococcusaeruginesusNaegeli	-	-	+	-	+	-	+	-	-	-
12	SynechocystisaquatilisSauvagean	-	-	-	-	-	+	-	-	+	+
13	MerismopediatenuissimaLemm.	-	+	+	-	-	+	+	-	-	-
14	ChlorogloeamicrocystoidesGeitler	+	+	-	-	-	-	-	-	-	-
15	MyxosarcinaburmersisSkuja	-	-	+	-	-	-	-	-	-	-
16	Arthrospiraplantensis (Nordst) Gomont	+	+	+	+	+	+	+	+	+	+
17	Spirulina gigantaSchmidle	-	+	-	-	+	-	-	-	-	-
18	Spirulina laxissimaWest, G.S.	+	-	+	+	+	+	+	+	+	-
19	Spirulina labyrinthiformis (Menegh) Gomont	+	+	+	+	+	+	+	-	+	+
20	Spirulina major Kuetz. ex Gomont	-	+	+	+	+	-	+	+	-	+
21	Spirulina subtilissimaKutz. ex Gomont	+	-	+	-	+	+	-	-	+	-
22	OscillatoriaacutaBruhl et Biswas,orth.mut.Geitler.	+	-	-	+	+	+	+	+	+	+
23	OscillatoriaamphibiaC.Agardh ex Gomont	+	+	+	+	+	+	-	+	+	+
24	OscillatoriaminimusBiswas	-	-	-	+	-	+	-	+	-	+
25	OscillatoriaobscuraBruhl et Biswas	-	+	+	-	-	+	-	+	+	+
26	OscillatoriapseudogeminataG.schmid	-	+	+	-	-	-	-	-	-	-
27	OscillatoriaquadripunctulataBruhl et Biswas	+	+	-	+	-	+	+	-	-	+
28	Oscillatoriasalina Biswas S										
-	-	-	+	-	-	+	+	-	+		
29	OscillatoriasalinaVar.major	-	-	-	-	+	+	+	-	-	-

30	Oscillatoriasubbrevisschmidle	-	-	-	+	-	-	-	-	-	+
31	PhormidiumabronemaSkuja	+	-	+	-	-	-	-	-	-	-
32	PhormidiumambigumGomont	+	-	-	-	-	-	-	-	-	-
33	PhormidiumangustissimumWest &G.S.West S	-	-	-	+	-	-	-	-	-	+
34	Phormidium corium (Ag.)Gomont	+	-	-	+	+	+	-	-	-	-
35	Phormidium fragile (Meneghini)Gomont	-	+	-	-	-	-	+	+	+	-
36	PhormidiumfoveolarumGomont S										
-	-	+	-	+	-	+	-	-	-		
37	PhormidiumjenkelianumShmid G.	-	+	+	-	-	+	+	-	-	-
38	PhormidiumlaminosumGomont	-	-	+	-	+	-	-	+	+	-
39	Phormidium tenue (menegh)Gomont	-	-	-	-	-	+	-	-	-	+
40	Phormidiummolle(Kuetz.) Gomont	+	+	+	+	+	+	+	-	-	+
41	LyngbyaaeustuariiLiebm. ex Gomont	-	-	+	-	-	-	-	-	-	-
42	LyngbyacrptovaginataSchkorbatow	-	-	-	-	-	+	+	-	-	-
43	LyngbyahieronymusiiLemm.	-	-	+	-	-	-	-	-	-	+
44	MicrocoleusacutissmusGardner	+	-	+	-	-	-	-	+	+	-
45	Microcoleussubtorulosus(Breb.) Gomont	-	-	-	-	-	-	-	+	+	-
46	Nostoc commune vaucher ex Born et flah.	-	-	-	-	+	-	-	-	-	-
47	Nostoclinckia(Roth) Bornet ex Born et flah	-	-	+	-	-	-	-	-	-	-
48	Plectonemagracillimum(Zopf) Hansgirg	+	+	+	+	+	-	-	+	-	+
49	PlectonemanotatumSchmidle S	-	-	-	-	+	-	-	-	-	-
50	PlectonemanostocorumBornet ex Gomont	+	-	-	+	+	+	+	-	+	+
51	Plectonemaputeale (kirchner) Hansgirg	-	-	-	-	-	+	-	-	+	-

+ = Present - = Absent

Table 2: Algal taxa recorded from selected sites of Lonar crater lake.

IV. CONCLUSION

Algal flora of Lonarlake is rich and it is found in diverse form. Cyanophyceae algae are found in maximum number as compared to other group. It is observed that alkaline and saline water of Lonarlake, favours growth of particular algae especially Cyanophyceae algae. Species of Arthrospira, Spirulina, Oscillatoria, Gloeocystis, Chlorella, Fragilaria and Nitzschiawere found abundant in Lonar lake. Seasonal variation study of algal flora reveals that winter and summer seasons are found more suitable for luxuriant growth of algae.

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Floristic Studies in Fimbristylis Vahl (Cyperaceae)

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ABSTRACT
Perennial or annual sedges. Stems trigonous or laterally compressed. Leaves: bladed or reduced to bladeless sheaths; blades mostly flat, rarely laterally compressed and becoming ensiform; seaths closed, cylindrical or laterally compressed with an acute keel; ligule much reduced, existing as a fringe of pubescence or none. Inflorescence: corymbose, head-like or reduced to a single terminal spikelet; bracts leafy, setaceous, not sheathing. Spikelets mostly ovoidal or ellipsoidal, terete or more or less laterally compressed. Glumes many, spirally imbricated, all alike and bearing a bisexual flower. Flowers all bisexual and fruit-bearing. Stamens 2 or 3. Styles trigonous or flattened, the style base dilated and jointed at base, hence falling free from the nut. Nuts trigonous to lenticular, smooth or cancellated, often verruculose, beraing a stype-like or an inconspicuous gynophore. Present study is on our own critical observations on fresh plant material collected from the different parts. The observations are also based on herbarium specimens. Relevant data from literature have been referred for comparative study. The study of Fimbristylis Vahl provides a detailed taxonomic description, illustration and relevant information for its easy identification in the field. Two species of Fimbristylis is elaborately described in this paper. The present report is hoped to provide basic material for further research in Cyperaceae.

Key Words: Fimbristylis acuminate, Fimbristylis argentea Floristic, Cyperaceae.

I. INTRODUCTION

The genus *Fimbristylis* (from Latin Fimbria- fringe; stylus-style, referring to fringed or hairy styles of certain species) was erected by Vahl, M. (1806) and is distinguished from closely allied genus *Scirpus* L. (1753) s.l. by articulate flat and hairy styles of its members. There are nearly ten different genera such as *Abildgardia* Vahl (1806), *Bulbostylis* Kunth (1837), *Oncostylis* Nees (1834), *Pogonostylis* Bertol (1833), *Iriha* (L. C. Rich) 1806, *Trichelostylis* Beauv. (1808), *Actinoschoenus* Benth (1883) etc. described subsequetly with similar characters. Most of these, however, are considered congeneric to *Fimbristylis* Vahl. The position of *Bulbostylis* Kunth appears to be controversial. Asa Gray, Bentham and recently Koyama (in his earlier treatment 1961) merged *Bulbostylis* into *Fimbristylis*. Recent morphologists take *Bulbostylis* distinct generically on account of the style-base persistent on nut as tumour and certain embryological features (see under *Bulbostylis*). The embryos of *Fimbristylis* are of different type (Vander Veken 1965).

The genus *Fimbristylis* Vahl earlier based on the spirally arranged glumes and flat, fimbriate, 2- fid deciduous styles with dialated base, subsequently based on distichous glume he created the genus *Abildgardia* (1806) apparently very similar to *Cyperus* sps. The tristigmatic species were left in *Scirpus.* However, R. Brown (1810) and Kunth (1837) added most of the tristigmatic species in the genus *Abildgardia* on account of deciduous styles. Recently only *Actinoschoenus* Benth. is retained distinct generically by Koyama & Simpson (Fl. Thailand 6(4): 417. 1998).

Govindrajalu E. described more than 40 new species from the peninsular India. Majority of the species often from dominent components of wet situations of plains. very few species such as *F. falcata, F. dichotoma, F. albovirids* appear to be hill forest dwellers but they are also found in plains.

According to W. Khan (2009) F. dichotoma and F. merrillii are highly polymorphic species, represents about 15 and 4 variant forms respectively. Only 3-4 variant forms have taxonomic value.

Type species: ***Fimbristylis dichotoma*** **(L.) Vahl**

Perennial or annual sedges. Stems trigonous or laterally compressed. Leaves : bladed or reduced to bladeless sheaths; blades mostly flat, rarely laterally compressed and becoming ensiform; seaths closed, cylindrical or laterally compressed with an acute keel; ligule much reduced, existing as a fringe of pubescence or none. Inflorescence : corymbose, head-like or reduced to a single terminal spikelet; bracts leafy, setaceous, or scale-like, not sheathing. Spikelets mostly ovoidal or ellipsoidal, terete or more or less laterally compressed. Glumes many, spirally imbricated or all or some becoming distichous on a continuous axis, all alike and bearing a bisexual flower, at times the basal on to few empty, with 1-3 nerved keel. Flowers all bisexual and fruit-bearing. Hypogynous bristles none. Stamens 2 or 3. Styles trigonous or flattened, the latter type usually with fimbriate margins, the style base dilated and jointed at base, hence falling free from the nut. Nuts trigonous to lenticular, smooth or cancellated, often verruculose, beraing a stype-like or an inconspicuous gynophore.

Taxonomic Treatment:

- ***Fimbristylis acuminata*** Vahl, Enum. Pl. 2:285. 1806; Clarke in Hook f. Fl. Brit India 6:631. 1893; Fischer in Gamble Fl. Pres. Madras (1931) 3:1649 (repr.ed.) 1994; Kern in Steenis Fl. Malesiana 1(3).7:588. 1974; Koyama in Dassan.& Fosb. Rev. Handb. Fl. Ceylon 5:319.1985; L'narsimhn in Sharma et al Fl. Maharashtra (Monocots): 304. 1996; Karthik. et al, Fl. Indic. En. Monocot. 50. 1989; Prasad & Singh Sedg. Karnataka (Fam. Cypr.): 155. 2002.

Annual, 6-30 cm long, rhizome inconspicous, stems slender, angled, *ca* 1 mm thick, glabrous. Leaves: reduced to sheaths, 1-4.5 cm long. Inflorescence: a solitary terminal spikelets; bracts glume like, triangular-ovate, *ca* 3 x 2 mm, keeled. Spikelets ovoid to lanceolate, acute-acuminate at apex, 6-10 x

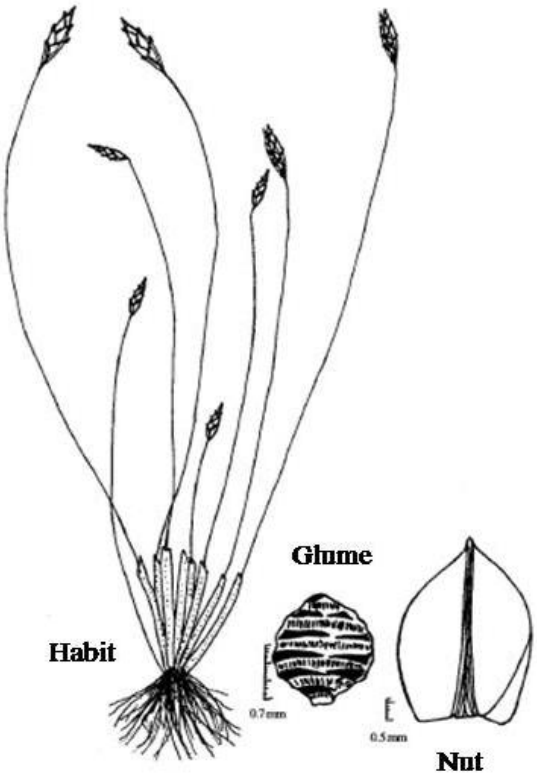

Fig. *Fimbristylis acuminata* Vahl

2-4 mm, few to many flowered, greenish white to pale brown.

Glumes broadly ovate, keeled shortly mucronate, 3-4.5 x 2-3 mm usually brown spotted towards the middle portion, hyaline margined, lowest 1 or 2 empty. Stamens 2; anthers linear oblong, 1-1.25 mm long, style 2-fid *ca* 3 mm long minutely ciliate towards apex. Nut biconvex, obovate, rounded towards apex *ca* 1.75 x 1.5 mm, with 5-8 transverse ridges, whitish to cream-coloured; inconspicuously stipitate.

Common in wet muddy areas, marshes, rice fields, and river banks, sea coast etc.

Flowers and Fruits: September to October.

Specimens examined: T. N. Tiruchchirappalli Dist. near Bhartidasan University, *Shaikh R. I.* 833; Tirunelveli Dist. *Taur R. D.* 316 (a), 531.

- ***Fimbristylis argentea*** (Rottb.) Vahl, Enum. 2: 294. 1806; Clarke in Hook f. Fl. Brit. India 6:640. 1893; Fischer in Gamble Fl. Pres. Madras (1931) 3:1652. (repr.ed.) 1994; Kern in Steenis Fl. Malesiana 1.7(3):586. 1974; W. Khan in Marathwada Univ. J. Sc. 22(15):8. 1983; Koyama in Dassan. & Fosb. Rev. Handb. Fl. Ceylon 5:314.1985; Karthik et al Fl. Indic. En. Monocots. 51. 1989; Brahmam & Saxena in Fl. Orissa: 4. 2171. 1996; W.Khan in Naik, Fl. Marathwada 2:947. 1998; Pullaiah & Hanumanth.Cypr. in Fl. Andhra Pradesh 3: 1079. 1997; Prasad & Singh Sedg. Karnataka (Fam. Cypr.): 160. 2002; *Scirpus argenteus* Rottb. Progr. 27. 1772, et Descr. et. Icon. 51: t. 171. f. 6. 1773.

Perennial; with short rhizomes, stems 5-20 cm tall compressed-trigonous, 0.5-1 mm thick, glabrous. Leaves: eligulate, usually shorter than or often overtoping the inflorescence, 0.5-1 mm wide, usually canaliculate, sheaths papery much broader than leaf blades. Inflorescence: of capitate head of few to many spikelets, globose or subglobose, 6-15 mm across; involucral bracts 2-4, usually canaliculate, lower 2-3 much longer than inflorescence, 0.8-4 cm long; slightly dilated at base. Spikelets sessile, oblong, acute or obtuse at apex, subangular, 4-6 x 1.5-2 mm densely many-flowered; rhachilla thick, narrowly winged. Glumes membranous, spiral, broadly ovate, obtuse and minutely apiculate at apex, *ca* 1 x 1 mm, 3-nerves ditinct in the middle portion. Stamen 1; anther linear oblong *ca* 0.5 mm long. Style 2fid, flat, dilated at base, *ca* 0.8 mm long, minutely ciliate towards apex. Nuts broadly biconvex, obovate, apiculate *ca* 0.6 x 0.5 mm, smooth or minutely verruculose, cream-coloured.

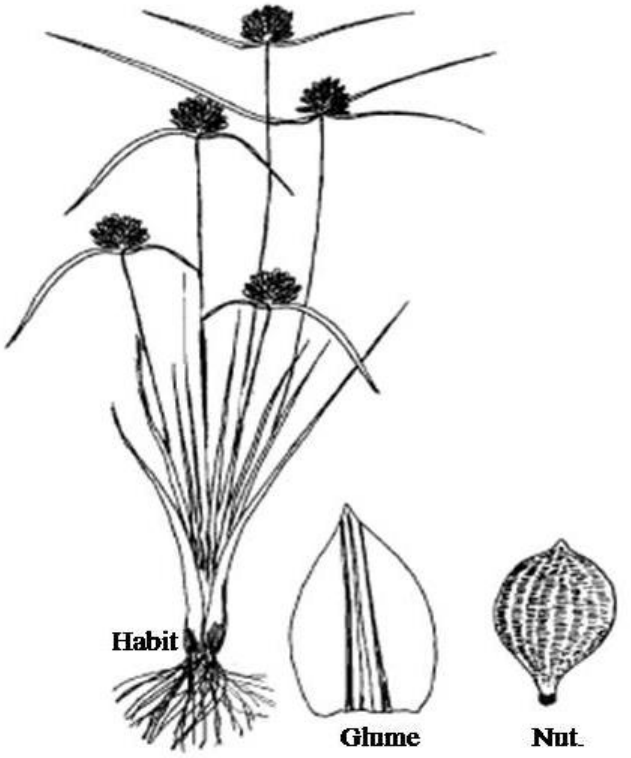

Fig. *Fimbristylis argentea* (Rottb.) Vahl

Common, in ditches along road sides, margins of tank, rice field, agricultural fields.

Flowers and Fruits: September to November.

Specimens examined: A. P. Chitoor Dist. Vinayakpuram, *Shiakh R. I.* 837, Karvetnagar, *Shaikh R. I.* 856; Krishna Dist. Kilespuram, *Shaikh R. I.* 707. T. N. Viluppuram Dist. *Shaikh R. I.* 1002.

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The author is thankful to Dr. M. A. Wadoodkhan ex Reder and Head, Dept. of Botany, Herbarium of Cyperaceae, Majalgaon College Majalgaon (HCMCM) for the confirmation of identity of taxa and going through the manuscript. Dr. Mohammad Ilyas Fazil, the Principal of the College for his constant support and the Principal, Majalgaon College Majalgaon for laboratory and library facilities.

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Oxidation of Mefenamic Acid by Potassium Dichromate in Acid Medium: A Kinetic Study

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ABSTRACT
Using potassium dichromate we studied the kinetic study of oxidation of mefenamic acid under acidic conditions using UV visible spectrophotometer. The results show the oxidation of mefenamic acid was first order with respect to potassium dichromate and mefenamic acid. The rate was found to be not depending on concentration of acid medium. The reaction product is found to be mefenamic acid N-oxide. It is found that the stoichiometry is one mole of potassium dichromate is required for oxidizing three moles of mefenamic acid. We on the basis of results obtained proposed probable mechanism. For thermodynamic study enthalpy and Gibbs free energy are calculated.

KEYWORDS: Oxidation, Kinetics, Mefenamic Acid, Potassium Dichromate

I. INTRODUCTION

Mefenamic acid is derivative of anthranilic acid and it is a non steroidal anti-inflammatory drug. It is used generally in the treatment of mild to moderate pain due to various conditions. It is also helpful in reducing the risk of Alzheimer disease [1, 2, 3].The kinetic study of oxidation of mefenamic acid using potassium dichromate as oxidizing agent is studied in acid medium. Chromium, chromate, dichromate, manganite and permanganate ions are used as strong oxidizing agent in oxidation of organic and inorganic substances in ionic medium [4]. Chromium is used as an oxidizing agent for preparation and analytical techniques as an important tool [5,6]. Chromic acid, chromate, dichromate, chromyl chloride, chromyl acetate and other substituted chromates are used frequently for oxidation of different compounds in different media [7,8,9]. Such an interesting chemistry of potassium dichromate have attracted many more to work with using these types of reagents. Literature survey reveals that no work is reported on oxidation of mefenamic acid with any potassium dichromate

II. MATERIALS AND METHODS

All the chemicals used are of AR grade supplied by alocal trader i.e. Lab Trading. The stock solution of potassium dichromate is praepared by dissolving a known weight of it in double distilled water. The standard solution of mefenamic acid is prepared with double distilled water. Thereaction of oxidation of mefenamic

acid with potassium dichromate in acid medium is allowed to complete under pseudo-first order conditions where concentration of mefenamic acid is excess over concentration of potassium dichromate [10]. For the reaction to complete fixed quantities of solutions of potassium dichromate, mefenamic acid and sulphuric acid were added and the resultant mixture was analyzed at UV visible spectrophotometer at the given temperature.

Stoichiometry and Product analysis

For product analysis the solutions of mefenamic acid with excess of potassium dichromate and sulphuric acid are kept for few hours to complete the reaction. The unreacted potassium dichromate is analyzed with UV visible spectrophotometer. On the basis of results obtained the stoichiometry of the oxidation is derived. It is found that one mole of potassium dichromate is consumed for the oxidation of three moles of mefenamic acid. On the basis of results the stoichiometric equation presented as

$$K_2Cr_2O_7 + 4H_2SO_{4(aq)} + 3C_{15}H_{15}NO_2 \rightarrow 3C_{15}H_{15}NO_3 + K_2SO_4 + (Cr_2SO_4)_3 + 4H_2O$$

The reaction mixture of substrate, oxidant and acid are mixed and allowed to stand for few hours to complete the reaction. The product obtained is extracted with ether. It is washed with distilled water and ethereal layer is neutralized with sodium bicarbonate. The product is identified as mefenamic acid N-oxide ($C_{15}H_{15}NO_3$)The product is confirmed by spot tests [11].

III. RESULT & DISCUSSIONS

We studied the kinetics of oxidation of mefenamic acid using potassium dichromate as oxidaing agent in acid medium. Difference concentrations of oxidant, substrate and acid are used and analyzed spectrophotometrically at given temperature. The results obtained are discussed and thermodynamic parameters are calculated.

Effect of substrate concentration

To study the effect of concentration of substrate its concentration is varied from $1x10^{-2}$ to $6x10^{-2}$mol $dm^{-3}$and other conditions are kept constant throughout the study. Figure 1 represents plot of concentration of mefenamc acid versus $k_{obs.}$ The increase in values of rate constant with increase in concentration of mefenamic acid is found at other conditions constant indicating first order rate of thereaction [12].

[MFA]mol dm^{-3}	0.01	0.02	0.03	0.04	0.05	0.06
k_{obs} x $10^{-4}s^{-1}$	4.3	4.6	5.0	5.4	5.9	6.5

Table 1: [MFA]mol $dm^{-3}$and k_{obs}

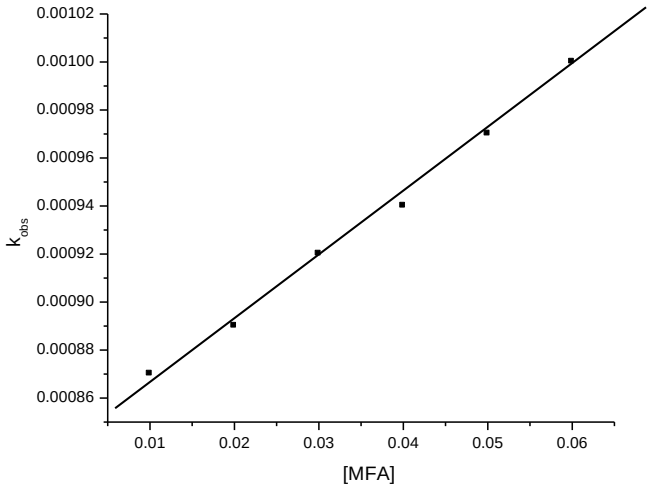

Figure 1: Graph of log[MFA] versus log k_{obs}

Effect of oxidant concentration

The effect of concentration of potassium dichromate is studied by taking its different concentrations from 0.001 to 0.006 mol dm^{-3} by keeping other conditions constant. The results indicate k_{obs} values increases with the increase in concentration of oxidant. The plot of 1/concentration of oxidant versus 1/log k_{obs} gives a straight line indicating first order dependence of the rate of the reaction on concentration of oxidant.

[PD] mol dm^{-3}	0.001	0.002	0.003	0.004	0.005	0.006
k_{obs} x 10^{-4} s^{-1}	8.7	9.1	9.6	10.0	10.5	11.3

Table 2 : [PDF] mol $dm^{-3}$and k_{obs}

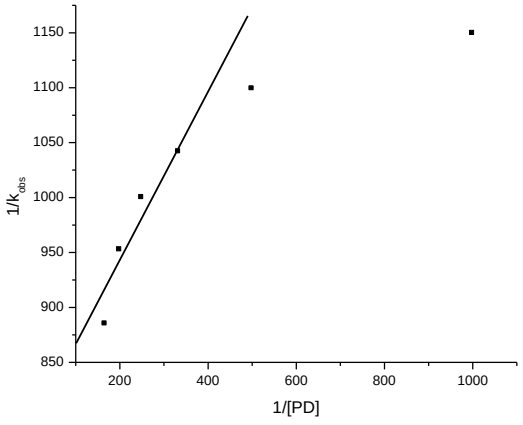

Figure 2 : Graph of log[1/PD] versus log 1/k_{obs}

Effect of Temperature

The effect of temperature on kinetics of oxidation of mefenamic acid with potassium dichromate is studiedby conducting kinetic runs at various temperatures ranging from 298K,303K,308K,313K and 318Kand keeping other conditions constant. The result shows that with the increase in temperature the rate of reaction increases. From the linear Arrhenius plots of logk /T versus 1/T thermodynamic parameters are calculated and tabulated in table 4.

Temperature K	298	303	308	313	318
k_{obs} **x** 10^{-4} s^{-1}	0.00063	0.00069	0.00075	0.00083	0.00098

Table 3: log k_{obs} at different temperatures

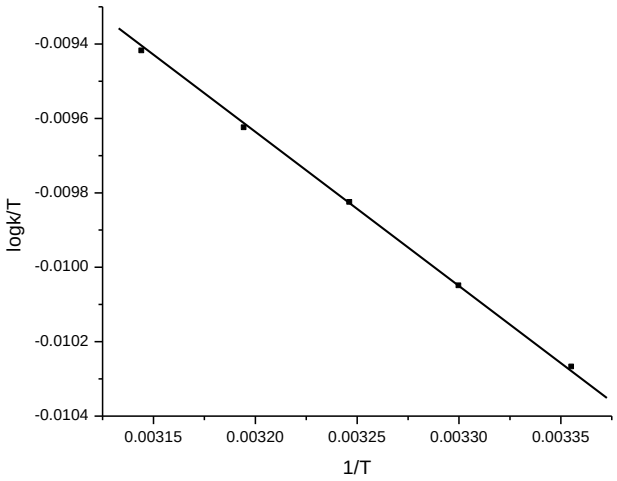

Figure 3: Graph of 1/T versus logk/T

Effect of acid concentration

The oxidation of mefenamic acid with potassium dichromate is studied with different concentrations of sulphuric acid keeping all other conditions of the reaction constant. There is no significant change in the rate constant with increasing sulphuric acid concentrations i.e. rate of the reaction is not depending on concentration of acid.

Free radical test

In the reaction mixture aqueous solution of acrylonitrile is added. It does not show initiation of polymerization reaction indicating non-involvement of free radical in the reaction steps [13, 14].

Effect of Salts added

To study the effect of salt added in the oxidation reaction of mefenamic acid with potassium dichromate in acid medium different salts are added. Sodium chloride (NaCl), potassium chloride (KCl), potassium bromide (KBr) and magnesium chloride ($MgCl_2$) these salts are added to the oxidation reaction at 298K. It is found that the added salt has no effect on the rate of oxidation of substrate and so there is no interaction of charged species during the reaction.

Mechanism of the reaction

The probable rate equation for the above reaction mechanism can be expressed as follows

$$Cr_2O_7^{-2} + H_2O \rightarrow 2CrO_4^{-2}\ (Cr\ VI) + 2H^+ \quad (1)$$

$$C_{15}H_{15}NO_2 + CrO_4^{-2} \rightarrow C_{15}H_{15}NO_2 \rightarrow O\text{-}CrO_3^{-2} \quad (2)$$

Complex Intermediate

$$C_{15}H_{15}NO_2 \rightarrow O\text{-}CrO_3^{-2} \rightarrow C_{15}H_{15}NO_2 \rightarrow O + CrO_3^{-2}\ (Cr\ IV) \quad (3)$$

$$-\frac{d}{dt}[Cr_2O_7^{-2}] = -\frac{d}{dt}[CrO_4^{-2}] = k_2[CI]$$

$$MFA + PD \underset{k-1}{\overset{k1}{\leftrightarrows}} CI \xrightarrow{k2} MFAN \rightarrow O$$

$$-\frac{d}{dt}[Cr_2O_7^{-2}] = -\frac{d}{dt}[CrO_4^{-2}] = k_2[CI]$$

We can apply steady state approximation to CI

$$\frac{d[CI]}{dt} = 0 = k_1[MFA]\ [PD] - k_{-1}\ [CI] - k_2[CI]$$

$$[CI] = \frac{k_1}{k_{-1} + k_2}[MFA][PD]$$

The overall rate is the rate of formation of MFAN→O

$$Rate = \frac{d[MFAN \rightarrow O]}{dt} = k_2\ [CI] = \frac{k_1 k_2}{k_{-1} + k_2}[MFA][PD]$$

Since k_{-1} is much smaller than k_2, $k_{-1} << k_2$ neglecting k_{-1} in the above equation, rate equation is reduced to

Rate $= k_1[MFA]\ [PD]$

Activation Parameters	Ea	ΔH	ΔS	ΔG
	3.638 $kJmol^{-1}$	2..429 $kJmol^{-1}$	-191.31 $JK^{-1}mol^{-1}$	64.104 $kJmol^{-1}$

Table 4 : Activation Parameters

IV. CONCLUSION

The probable reaction mechanism is suggested above has a fast complex intermediate formation between the substrate and the kinetically active chromate ion. It gets decomposed in the rate determining step to give rise to the final product. The kinetic study of oxidation of mefenamic acid with potassium dichromate shows that mefenamic acid undergoes oxidation in acid medium in which the nitrogen of amino benzoic acid partof the mefenamic acid molecule undergoes oxidation to yield mefenamic acid N-oxide as the main product. The rate of the reaction is first order with respect to substrate and oxidant but it is not depending on the concentration of acid.In the reaction the chromium(VI) exists in acid media as chromic acid H_2CrO_4. The negative value of entropy of activation indicates formation of rigid transition state. It can be concluded from kinetic data the overall mechanistic sequence described is consistent with product and the scheme proposed.

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Synthesis of Subtituted Pyrazoles using Ionic Liquid

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ABSTRACT

Pyrazoles are well known five-membered nitrogen containing heterocyclic compounds possessing diverse bioactivities and are used extensively in pharmaceutical industry. Removing organic solvents in chemical synthesis is important in drive towards benign chemical technologies. Here we have screened different imidazolium-based ionic liquid and we found that 1-Ethyl-3-methylimidazolium Chloride is a better media for the synthesis of 1-substituted pyrazole and the method for the reaction system exhibited tolerance with various functional groups and gives good to excellent yields.

Keywords: Ionic liquid, Pyrazole, N-Tosylhydrazine.

INTRODUCTION

Pyrazoles and its derivatives possessing diverse bioactivities, such as analgesic agent, platelet aggregation inhibitors, and nonsteroidal anti-inflammatory agents, thus these compounds are widely used in the development of drug research [1] and agriculture [2]. They are also useful intermediates for many industrial products [3] ,[4] . Consequently, pyrazoles have attracted much attention, and various procedures for their synthesis have been developed [5]. As reported in the literature, the synthesis methods toward substituted pyrazoles include: (a) Condensation of α, β-unsaturated carbonyl compounds with hydrazines, which is used as a major strategy. [6]

A lot of syntheses of pyrazoles have been developed.[7] However, these syntheses are usually carried out in organic solvents. Recently, solventless organic reactions such as Michael additions,[8] aldol condensations,[9] Claisen condensation, [10] Stobbe condensation,[11] and Thorpe reaction16 have been studied. Compared with the reactions in organic solvents, solventless reactions are often rapid, regio- or chemoselective, occur in high yields and have environmental and economic advantages. [8] For these reasons, we studied syntheses of pyrazole derivatives by the solventless reaction of 1,3-dicarbonyl compounds with hydrazines.

Among these popular procedures for pyrazole synthesis, hydrazine hydrate is applied as a predominant nitrogen source, nevertheless, most of these transformations are dependent on a large excess amount of

hydrazine hydrate and oxidant or base. In 1987, Shechter et al. published the early report in which only 1.1 equiv of tosyl hydrazide with unsaturated ketone was used as
nitrogen source for the preparation of 1H-cyclooctapyrazoles. [12] Then, a remarkable number of novel 1H-pyrazole synthesis using substituted hydrazides, especially sulfonyl hydrazides as nitrogen transfer reagents have been reported. In 2011, Yu and co-workers established a highly efficient and eco-friendly protocol for the preparation of substituted 1H-pyrazoles by a one-pot condensation reaction of α,β-unsaturated carbonyl compounds with tosyl hydrazide promoted by stoichiometric tetrabutylammonium bromide in water [13].
Ionic liquids (ILs) has attracted the attention on scientific community in the last decade, due their particular properties and their applications in Organic Synthesis [14], catalysis [15], biocatalysis [16], liquid-liquid separations [17], extraction [18] and dissolution (celulose in microwave [19] and petroleum asphaltenes in microwave [20]) processes, nanomaterials synthesis [21], polymerization reactions [22] and electrochemistry [23]. ILs are an excellent alternative to substitute volatile organic solvents in more environmental friendly technologies ("green technologies"), since their very low vapor pressures, their thermal and chemical stability, their ability to act as catalyst, and their non-flammability and non-corrosives properties.

EXPERIMENTAL SECTION

General Considerations

All reagents and catalyst purchased from commercial sources were used as received. The solvents ionic liquids was prepared by reported procedure [24] and used. All reactions were carried out in oven-dried glassware and were magnetically stirred. FTIR spectra were taken on F.T. Infra-Red Spectrophotometer Model RZX (Perkin Elmer) and ^{1}H and ^{13}C spectra were taken on bruker AVANCE II 400 MHz spectrometer with TMS as internal standard $CDCl_3$ / DMSO as solvent. ESI-Mass spectral data were recorded on Q-TOF Micro Waters (ESI-MS) Spectrometer.

General Procedure for the Screening of ionic liquids:

A mixture of 1,3-dialdehyde (**1**) (13.8 mmol) and tosylhydrazine (**2**) (13.8 mmol) was dissolved in separately in five different imidazolium-based ionic liquids (5 ml) and stirred at room temperature for 20 min. After stirring the reaction mixtures for 20 min., the reaction mass were poured on crushed ice. The obtained solids were filtered, washed with water and dried. The crude compounds were crystallized using DMF-Ethanol. Then for every seven different aldehydes the procedure was repeated. After screening the imidazolium-based ionic liquids, it was found 1-Ethyl-3-methylimidazolium Chloride was a suitable and novel medium for carrying the cyclocondensation leading to title products with excellent yields (**Table 1**, entry 2). The advantage of 1-Ethyl-3-methylimidazolium Chloride is that, it is stable, easily synthesized, cost effective, and recyclable.

Table 1

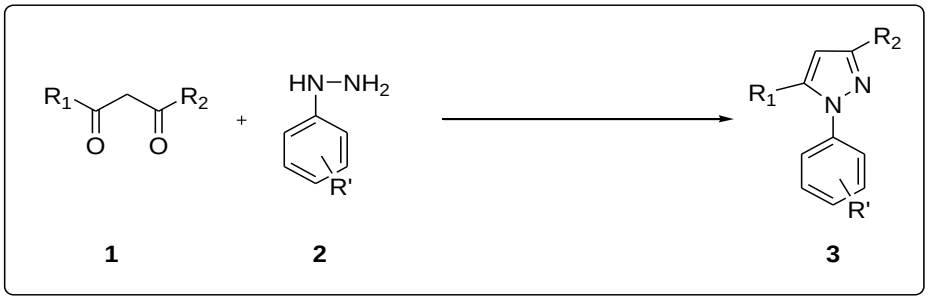
Screening of ionic liquids to search a suitable medium for one pot synthesis of phenyl pyrazoles (**2**)[a]

Entry	Ionic liquids	Time (min.)	Yield[b] %

1	1-Ethyl-3-methylimidazolium tetrafluoroaluminate	20	75
2	1-Ethyl-3-methylimidazolium Chloride	20	95
3	1-Butyl-3-methylimidazolium Chloride	20	60
4	1-Butyl-3-methylimidazolium hexafluorophosphate	20	65
5	1-Butyl-3-methylimidazolium tetrafluoroborate	20	56

[a]**Reaction conditions:** A mixture of 1,3-dicarbonyl (**1**) (13.8 mmol) and tosylhydrazine (**2**) (13.8 mmol) was dissolved in ionic liquids (5 ml) and stirred at room temperature for 20 min.

[b]Isolated yields.



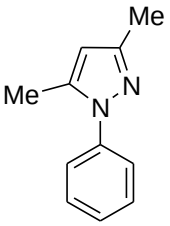
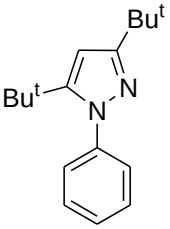
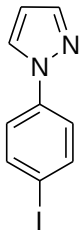
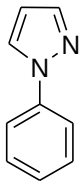
General procedure for the synthesis of 3-substituted Pyrazoles (3a-g).

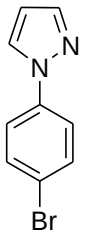
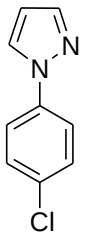
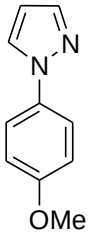
A mixture of 1,3-dicarbonyl (**1**) (13.8 mmol) and tosylhydrazine (**2**) (13.8 mmol) (**1a-g**) was dissolved in ionic liquid, 1-Ethyl-3-methylimidazolium Chloride (5 ml) and stirred at room temperature for 20 min.After stirring the reaction mixture for 20 min., the reaction mass was poured on crushed ice. The obtained solid was filtered, washed with water and dried. The crude compound was crystallized using DMF-Ethanol. For liquid compounds (**Table 2,** entry 3a,3d and 3g) the product was isolated as by pouring the compound on crushed ice to that ethyl acetate was added stir then sodium chloride was added, the two layers was separated then to the the organic layer sodium sulfate was added stir and filtered then residue was wash with ethyl acetate then the organic layer was separated and the finial compound was isolated by distillation.

Compound **3d**: Yield 94%; light yellow liquid; bp 141-142 ℃. FTIR Model RZX (Perkin Elmer) cm^{-1}: 1518 (C=N str., Pyrazolyl); 1199 (C-N str.); ^{1}H-NMR (400 MHz, $CDCl_3$): δ 7.13 (t, 1H, Pyrazolyl), 7.67 (d, 1H, Pyrazolyl), 7.76 (d, 1H, Pyrazolyl), 7.59-7.62 (m, 5H, Ar-H) ppm; ^{13}C-NMR (100 MHz, $CDCl_3$): δ 141.03, 140.12, 129.40, 126.81, 126.35, 119.02, 107.66 ppm;MS (ESI, m/z): calcd for $C_9H_8N_2$ ($M + H^+$) 144.0687; found: 145.1508.

Table 2

One pot synthesis of phenyl pyrazoles (**3a-g**), carried in 1-Butyl-3-methylimidazolium tetrafluoroborate

Compound	R'	R^1	R^2	Product	Yield	M. P./B.P (℃)
3a	-H	-Me	-Me		90	b.p;144-145
3b	-H	-Bu^t	-Bu^t		93	m.p;106-108
3c	p-I	-H	-H		90	m.p.;90-91
3d	-H	-H	-H		93	b.p;141-142

3e	p-Br	-H	-H		90	m.p;69-76
3f	p-Cl	-H	-H		87	m.p;88-91
3g	p-OMe	-H	-H		62	b.p;280

RESULTS AND DISCUSSION

The titled compounds have been synthesized by one pot synthesis by using readily available starting materials, such as different 1,3-dicarbonyl (**1a-g**) andp-toluenesulfonyl hydrazide ($TsNHNH_2$) (**2**). The ionic liquid, 1-Ethyl-3-methylimidazolium Chloride was prepared and used immediately.The reactions were carried out at room temperature for 20 min.The progress of the reaction was monitored by TLC. Various 1,3-dicarbonyls (**1a-g)** could give target pyrazoles through the same action with excellent yields (**3a-g**).

CONCLUSION

In conclusion, we have developed a simple, highly efficient, and environmentally friendly method for the synthesis of 1-substituted pyrazoles in ionic liquid, 1-Ethyl-3-methylimidazolium Chloride. Encouraged by this result, we have focused attention on the use of 1-Ethyl-3-methylimidazolium Chloride (dicationic ionic liquid) as solvent as well as catalyst. It was found that the ionic liquid worked well and the conversion found to take place rapidly giving excellent yield. Furtherstudies on the biological activities of the products and application of this methodology to other interesting pyrazole derivatives are underway in our laboratory.

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Mycomediated Remediation of Dye by Using Laccase Enzyme Produced at Different Temperature

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ABSTRACT
Nature is reach in biotic as well as abiotic things which are important pillars of ecosystem. Healthy ecosystem is due to the stability in the number ofproducers, consumers and decomposers. Each component of the ecosystem is depended on another for various purposes. Decomposers performing a very important role in the ecosystem. In this study, experiments were conducted to find out the fungi responsible for laccase production in the view of dyes decolourization. For this research collection of samples, isolation of fungi, identification of fungi, selection of dyes, laccase detection, dyes decolourization parameters are considered. This work is done in the departmental laboratory. Scientific tools and techniques were followed for this work. collection of samples was done from the Aurangabad industrial area. Four different samples were collected from two different localities of waluj MIDC of Aurangabad. Thirty-three different fungi isolated from the collected samples. Identification of fungi is done in the laboratory of botany department with help of standard books and manuals.Results were recorded time to time which found very good.During the experiment it was found that the fungi like*Aspergillus niger* and *Aspergillus flavus* have great potential for laccase production, the fungi like *Fusarium solani* and *Alternaria alternata*are recorded moderate while the fungus *Fusarium sp.*recorded very less.

Keywords : Isolation and identification of fungi, Physical factors- Temperature, Laccase detection, Dyes decolorization.

INTRODUCTION
Presence of biotic component in the ecosystem in the form of producer, consumer and decomposers making the sable ecosystem. Like producers and consumers, decomposers are major pillar of any ecosystem. Decomposers including bacteria, fungi, actinomycetes are popularly known for their ability in various fields. Increased number of human populations is a major problem in present condition as increasing demand in the food and shelter. As per human requirements in the daily needs, industrialization also increases. Industries such as leather, plastic, textiles are one of higher producer in all over the world. This type of industries requires large numbers of supplements for their products. Demands for dyes in the textiles and fibre industries is drastically increases as per increased requirement. Zollinger, 1987; Carliell et al., 1995 said that the Synthetic dyes are widely used in textile, paper, food, colour photography, paper printing, plastic, cosmetics, pharmaceutical, leather and toy industries. During the process of dying in the industries large

number of dyes were released out as effluent. Such industrial effluent is coming in the contact of soil, water and make contaminated. According to Mahapatra 2016, dyes are soluble organic compounds. Due to their low degradability, high solubility in water and dyes are most problematic compounds present in textile effluents (Wesenberg, et al., 2003). The azo dye Congo red (C32H22N6Na2O6S2 C.I. No. 22120) is abundant in the effluents of the textile and paper industries and has been reported to be extremely carcinogenic and toxic to both environment and humans (Chung, 2016). This effluent is a kind of pollutant which destroy the soil ecosystem. When such type of industrial effluent is comes in the contact of other animal they also affected.It also causes negative effect on photosynthesis.According to Hassan &Carr 2018, dyes in water can prevents the penetration of light.Dyes in wastewater often lead to calamities viz. the incidence of bladder tumors has been reported to be particularly higher in dye industry workers than in the general population (Suryavathi et al., 2005). Hunger 2003, dyes reveal mutagenic potentiality. In addition, dyes are potentially toxic, carcinogenic, mutagenic and allergenic compounds, and their efficient removal from industrial wastes is absolutely mandatory (Rodríguez et al., 1999). Degradation of such pollutants by various method in the applied research is a good research area. Fungi are present almost everywhere as they are more adaptable when compared to others. Many fungi are able to grow on this polluted are by decolorizing or degrading the dyes.Many fungi have the great potential to degrade the dyes, Fungi like *Aspergillusniger*, *Scheffersomycesspartinae* and *Galactomycesgeotrichum* degrades the dyes of different group Chaudhry MT and et.al (2014).Fungi are very active as they secreate different organic acids, various enzymes and chemicals.Laccase enzyme is one of them which are able to degrade the synthetic dyes.According to Bilal et al., 2019; Mota et al., 2015; Peralta et al., 2017, Up to now the laccases used in the process of degradation and detoxification of dyes like Congo red, are those obtained from the white-rot fungi. Singh 2006 said that the fungal treatment of textile dyes is an economical and effective alternative to discoloration. Mechanisms involved are bioaccumulation, biosorption and biodegradation for dyes decolorization and degradation (Kaushik & Malik, 2015). Laccase enzyme is able to degrade the synthetic dyes by oxidise them. Hence the topic is selected for to give a convenient method to make the healthy ecosystem.

MATERIAL AND METHODS

Selection of sites and collection of samples

Present research work is done for laccase production and decolorization of dyes, industrial area was selected from the Aurangabad district. Collection of four different sample were done from the two different sites of the Waluj industrial area. Collection was done form selected site. During the collection, samples were collected by scientific tools and techniques. Samples were collected in the form of dry and most effluent. This effluent was collected by the sterilized polythene bags, forceps by wearing gloves. It were labelled out to avoid the confusion. Collected samples were brought to laboratory and kept it for room temperature for further experiments.

Isolation and identification of fungi

Isolation of fungi from collected sample were done by using serial dilution method. For isolation of fungi, CZA medium were used. Medium were autoclaved and laterally poured in standard petri plates. After that dilutions were spread on Petri plates containing media. After 3-4 days, it was found that number of fungal colonies were started to growing. These fungi were again inoculated on CZA medium to obtain the pure cultures. Thirty-threefungi were successfully isolated from the collected samples. Isolated fungi were identified in the departmental laboratory with the help of available literature Ellies 1971 and Mukadam et al., 2006.

Production of laccase under different culture conditions

As laccase is responsible for dyes degradation, this experiment was conducted for to obtain the maximum laccase. Here different temperature was used to know the highest rate for laccase production. Temperature such 10ºC, 20ºC, 30ºC, 40ºC and 50ºC were used to produce laccase by fungi. Here GN Broth medium were used for experiment. Tanic acid method is used to know the presence of laccase in the cultural filtrate as brown colonies. Data were recorded after the 7th day of inoculation. Results are seen to be very effective. Here, dominant fungi were selected for further experiment.

Dyes degradation and Seed germination bioassay

Selected dominant fungi were allowed to the degradation of Congo red () dye. Here GN Broth medium were used for this experiment. In the medium congo red dye were added int the proportion of 100mg/L. Fungi *Aspergillus flavus,* Aspergillus*niger, Fusarium sp., Fusarium solani, Alternaria alternata*are allowed for the experiment. It was found that the fungi have avery good potential for the dye degradation. Along with this another experiment were conducted seed germination bioassay. In this experiment seeds of Arachis *hypogea*were soake in the concentrated congo red dye (100mg/L) as well as in the cultural filtrate of the fungi and in the water as control. Here results were recorded on the 7th days of experiment. Here also found that the seeds treated by fungi showed good germination when compared to dyes solution.

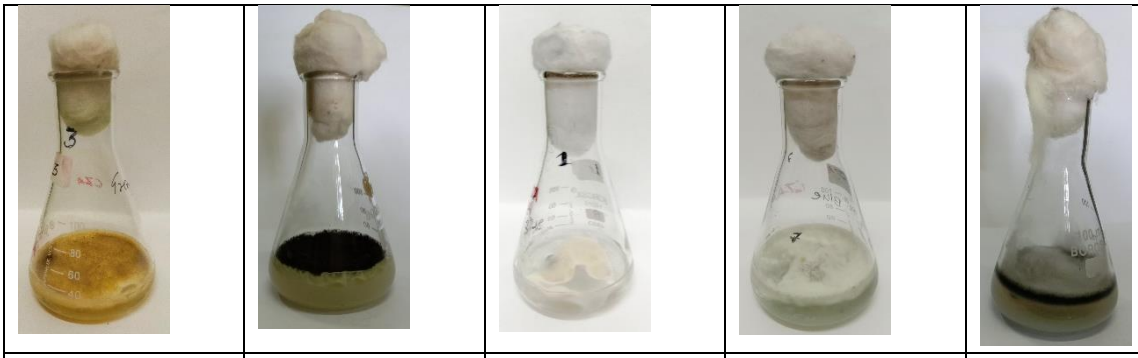
RESULT AND DISCUSSION

In this study it was found that the fungi have the potential to produce laccase enzyeme and also able to degrade the dye. During the study it was found that the fungi like *Aspergillus niger* and *Aspergillus flavus* have the very good potential to produce laccase enzyme. Fungi such as *fusarium solani* and *Alternaria alternata* are found to be moderate one while the *fusarium sp*. Recorded as very less producer of laccase enzyme. It is found that all the fungi degraded the congo red dye in the temperature 30ºC. this result is followed by the 20ºC and 40ºC temperature while in the temperature 10ºC and 50ºC the degradation ratio is recorded very low. Here experiment is done on the seed germination of *Arachis hypogea*. Seeds which are soaked in the dye solution are unable to germinate. Seeds in the water showed highest and fast seed germination. This germination ratio is followed by almost all the cultural filtrate of fungi.

Table 1. Congo red degradation by using fungi at different temperature

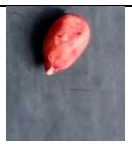
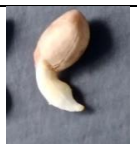
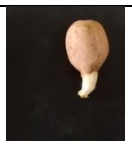
Sr. No	Name of fungi	Degradation of dye at different temperature				
		10ºC	20ºC	30ºC	40ºC	50ºC
1	*Aspergillus flavus*	+	++++	++++	++	+
2	*Aspergillus niger*	+	++++	++++	++++	+
3	*Fusarium sp.*	-	++	+++	+	-
4	*Fusarium solani*	+	+++	+++	+	-
5	*Alternaria alternata*	-	+++	++++	++	+

Fig No: 1. Production of laccase by selected fungi on liquid broth medium

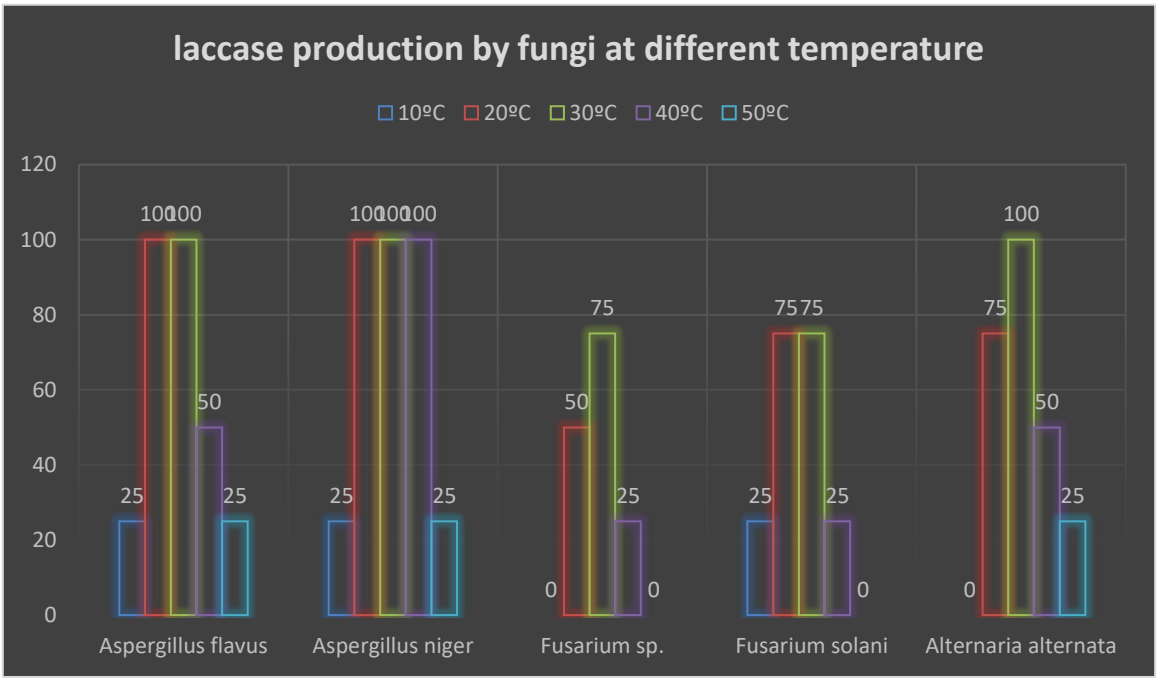


Aspergillus flavus	*Aspergillus niger*	*Fusarium sp.*	*Fusarium solani*	*Alternaria alternata*

Fig no. 2: Treated seeds of *Arachis hypogea* with different cultural filtrate, dye solution and in water

Effect of cultural filtrate on seed germination						
						
Control	Dye	*Aspergillus flavus*	*Aspergillus niger*	*Fusarium sp.*	*Fusarium solani*	*Alternaria alternata*

Graph No. 1: Production of laccase by selected fungi at different temperature



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