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CONFERENCE PROCEEDINGS

One Day
International E-Conference on
Life Sciences, Technology and Management
(5th May, 2022)

Organised by
The English Educators Society, Ambajogai (MS) &
Adarsh Shikashan Sanstha's
Kalikadvi Arts, Commerce & Science College,
Shirur (Ka.) Beed, Maharashtra, India

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Comparative Studies on Physico-Chemical Properties of Termite Mound and Surrounding Soil

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ABSTRACT

In present investigation the study undertaken to evaluate an effect of termite activity on mound soil physico-chemical properties at Sharadanagar area Kopargaon, Ahmednagar, Maharashtra, from December 2019 to April 2020. In this study we analysed 13 physico-chemical parameters. Result obtained from the study showing significant differences in physico-chemical properties between mound soil and surrounding soil. Generally all the parameters are inclining in nature but nitrogen, calcium, sulfur and manganese were decline in mound soil. However, these relationships were also termite specific between mound soil and adjacent soil. This study highlights the importance of termite's activities for increasing the contents of some vital parameters in the mound soil.

Key words: Investigation, Termite, mound soil, physico-chemical, highlights

I. INTRODUCTION

Termites are playing very vital role in agricultural ecosystem as a decomposers. They build mounds therefore also called as 'ecosystem engineers' and plays important role in biotransformation (Abiyot et al., 2016, Dangerfield et al., 1998, Blouin et al., 2013, Dhembare, 2013, Bera et al., 2020). As like similar to earthworm, termites are also considered as an important soil macrofauna that affects in soil functioning and ecosystem activity (Dhembare, 2013). Many researchers reviewed that the soil macro fauna, earthworms, termites and ants are plays mainly vital roles in controlling soil structure to produce fertile soil (Blouin et al., 2013). However termites are useful organisms in ecosystem and plays vital ecological role to increase the soil fertility and productivity. Termites are the social insect as like honeybees. Termites belongs from the order Isoptera. There are about 3000 species found all over the world out them approximately more than 75% species are feeding on soil and 28 species are acting as pests (Glaciela et al., 2006; Adekayode and Ogunkoya 2009; Dhembare, 2013).

Termite's activity increases the amount of organic matter and changes the composition of clay minerals in soil that used for building their nests (Awadzi et al., 2004). Only calcium was cycled in important quantities. They also find that termites only affects a little physico-chemical properties of soils from Uganda, although the number of termite mounds are comparatively in ample mount (Pomeroy, 2006). Termite increases soil permeability with drilling and poke the soil profile foam construction production. The termite nests are underground, termite mound, tree termite nests and one piece nests. Underground nests are common on lower temperature area, mention temperature and moisture on optimal level (Bignell et al., 2000). Termite mounds often occurredinan Indian region. The high of mound is more than a few meters. The mounds are made with materials from underlying soils. It was reported that some farmers collect termite mound soil and apply to crop fieldas a natural fertilizers. However it can be rich in nitrogen, total phosphorus, and organic carbon than adjacent soil (Lopez-hemandez et al., 2001). Overall the termites are the ecological engineer and can be use for restoration of degraded ecosystem (Bottinelli et al., 2018). There are several termite mounds in the present study area as shown in Photo Plate 2.

II. OBJECTIVE OF THE STUDY

The objective of this study was to analyze and compare the physical and chemical properties of mound soil and surrounding soil and to check nutrients availability as well as fertility status of soil for the agricultural use from Sharadanagar area, Kopargaon, Ahmednagar, Maharashtra.

III. MATERIALS AND METHODS

Study Area: The study has been carried out in the Sharadanagar area Kopargaon, Ahmednagar district, Maharashtra, India. Study area (1.15 sqkm) is located near Godavari River Vicinity at 19°53'39.4"N latitude and 74°29'13.3"E longitude as shown in Photo Plate 1. The soil type is black clay soil. Physico-chemical properties of termite mound tends to know the quality of soil for agricultural crop yielding purpose.

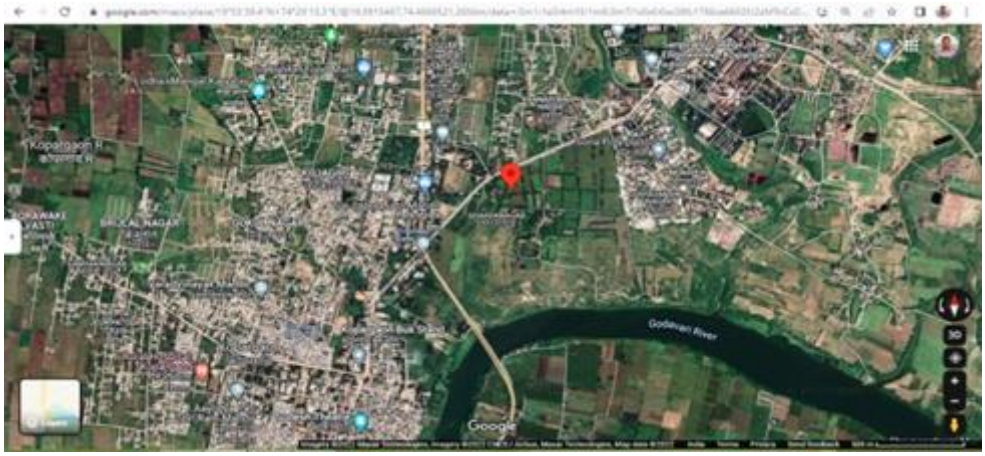


Photo Plate 1: Google Map Image Showing Study Area, Sharadanagar, Kopargaon
(Source: https://www.google.com/maps/place/19%C2%B053'39.4%22N+74%C2%B029'13.3%22/)

Collection of Soil Samples: The termite mound soil samples were collected from twenty-five different selected sites of Sharadanagar area Kopargaon. The collections were made during dry monsoon season (December- 2019-April 2020). At each sites, soil sample was taken from different fields. The study sites were fixed, then digged at about 30 cm deep 'V' shaped pit and remove all soil after the samples were collected from margin of V shaped pit with help of large scalpel. Also five feet surrounding the mound soil samples were collected as control (Dhembare 2013). The collected samples were made into four same sized parts and then removed two opposite parts. The process was repeated until the sample retained one half kg (APHA, 2005). Each of samples were labeled, with date of collection, survey number, name of site collected, type of field and numbered, accordingly, etc.

Photo Plate 2: Photographs Showing Termite Mounds and Internal Structure of Mound

Soil Analysis: The collected soil samples were dried and sieved by 2 mm sieve, then analysis has been done for various physico-chemical parameters (Bera et al., 2020). The experiments were carried out in triplicates. It includes pH, electric conductivity (EC), organic carbon (OC), available Nitrogen (N), Phosphorus (P), Potassium (K), Calcium (Ca), Magnesium (Mg), Sulfur (S), were determined according to APHA (APHA, 2005). The soil samples are subjected for the estimation of Copper (Cu), Manganese (Mn), Zinc (Zn) and Iron (Fe) through atomic absorption spectrum (AAS).

Statistical Analysis: The analysis of variance was performed using MS/Excel/2010. The mean values were compared by Student t-test ($p \leq 0.05$).The main effect and interaction was analyzed by a general at a significant level of $p \leq 0.05$. A correlation coefficient r (significant correlation at $p \leq 0.05$ marked with). The mean data is presented in table 1.

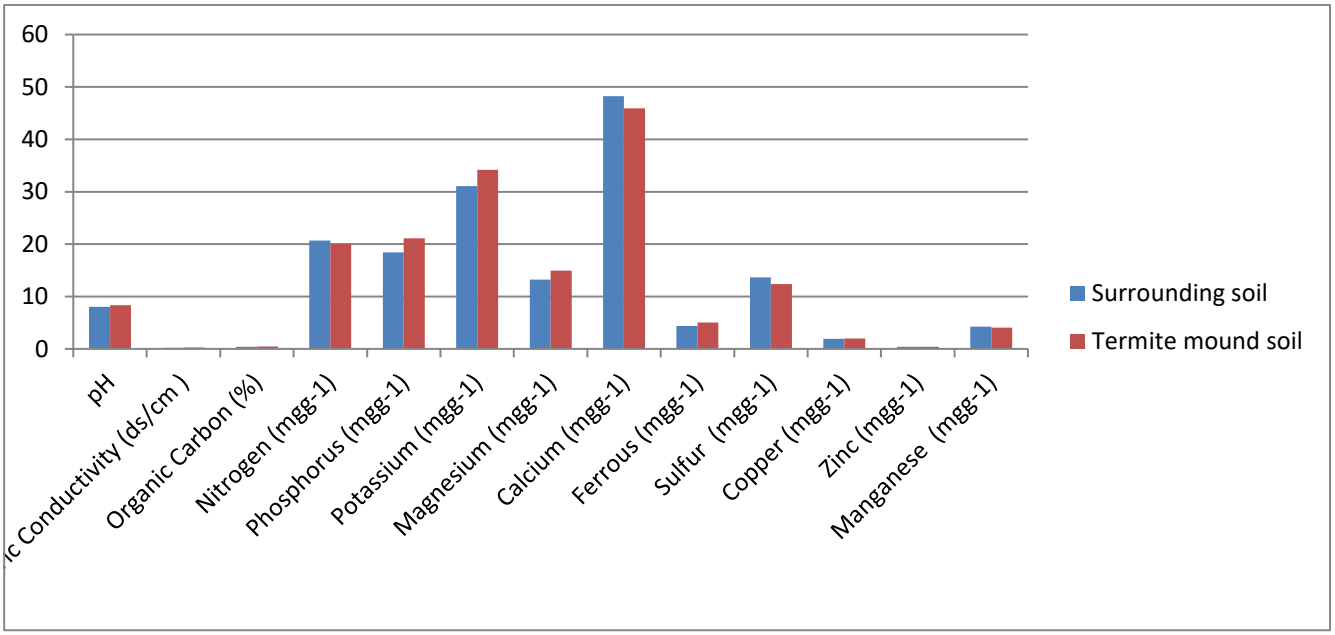
Sr.No.	Parameter	Surrounding (Control) Soil	Termite mound Soil	% decline or incline over control
1	pH	8.05	8.34	3.73
2	Electric Conductivity (ds/cm)	0.24	0.29	20.83
3	Organic Carbon (%)	0.41	0.45	9.76

4	Nitrogen (mgg^{-1})	20.70	20.10	-2.09
5	Phosphorus (mgg^{-1})	18.41	21.12	14.72
6	Potassium (mgg^{-1})	31.06	34.19	10.08
7	Magnesium (mgg^{-1})	13.21	14.95	13.26
8	Calcium (mgg^{-1})	48.21	45.91	-4.77
9	Ferrous (mgg^{-1})	4.40	5.04	14.54
10	Sulfur (mgg^{-1})	13.68	12.40	-9.36
11	Copper (mgg^{-1})	1.91	2.01	5.24
12	Zinc (mgg^{-1})	0.39	0.42	7.70
13	Manganese (mgg^{-1})	4.22	4.08	-3.32

Table 1. Showing physicochemical properties of termite mound soil and surrounding soil.

IV. RESULT AND DISCUSSION

The soil chemical properties showed significant differences between termite mounds soil and surrounding soil. It showed highly positive correlation between mound soil and surrounding soil (r = 0.99) The Student t - test was also significant at 0.05 % level. Result showed that the amount of nutrients such as organic carbon, potassium, phosphorus, magnesium were elevated but Fe , copper and zinc in trace amount while total nitrogen, calcium, sulfur and manganese in termite mound soil were reduced as shown in graph 1.



Graph 1: Showing results for various physico-chemical Parameters

The pH was observed 8.34 in termite mound soil and 8.05 surroundings. It is about 3.73% increase in pH. The pH was not highly modified, there was about 0.3 difference. The possible explanation could be that termite the termite helps to modify or increases pH up to 12.5 Brune and Kuhl, 1996). The pH value of the termite

mound soil was found higher than that of the pH value of the surrounding soil (Y Li et al., 2017). However the dynamics of pH depends upon the soil type, plant material and termite gut activities in that area (Bottinelli et al., 2018).

The EC value was 0.24 dS/m in adjacent soil while in case of mount soil it was 0.25dS/m.. There was 4.17 % incline over control. As agricultural point of view soils with an EC greater than 4 dS/m are considered as saline. However the mound soil was not saline in nature. The salt-sensitive plants may be affected by conductivities less than 4 dS/m and salt tolerant species may not be impacted by concentrations of up to twice than that of the maximum agricultural tolerance limit (Munshower, 1994).

The organic carbon content in mound was 0.45 % and adjacent soil as 0.41%. It was increased about 9.76% over the control. Soil carbon is the largest terrestrial pool of carbon (Batjes, 1996). According to the study conducted by Y Li and his colleagues in 2017, termite's activities can enhance the accumulation of organic matter and enrichment of soil minerals and nutrients. It plays a key role in the carbon cycle and thus it is important in global climatic models. It improves the physical properties of soil and increases the cation exchange capacity, water holding capacity of soil and it contributes to the structural stability of clay soils, termite's activities and their population density have significant effect on physicochemical properties and various processess of soil (Leeper et al., 1993, Holt and Lepage, 2000).

Total nitrogen value was observed as 20.7 mgg^{-1} in surrounding while it was 20.1 mgg^{-1} in the mound soil. Termite mound soil showed decline in nitrogen content. It is as essential macronutrient for the plant growth. Although it is a key for regulation of ecosystem processes (Paster et al., 1984). The increased nitrogen causes acidification and eutrophication (Linda et al., 2010).

The Phosphorus concentration was 18.41 mg/g in surrounding and 21.12 mg/g in termite mound soil. It was about 14.72% more than adjacent soil. It is often recommended as a row-applied starter fertilizer and starter applications may increase early growth but does not increase grain yield.

Potassium was noticed as 31.06 mgg^{-1} in the adjacent soiland 34.19 mgg^{-1} in mound soil. It was shown10.08% higher than adjacent soil. Potassium is essential element and its main role is to provide the ionic environment for metabolic processes which regulates various processes including growth regulation (Datnoff et al., 2006).

The micronutrient magnesium was recorded was 13.21 mgg^{-1} in surrounding soil and 14.95 mgg^{-1} in termite mound soil. There is about 13.26% inclined. The calcium was 48.21 mgg^{-1} in surrounding and 45.91 mgg^{-1} in mound soil. There was about 4.77% reduction over the control. Ferrous in the mound soil was 5.04 mgg^{-1} and in the surrounding 4.85 mg g^{-1}. It is about 3.92 % higher than control. The sulfur contents was 13.68 mg g^{-1}in the control soil and 12.40 mg g^{-1}in mound soil. There is about 9.36 % reduction. The availability of sulfur to plants is dependent on the release of this element from soil organic matter (Bettany and Stewart, 1983). It is also shown that net mineralization of soil Sulfur is affected by organic matter additions (Saggar et al., 1981) and plant growth (Tsuji and Goha, 1979). Copper in the mound soil was 1.97 mgg-1 and in the surrounding 2.01 mgg-1. There is about 2.03 % elevation over control. It is essential for plant functions such as a catalyst in photosynthesis, respiration, several enzyme systems, and carbohydrate and protein metabolism. It is important to the formation of lignin in plant cell walls which contributes to the structural strength of the cells and the plant. Zinc in the mound soil was 0.4 mgg^{-1} and in the surrounding 0.39 mgg^{-1}. There is about

2.56 % incline over the control. Zinc is essential for many plant functions such as production of auxins, activates enzymes in protein synthesis, regulation and consumption of sugars, starch formation and root development. It is necessary for the formation of chlorophyll and carbohydrates.

Manganese in the mound soil was 5.22 mgg^{-1} and in the surrounding 4.08 mgg^{-1}. It is about 3.32% declined over the control. It was higher than prescribed standards. Manganese has activated many enzymatic reactions involved in metabolize of organic acids. Manganese along with Fe plays very vital role in the formation chlorophyll pigments.

Termite enrich the soil with organic carbon, phosphorus, potassium, and magnesium as a result of digesting plant materials and depositing feces and saliva in their working at the surface (Nutting et al., 1987, Semhi et al., 2008). During this process they can breakdown the litter into minute particles, enhancing the action of fungi and soil bacteria, thus favoring the decomposition of organic matter, plant material, cycling of nutrients and helping for the formation of humic substances (Gholami and Riazi, 2012). The organic material which passes through the digestive tract is subjected to various chemical and biological processes such as organic matter, as well as its humification degree and complication with metal ions (Brauman, 2000). The acceleration of organic matter decomposition due to termite action can further increase the aggregate stability and soil porosity, which can enhance water retention (Miklos, 1995, Balbino et al., 2002). In the oligothrophic environment, the source of phosphorous is mainly organic, the higher P associated with higher organic matter content in the mounds, compared with control soil.

Manuwa (2009) reported in the study of Physico-chemical and dynamic properties of termite mound soil relevant in sustainable food production was obtained somewhat similar conclusion about potassium, calcium and magnesium concentration but unlike this investigation result is reported decreasing in the amount of nitrogen and phosphorus. In the present study nitrogen was also declined. In order to study the effect of termite mounds on plant establishment and development of plant species in forest have been shown that nitrogen and phosphorus were elevated in termite mound, also phosphorus and magnesium did not differ significantly between termite mound and control soil (Ackreman et al., 2007). Semhi et al., (2008) also studied that the activity of termites after increased most macro elements but decreased the amount of potassium and also showed the contents of some trace elements except for manganese.

Soil analysis showed that an increase in clay percent in the soil with termite activity. One reason of this may be related to preferred selection of clay particles by termites. Similar results have been reported by Roose et al., (2004) and Lima et al., 2018 found that there is higher clay content in mound soil than the surrounding soil, but Ackreman et al., (2007) were seen lower percentage of clay in the termites soil. Roose et al., (2004) also have observed that termite's activity increases the amount of organic matter in the soil that they use the construction of their nests (Millogo et al., 2011). As reported by Gholami and Riazi, (2012) the termites surveyed as a pest in Iran. The findings concluded that termites have impact on soil and its functions (Fageria and Baliger, 2005; Lima et al., 2018).

V. CONCLUSION

The termite's significant role has been observed in decomposition of plant material, crop residues, nutrient cycles, enhancement in soil fertility, soil formation and biotransformation etc. The role of termites has been also surveyed as pests and determines the effects of them on physical and chemical properties of soil, further more studies are needed for understanding the gut and saliva composition of termites. The study of termite mound soil have shown that the mound soil can have higher or lower value of pH, EC, organic carbon, total nitrogen, exchangeable Ca, Mg, and K, water holding capacity and water infiltration rate.

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Study of Web Mining, Algorithms of Web Mining and Applications of Web Mining

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ABSTRACT

Without the internet, life would have been almost impossible. The web mining is application of data mining. Web Mining is the process of Data Mining techniques to automatically discover and extract information from Web documents and services. The data available on the web is so voluminous and heterogeneous that it becomes an essential factor to mine this available data to make it presentable, useful, and pertinent to a particular problem. Web mining deals with extracting these interesting patterns and developing useful abstracts from different sources. This paper tells how data on web are mined how ranks the web application. Also what types of algorithms are used for web mining? Applications of web mining.

Keywords: Web Mining, Types of web mining, HITS algorithms, PageRank algorithms, Applications

I. INTRODUCTION

Web is internet without internet we can't imagine our life. WWW is world wide web where heterogeneous data is resides. We access this information through internet sites. (Berners-Lee and Cailliau and Loutonen and Nielsen and Secret. 1994) WWW is connected to number of servers where web pages are linked. Whatever information we want is when you search is send by server on client side. Web is a collection of inter-related files on one or more Web servers. Web mining is part of data mining technology which mining large amounts of web data to improve service of internet. W3 provides information which user wants. But to identify the relevant piece of information web mining technics is used. Research in web mining tries to address this problem by applying techniques from data mining and machine learning to Web data and documents.

Web Mining: Web mining is actually an area of data mining related to the information available on internet. It is a concept of extracting informative data available on web pages over the internet (Kumar and singh 2016). Users use different search engines to fetch their required data from the internet, that informative and user needed data is discovered through mining technique called Web Mining.

II. TYPES OF WEB MINING

Web mining the application of data mining techniques to web-based data for the purpose of learning or extracting knowledge. (Cooley and Mobasher and Srivastava 1997)Web mining methodologies can generally be classified into one of three distinct categories as:-

1) Web Content Mining
2) Web Structure Mining
3) Web uses mining

1) **Web Content Mining:-**It is the process of extracting useful information from the contents of Web documents. The content may be data (text formatted information), audio, video, images or structured records. Content mining is the scanning and mining of text, pictures and graphs of a Web page to determine the related content to the search query. With the massive amount of information that is available on the World Wide Web, content mining provides the results lists to search engines in order of highest relevance to the keywords in the query.

Text mining is directed toward specific information provided by the customer search information in search engines (Johnson and Gupta2012). Main purpose of text mining is to extract previous information from content source.

Various algorithms are used for web content mining such as Decision Tree, Naïve Bayes, Neural Networks,

2) **Web Structure Mining:-** It is the application of discovering structure information from the web. The structure of the web graph consists of web pages as nodes, and hyperlinks as edges connecting related pages. Structure mining basically shows the structured summary of a particular website. It identifies relationship between web pages linked by information or direct link connection. To determine the connection between two commercial websites, Web structure mining can be very useful.

This allows a search engine to call web pages in which data resides which user wants. This process is completed by scanning the websites, retrieving the home page, then linking the information through reference links to bring the specific page containing the desired information.

Algorithms used for structured web mining HITS algorithm, PageRank algorithm, Distance Rank algorithm and so on.

3) **Web Uses mining:** - It is the application of discovering interesting usage patterns from large data sets. Depends on pattern understands what user want to search again and again on different sites.(Prabha and Suganya 2017) User access data on the web and collect data in form of logs. So, Web usage mining is also called log mining.

For web uses mining FP Growth algorithm, prefix spam, Apriori algorithm, and maxi-mal reference algorithms are used.

Different algorithms are used for web mining in different categorires.In this paper I discussed two of them i.e. HITS algorithm and page rank algorithm

III. ALGORITHMS OF STRUCTURAL WEB MINING

A) **HITS Algorithm:-**HITS stands for hyperlink induced topic search. It is used for web analysis. It is introduced by Jon Kleinberg (Shivakumar and Mylsami 2014) for ranking pages. There are two terms in HITS algorithm i.e Hubs & authorities.

Authorities: - The set of highly relevant web pages are called Roots .Roots are also called as Authorities.

Hub :- Pages that are not very relevant but point to pages in the Root are called Hubs.

An Authority is a page that many hubs link to whereas a Hub is a page that links to many authorities.

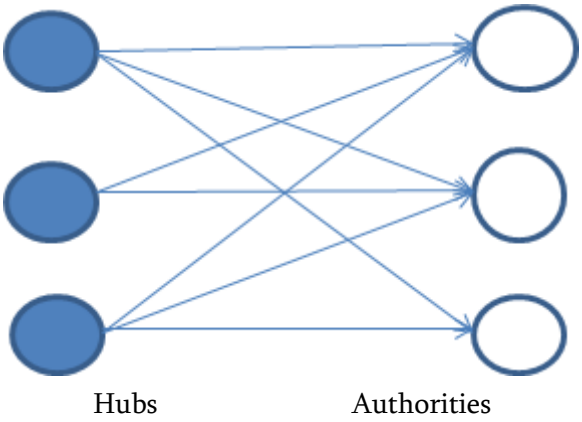

Fig 1. HITS (Hub & Authorities) (Sehgal. 2014)

Good authority is a page that is pointed by high hub weights and good hubs are pages that points to many authority pages with high weights which shown in Fig1.It is not easy to differentiate for some websites which is hub & authorities(sehgal.2014). HITS algorithms works in two way

1) if we use adjacency matrix given for linked web pages or as nodes in matrix
2) If we not used matrix

1) If we use adjacency matrix given for linked web pages or as nodes in matrix:- When adjacent matrix is given then we have to calculate Hub weighted graph (u) and Authority weighted graph(v) by using formula 1) Hub weighted graph (u) =A*v 2) Authority weighted graph (v) =A^{T}*u

formBy using these formula we have to get score value of each pages or nodes. After that if ask for iteration (k) ,values calculated for hubs & authorities are calculated by using Normalize the scores by dividing each Hub score by square root of the sum of the squares of all Hub scores, and dividing each Authority score by square root of the sum of the squares of all Authority scores. (Optional)

Each row & column represents N1, N2, N3, N4 links. By take any example in adjacent matrix where N1,N 2,N3,N4 are web pages which connected write 1 not connected write 0.by taking example I calculate score of web pages in hub & authorities.

$$A = \begin{bmatrix} 0 & 1 & 1 & 1 \\ 1 & 1 & 1 & 0 \\ 0 & 0 & 1 & 1 \\ 0 & 0 & 1 & 0 \end{bmatrix} \quad \text{and}$$

$$A^T = \begin{bmatrix} 0 & 1 & 0 & 0 \\ 1 & 1 & 0 & 0 \\ 1 & 1 & 1 & 1 \\ 1 & 0 & 1 & 0 \end{bmatrix}$$

Transparency matrix obtains by interchanging row by column. After that assume u=1 i.e.

$v = A^T * u$

$$v = \begin{bmatrix} 0 & 1 & 0 & 0 \\ 1 & 1 & 0 & 0 \\ 1 & 1 & 1 & 1 \\ 1 & 0 & 1 & 0 \end{bmatrix} * \begin{bmatrix} 1 \\ 1 \\ 1 \\ 1 \end{bmatrix} = \begin{bmatrix} 1 \\ 2 \\ 4 \\ 2 \end{bmatrix} Authority\ score\ of\ each\ page$$

$u = A^* v$

$$u = \begin{bmatrix} 0 & 1 & 1 & 1 \\ 1 & 1 & 1 & 0 \\ 0 & 0 & 1 & 1 \\ 0 & 0 & 1 & 0 \end{bmatrix} * \begin{bmatrix} 1 \\ 2 \\ 4 \\ 2 \end{bmatrix} = \begin{bmatrix} 8 \\ 7 \\ 6 \\ 4 \end{bmatrix} Hub\ score\ of\ each\ page$$

Sequence of authorities web pages={ N3,{N1,N4},N1} & Sequence of hubs ={N1,N2,N3,N4}.

If iterations are given then we get values of each web pages which act as hubs & authorities so we apply normalization method on it as authorities score

1) N1= 1/ square root of($1^2+2^2+4^2+2^2$) =1/5=0.5 And by calculating other values same as N2=0.4 ,N3=0.8 ,N4=0.4

Scores of hubs are 1) N1= 8/square root ($8^2+7^2+6^2+4^2$)=8/square root of 165=8/12.84 =9.96

2) N2=7/12.84=0.5451 3) N3=6/12.84=0.467 4) N4=4/12.84=0.311

Depends on score values that pages are send to user for related topics.

2) If we have not given adjacent matrix's HITS algorithms work as

1) Each node is assigned a Hub score = 1 and an Authority score = 1. 2) Let number of iterations be k. 3) Repeat for k

Hub update: Each node's Hub score = ∑ (Authority score of each node it points to).

Authority update: Each node's Authority score = ∑ (Hub score of each node pointing to it)

Normalize the scores by dividing each Hub score by square root of the sum of the squares of all Hub scores, and dividing each Authority score by square root of the sum of the squares of all Authority scores. (Optional)

B) **Page Rank algorithms:** Page Rank algorithm was developed by two famous authors L. Page and S. Brain(Shivakumar and Mylsami 2014)Both authors suggested that Google search engine works on page rank algorithms. This algorithm works on ranking the web pages which websites contain. If one web page linking to specific web pages indicates the importance of that web pages. This link is known as backlink. The backlink is produced from specific web page where that page is connected. then weightage of this link will be higher than those whose links are coming from non-important pages.

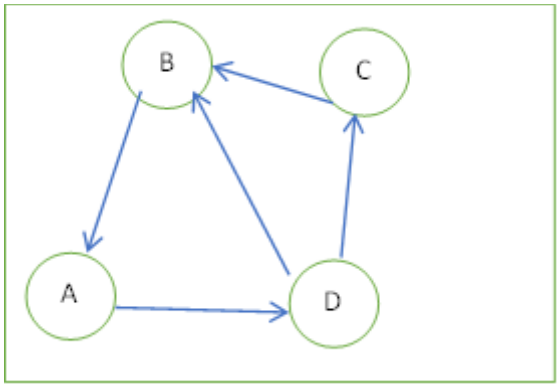

Fig 2 . Back Link structures of nodes (Shivakumar and Mylsami 2014)

Link from page A to page D is considered as a vote Shown in Fig. 2: Back link Structure. More the vote receives by the page more the importance of that specific page will be. If vote produced from a high weightage page then the importance of linking page will become higher.

Following is formula (Miguel and Zhiguo 2005) to find page rank of A

PR (A) = (1-d) $+d(\frac{PR(T1)}{C(T1)} + \cdots \frac{PR(Tn)}{C(Tn)})$

Where,

1) PR(A) is page rank of A
2) PR(Ti)=page rank of page (Ti is page rank of A)
3) C(Ti)=no of outlinks of i^{th} page
4) d = damping factor (value ranges from 0 to 1)

IV. APPLICATIONS OF WEB MINING

1) Web mining is used to discover how users navigate a website and the results can help in improving the site design and making it more visible on the web.
2) In digital world, popularity of use of digital images in social media is increased to improve digital image technology & convenient availability facilitated by internet. Images are not described so to find appropriated match of user want web mining is used.
3) Web mining is used for social network analysis. Social network is the study of social entities and their interactions and relationships The ideas from social network analysis are indeed instrumental to the success of Web search engines Social network analysis is useful for the Web because the Web is essentially a virtual society, and thus a virtual social network,

V. CONCLUSION

WWW is plaice where global information stored in the form of web pages. User can access it for any reason. Web mining technics discover & analysis these web pages to find certain patterens.Three types of mining are done i.e. content, structural, usages.

In content web mining we discover pattern on analysis the content in web pages. In structural web mining we analysis the relationships between the web pages by hyperlink also ranks the web pages. In usages web mining, we observe the users & web pages or websites relationship. For mining various algorithm are used for discovering pattern out of all algorithms in this paper two algorithms are discussed HITS & PageRank.

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Degenerative Changes in Gills of Poecilia Reticulata Peters on Chronic Exposure to Sodium Fluoride

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ABSTRACT

Background: Fluoride is known as a 'double edged sword' that causes dental, skeletal and non-skeletal fluorosis on excess concentration in body. The effects of toxicant exposure are of particular importance to those concerned with the aquatic environment, since they more closely represent natural situations.

Objective: The damage to the various tissues due to chronic or long-term exposure is more severe than that occurring due to acute or short-term exposure because the organism gets exposed to the deleterious or toxic environment for a considerably long period of time. The study was carried out to assess the applicability of histopathology in aquatic toxicity testing, investigation was carried out on the Guppy, Poecilia reticulata Peters using aqueous solution of Sodium fluoride exposure chronically for a span of 60 days.

Results: Fish were exposed to three sub-lethal concentrations of Sodium fluoride viz. lowest (5.75 ppm), lower intermediate (7.18 ppm) and higher intermediate (9.58 ppm), which were selected on the basis of 96 hrs. LC50 value of 115 ppm. Histopathological deviations in the gills manifestation under intoxication of fluoride were thickening of basement membrane and enlargement of cartilaginous axis cells, degeneration of gill lamellae, swelling of base, proliferation in the inter-lamellar space, pycnosis and necrosis of chloride cells, hyperplasia and fusion of the secondary lamellae characterized by swelling at the tip, which caused failure of the respiratory mechanism resulting in augmentation of mortality of the test fish.

Discussion: The necrosis observed in the cellular architecture of the gill tissue in histopathology slides that revealed the toxic effects of fluoride resulting in physiological imbalance caused by disturbance in primary and secondary gill lamellae with hyperplasia and hypertrophy of gill tissue altering the respiratory potential in the test fish with death due to asphyxiation.

Conclusion: From present investigation it is concluded that fluoride affects dynamic organ like gills in Guppy causing deterioration of gill tissue, the most sensitive indicator disrupting the respiratory potential. Furthermore, the epithelial transport mechanisms which are pretentious in the fish gill model bear a resemblance to those described in the human gut and kidney the sites of action of a variety of environmental contaminants.

KEYWORDS: Fluoride Toxicity, Histopathology, Gill, Poecilia reticulata Peters.

I. INTRODUCTION

A chronic direct effect differs from an acute one in that the toxicant causes a sub-lethal change in the host that may or may not be the eventual cause of death. The effects of toxicant exposure are of particular importance to those concerned with the aquatic environment, since they more closely represent natural situations. The damage to the various tissues due to chronic or long-term exposure is more severe than that occurring due to acute or short-term exposure because the organism gets exposed to the deleterious or toxic environment for a considerably long period of time. In India, about 62 million people are estimated to be afflicted with various stages of skeletal fluorosis from consuming fluoride-contaminated water (Jain et al., 2000). Although uncontaminated freshwater bodies usually have low levels of fluoride, the concentration might increase considerably due to fertilizer run-off, mining activities and industrial emissions. Fluorides also originate in ground water from fluoride rich rocks, volcanic rock and clay mineral, due to industrial effluents discharged directly into them and also by anthropogenic activities. The toxic effects of Sodium fluoride are not just restricted to skeletal or dental fluorosis but even the soft tissues causing soft tissue fluorosis. The test fish, *Poecilia reticulata* Peters is universally known as Guppy fish, which are larvivorous fish thus profusely used as a tool in the biological control of pest. Though not eatable, its momentous involvement in control of mosquitoes' menace cannot be ruled out in space and time. The present study is an effort to reveal influence of fluoride (as NaF) triggering non-skeletal fluorosis in gill tissue of *Poecilia reticulata* Peters.

Past few decades many workers have investigated effects of different categories of toxicants and observed their long-term or chronic implication on histopathology of aquatic organisms in general and fish in particular. Mallot (1985) have presented an exceptional statistical review of various gill lesions caused by a number of aquatic pollutants. Muley et al. (1996) treated *Tilapia mossambica* with sodium fluoride and reported damage to the cellular architecture of the tissue. Studies by Palaniappan et al. (2003) on the histopathology of *Cirrhinus mrigala* exposed to sub-lethal concentration of nickel revealed severe damage and changes in the cellular level of gills leading to death of fish. Histopathological changes in *Poecilia reticulata* exposed to sub-lethal concentrations of azodye methyl red as reported by Sharma et al. (2006) includes distortion and disintegration in primary gill lamellae, damage of respiratory epithelium, mucous and blood cells accompanied by thickening of basement membrane, enlargement of cartilaginous axis cells with complete disintegration of secondary gill lamellae. The histopathological alterations reported by them were detached gill lamellae from the filament with broken gill filament and ruptured capillaries. The rate of absorption of oxygen through gills and skin depends on the availability or fluoride concentration. Higher the fluoride concentration lowers the absorption of oxygen which will be later on produced alteration in all biochemical processes occurring in fish (Singh and Tripathi, 2015). Cao et al., (2013) reported accumulation of fluoride to be associated with the inhibition of superoxide dismutase (SOD) activities and a dose-dependent stimulation of malondialdehyde (MDA) levels in the gill tissues of *C. carpio*, suggesting that fluoride promoted oxidative stress in the fish. Microscopic examinations revealed injuries to gill tissues and chloride cells, with the severity of injury increasing with exposure concentration. Histopathological changes induced by fluoride have been adequately documented in

rat by Uprete and Kannan (2005) and fish by Bhatnagar et al., (2007); Shingadia (2011; 2012, 2014); Shingadia and Agharia (2013).

II. MATERIALS AND METHOD

The test fish, *Poecilia reticulata* Peters measuring 3.5±0.1cm & average weight of 0.52±0.002g were acclimated in the laboratory for two weeks and fed with standard pellet food. The physico-chemical parameters like temperature, pH, DO, Free CO_2, Total hardness, Alkalinity and Acidity of aged tap water were analysed using standard methods as given in APHA (2005). Twenty-five acclimated healthy fish were exposed to three sub-lethal concentrations of Sodium fluoride (NaF) viz. lowest (5.75 ppm), lower intermediate (7.18 ppm) and higher intermediate (9.58 ppm). The doses were selected on the basis of 96 hrs. LC_{50} value being 115 ppm. A duplicate set of this experiment was simultaneously run for confirmation of the results. Control set with same number of test fish but without any toxicant was also run simultaneously. The tests were carried out in glass aquaria measuring 60x30x30cm³ dimensions. The amount of water in each tank was 2.0 L/g body weight of the test fish. Entire water from each tank was replaced every alternate day to avoid any accumulation of metabolic wastes and to keep the level of toxicants in the respective tanks constant. At the end of chronic toxicity test period of 60 days, the surviving fish from control & treatment tanks of three sub-lethal concentrations viz. 5.75 ppm, 7.18 ppm and 9.58 ppm were used for the histopathological studies. After sacrificing the fish by decapitation, gills were dissected out and immediately fixed in neutral formalin fixative to prevent autolysis and preserve the shape, structure and chemical constituents of the tissue. After 24 hours of fixation the tissues were dehydrated with alcohol. The tissues were then subjected to the process of infiltration in paraffin wax (M.P. 52-54ºC). Paraffin blocks were prepared and sections were cut on the microtome at 4-5µm thickness. After dehydrated with alcohol the dewaxed tissues were stained with Erhlich's Haematoxylin and Eosin Y stain (Gurr, 1956). Finally, the sections were mounted in Diether Plasticizer Xylene & photomicrographs were taken using digital camera.

III. RESULTS AND DISCUSSIONS

The physico-chemical characteristics like Temperature, pH, DO, Free CO_2, Total hardness, Alkalinity and Acidity of aged tap water used in the bioassay study is as presented in Table 1. The examination of gill tissue exposed to three sub-lethal concentrations of Sodium fluoride at the end of 60 days exposure period revealed that in the lowest concentration (5.75 ppm) of sodium fluoride, the tissues were practically unaffected whereas the damage caused to the tissues of fish treated with lower intermediate (7.18 ppm) and higher intermediate (9.58 ppm) concentrations was of almost similar nature and hence the histopathological changes pertaining to both these concentrations are discussed together.

Histological structure of gills of fish from control tank (Fig. 1):

The gill in fish forms the major site for gaseous exchange. These are situated beneath the operculum and consist of four pairs of arched gill bars. Each bar bears two adjacent rows of slender gill filaments that are flat and

elongated, arising alternately along its length. These are called primary gill lamellae (PGL). On the upper and lower surface of each gill filament there are series of thin parallel folds called secondary gill lamellae (SGL). Blood vessels are extended into each of the secondary gill filaments. These form the sites of gaseous exchange. The gill filaments are supported by a cartilaginous gill ray that acts as a mechanical support and a site of attachment for the adductor muscles. The epithelial wall (EW) of the secondary gill lamellae lies on the basement membrane (BM) and is supported by Pillar cells (PC) and Salt cells (SC). Epithelium of the filament is multilayered and particularly well developed at the tips and also possess numerous mucous cells (MC). The region between the two adjacent secondary gill lamellae is known as inter-lamellar space (ILS).

Histopathological structure of gills of Sodium fluoride treated fish (Fig. 2):

Marked pathological changes in the exposed gill of the treated fish in the apical region as compared with control were observed. There was congestion in the primary gill lamellae (PGL) of gill with accumulation of erythrocytes (RBC). There was proliferation of cells in the secondary gill lamellae (SGL). The epithelial wall (EC) of secondary lamellae appeared ruptured due to necrosis and lifting of respiratory epithelium. Vacuolation (V) was also observed at the base of the secondary lamellae with thickening of basement membrane (BM) and enlargement of cartilaginous axis cells (CAC). Swelling at the tips of the secondary gill lamellae (STSL) was observed. Both the primary and secondary gill lamellae appeared to be ruptured. Gill filaments at the interval showed splitting of gill tissue and rupture of gill filament. Architecture of Pillar cell (PC) was perhaps changed by proliferation in Chloride cell (CC) amount and their consequent bulging to the periphery. The necrosis observed in the cellular architecture of the gill tissue in histopathological observation revealed the toxic effects of fluoride resulting in physiological imbalance triggered by disruption in primary and secondary gill lamellae with hyperplasia and hypertrophy of gill tissue distressing the respiratory function in the test fish.

The above-mentioned results depict the damage caused by sodium fluoride to the histoarchitecture of the vital respiratory tissue of Guppy, *Poecilia reticulata* Peters. Most degenerative changes in cells are initiated by inability to maintain proper ionic balance. Cellular injury causes an intracellular reduction in oxidative phosphorylation with a resultant drop in the level of Adenosine triphosphate and a concomitant shift towards acidosis. The cation pump of the cell, which uses ATP as an energy source, breaks down allowing an influx of sodium, chloride, calcium and water. This causes cellular swelling and damages cell membranes, which leak intracellular ions like Potassium, enzymes and proteins. Most degenerative changes in cells are irreversible to a certain degree before cell death becomes inevitable. Leandro et al. (2004) reported histological anomalies in branchial epithelium with increased mucous secretion and chloride cells and also reported alteration in the content of the granules, suggesting behavioral changes with excessive secretion of mucous to enable Guppy fish to adapt to the toxic environment due to increasing concentration of sodium fluoride. Hitesh Shingadia (2011, 2012, 2014) have earlier reported chronic revelation of sodium fluoride to induce pathohistological alterations in gonads, liver and intestine of *Poecilia reticulata* Peter and & its repercussions on activities of some marker enzymes.

The present investigations with the aforementioned histopathological observations clearly exhibit highly significant changes in the respiratory tissue of test fish under chronic exposure of sodium fluoride. The alteration in the gill tissue might reduce the respiratory area thereby reducing the respiratory and

osmoregulatory potential of the fish. It also indicates a decrease in energy metabolism due to degeneration of respiratory epithelium and the damage of the gill tissues may finally result in tissue hypoxia. Similar observations on fish as test animal have been reported by many researchers that substantiates with the present findings. Bhatnagar et al. (2007) reported fluoride induced pathological irreversible damage to vital tissue like gill of freshwater teleost, *Labeo rohita* characterized by clubbed lamellae, mucoid metaplasia and lamellar hyperplasia that validates with the present findings. Proliferation of mucous cells in the epithelium of the gills and the head region is postulated to be instrumental in the excretion of fluoride from the body and is considered an effective defense mechanism against fluoride intoxication as propounded by John and Williams (2011). Yang et al. (2011) reported that NaF reduced cell viability in a temporal and concentration dependent manner thus promoting osteoblast apoptosis even at lower concentrations (10^{-5}M). Abdo et al. (2011) observed in ultrastructure of kidney of proximal lining cells; some heterochromatic nuclei, numerous cytoplasmic vacuolation of variable sizes and small scattered rounded mitochondria associated with loss of basal infoldings. These results suggest that chronic exposure to elevated concentrations of fluoride might induce toxicity in the test fish. Bajpai and Tripathi (2012) observed that when Catfish, *Hetropneustis fossilis* (Bloch) was exposed to Fluoride, primary and secondary lamellar epithelium became swelled and clubbing on the tip of secondary lamellae of gills, shortening and fusion of secondary lamellae, hyperplasia and hypertrophy in chloride cells of gills that are also observed in the present study. Cao et al. (2014) observed increase in ROS and decrease in antioxidant capacity in the gills of chronically exposed *C. carpio* that eventually caused the apoptosis in the fluoride-exposed gills and cells in the test fish, which according to them played a crucial role in physiological functioning of gill impairment induced by chronic fluorosis.

IV. CONCLUSION

The primary task of toxicological work is providing a scientific basis for the maximum permissible concentration of toxic substances or pollutants to be released in the water bodies and determining the maximum harmless concentration of toxic substances for aquatic animals. Thus, when the concentration exceeds permissible limits irreparable architectural changes in the vital organ like gills damages them making the fish less fit for better survival. The gill epithelium is the site of gas exchange, ionic regulation, acid-base balance and nitrogenous waste excretion in fishes that are controlled by passive and active transport of various solutes across the epithelium. Environmental pollutant like fluoride have been found to affect the morphology of the gill epithelium causing physiological disturbances that underlay the harmfulness of this pollutant. The present study has established toxicity of even otherwise essential element like Fluorine (as NaF) in the freshwater Guppy fish, *Poecilia reticulata* Peters at tissue level that are essential for their body energetics and normal metabolism.

V. ACKNOWLEDGEMENT

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Table 1 Physico-chemical characteristics of test water used in bioassay study

Hydrological Parameters	Range
Temperature (ºC)	29-30
pH	7.2-7.6
Dissolved Oxygen (mg/L)	5.5-6.5
Free CO_2 (mg/L)	Nil
Total Hardness (mg/L as $CaCO_3$)	35-40
Alkalinity (mg/L)	50-55
Acidity (mg/L)	3-4

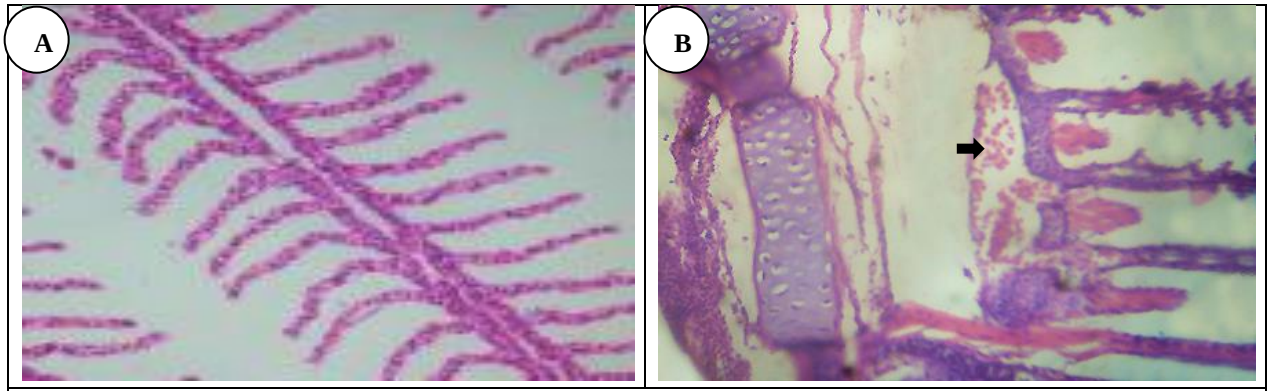

Fig. 1 Showing normal histological structure of Gills of *P. reticulata* Peters from control tank. (A=40x & B=100x)

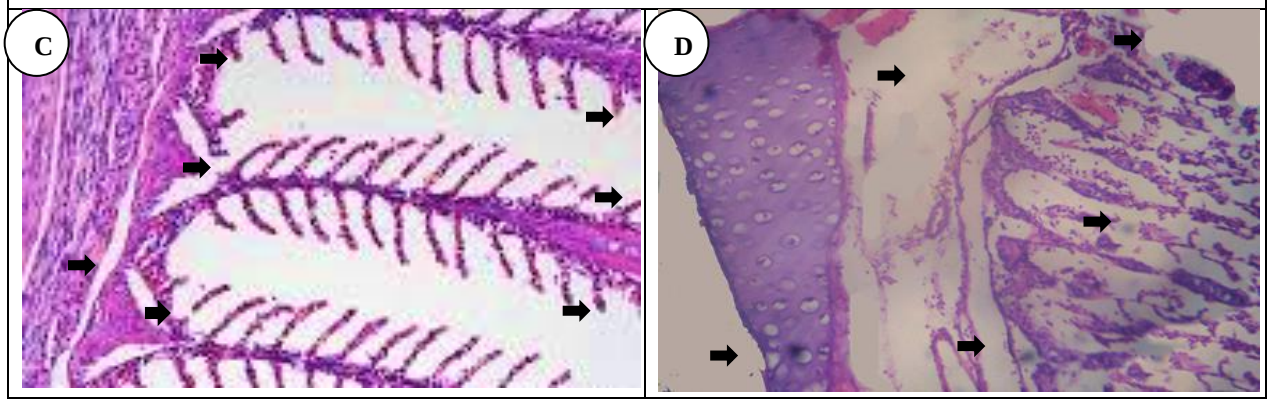

Fig. 2 Showing Sodium fluoride induced histopathological changes in Gills of *P. reticulata* Peters from treated tank. Arrow indicates disintegration of gill lamellae, degeneration of gill tissue, thinning of mucosa & vacuolation. (C=40x & D=100x)

[CL (Clubbed lamellae); EC (Epithelial cell); ENC (Endothelial cell); ILS (Interlamellar space); LF (Lamellar fusion); PC (Pillar cell); PGL (Primary gill lamella); RBC (Red blood cells); SC (Salt cell); SGL (Secondary gill lamellae); STSL (Swollen tip of secondary lamellae)]

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Total Protein Analysis in Muscle, Liver and Serum of Heteropneustes Fosilis (Bloch.)

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ABSTRACT

The total protein contents (TPCs) in muscle, liver and serum of Heteropneustes fosilis (Bloch.) was evaluated. Fish was sacrificed to obtained muscle, liver and serum. Muscle and liver homogenate was prepared for TPCs estimation. The highest muscle TPCs were observed (22.831 ± 0.119 mg/g and 28.485 ± 0.227 mg/g) in the month of February whereas lowest TPCs were observed in July as 12.499±0.27 respectively. These results pointed out that environmental factors, such as physico-chemical profiles of aquatic medium, spawning season affect the protein content in Heteropneustes fosilis.

Keywords: Total protein, Muscle, Liver, Serum, Heteropneustes fosilis.

I. INTRODUCTION

The nutritive and medicinal values of fishes have been recognized from time immemorial. Fresh fish flesh provides an excellent source of proteins for human diet (Gangwar et al., 2007).Protein is of relatively high digestibility and contains all the ten essential amino acids in desirable quantity for human consumption (Chandrashekhar et al., 2004).Protein digested and assimilated is mostly incorporated into muscles of the fish (Dabhade et al., 2009). Muscles contribute upto 60% of the total body mass in most fishes. Knowledge of biochemical composition of fish is of great help in evaluating its nutritive value (Kingston and Venkataramani,1994).Though lot of work on biochemical composition of fish muscle protein (Kandemir and Polat,2007) has been undertaken. The biochemical composition of fish muscle is an indication of fish quality. It helps to assess the nutritional and edible value of fish. Variation in biochemical composition of fish flesh also depend upon environmental conditions, breeding season, sex of individual and reproductive status. The basic objective of of this research was to examine the fish muscles, liver and serum total protein of *Heteropneustes fosilis*.

II. MATERIAL AND METHODS

Histological Methods

The present study was undertaken to analyse the histochemical and biochemical protein content in muscle liver and serum of *Heteropneustes fosilis*. Live fishes brought to laboratory, acclimatized in aquarium. Then anaesthetized, photographed and dissected in normal saline solution. The samples of muscle of about 1cm*3* were excised and fixed in Cornoy's fixative (3-6 hours) for histochemical studies.

Mercury Bromophenol Blue Staining Method for Histochemical Demonstration of Proteins (Mazia et al., 1953):

The sections were deparaffinized in xylene and passed through a descending grades of alcohol and brought to the water. Then stained in (for 2- 5 minutes) Bromophenol Blue (BPB) for 2- 5 minutes, rinsed in 0.5% glacial acetic Acid, then differentiated in tertiary butyl alcohol, clear in xylene and mounted in DPX. Staining is indicated in various photomicrographs.

Biochemical Method for Estimation of Proteins Tissue extracts

The tissues were weighed to 0.1 g accuracy and homogenized in ice cold Ringer's solution using pestle and mortar.

Estimation

Tissue proteins were estimated by Lowry et al., (1951) method with minor modifications. 1 ml of homogenate was mixed with 1 ml of 10% Trichloroacetic acid (TCA) and centrifuged for 15 minutes at 10,000 RPM. The precipitate was dissolved in 3 ml of 0.1 N NaOH, of which 1 ml of dissolved precipitate was taken in a clean test tube and diluted up to 4 ml by adding 3 ml distilled water, then 5.5 ml of alkaline copper sulphate reagent was added and kept for 10 minutes. Simultaneously, Bovine serum albumin (1mg/ ml) as standard and distilled water (Blank) was taken in separate clean test tubes, 3 ml distilled water and 5.5 ml of alkaline copper sulphate reagent was added with vigorous shaking in each test tube. In all the test tubes, 0.5 ml of folin phenol reagent was added and mixed thoroughly and kept for 30 minutes at room temperature for incubation and color intensity was observed at 650 nm in the digital spectrophotometer (Systronic 104). The standard graph was drawn with five standard BSA solutions and from this, the unknown amount of proteins was determined from the extracted samples. Values are expressed in mg proteins/gm of tissue weight and mg proteins/ml of serum.

III. RESULTS AND DISCUSSION

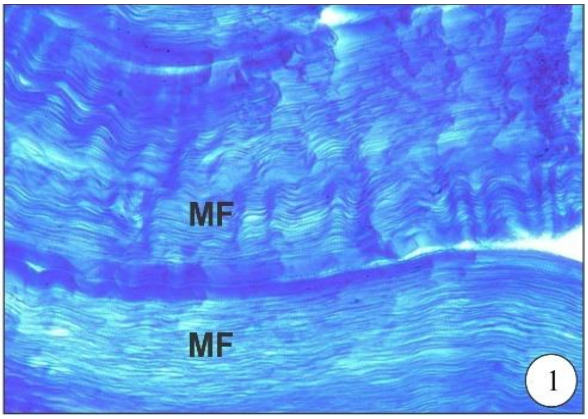


Fig1. L.S. of normal *H.fossilis* muscle fixed in Cornoy's fluid, stained with mercury bromophenol blue for proteins (Hg-BpB X400).

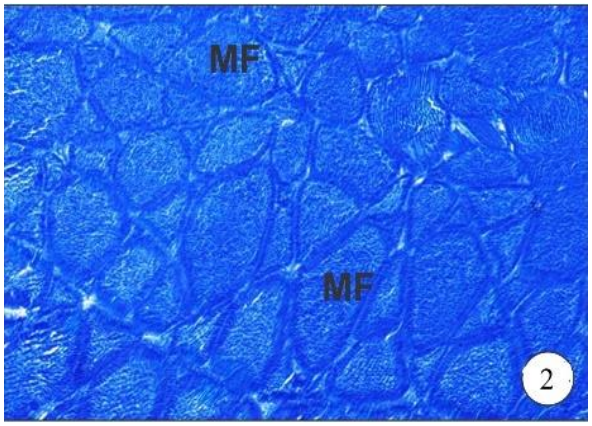


Fig 2. T.S. of normal muscles fixed in Cornoy's fluid, stained with mercury bromophenol blue for proteins {*H.fossilis* (Hg-BpB X200)}.

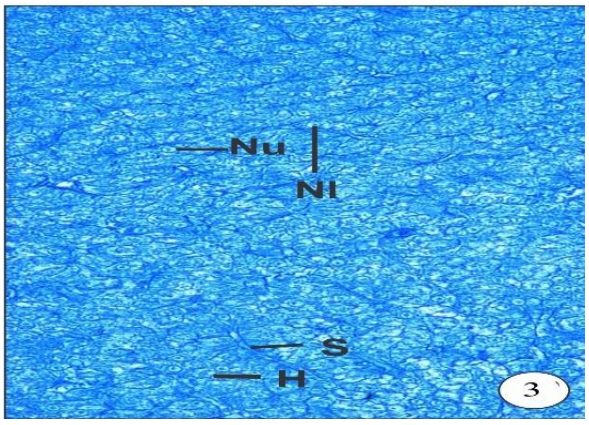


Fig 3. T.S. of normal *H.fossilis* liver fixed in Cornoy's fluid, stained with mercury bromophenol blue for total proteins (Hg-BpB X400).

Abbreviations: MF-Muscle Fibers; Nu-Nucleus; Nl-Nucleolus; H-Hepatocyte; S-Sinusoids

Histochemical Observations

The presence of proteins is demonstrated by Mercury Bromophenol Blue (Hg-MBB) Method (Mazia et.al., 1953) in *Heteropneustes fosilis* muscles and liver. Histochemically, muscle fibers were stained with Mercury Bromophenol Blue stain indicating presence of proteins in muscles (Fig.1, 2).T.S. of muscles shows ribbon like myofibrilar bundles formimg sarcoplasmic hub at the edges of fibre in present study was in agreement with the observations of Bangdkar et. al.2021.

In the liver, protein granules appeared as intensely stained dark blue coloured granules in the cytoplasm. Hepatic cell wall, nuclear wall and nucleolus showed intense staining with Mercury Bromophenol Blue stain (Hg-MBB) (Fig.3) also reported by Pathan and Baile (2005).

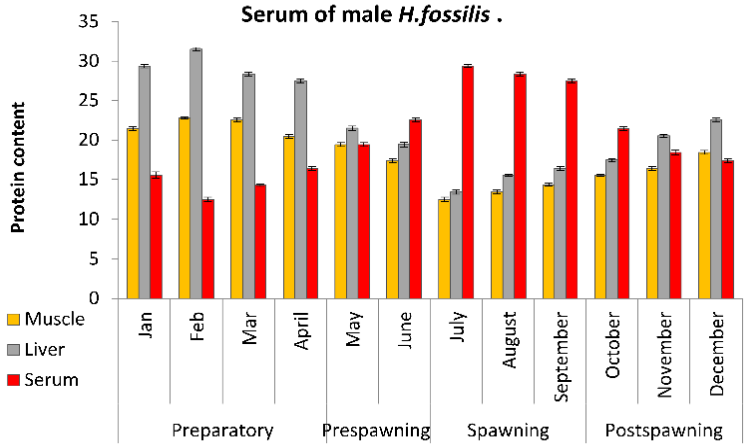
Biochemical Observations

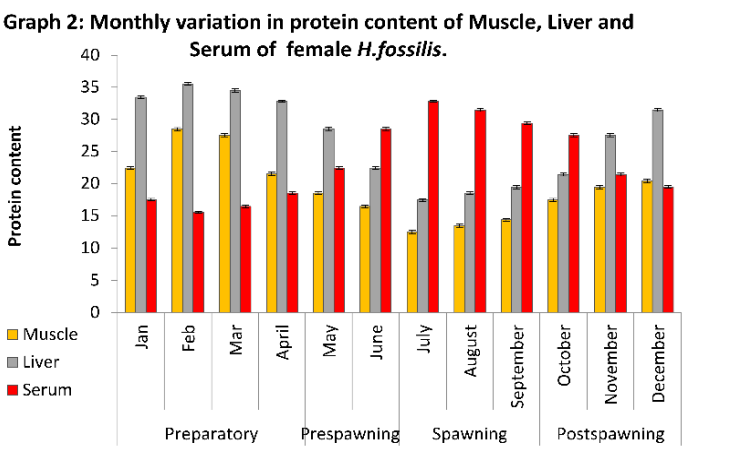
Proteins were estimated by the method of Lowry et. al. (1951). The results are summarized in below:

Protein profile in male *Heteropneustes fossilis*:

The muscle proteins showed highest value (22.831 ± 0.119 mg/g) in the month of February, and then there was gradual decrease (17.416± 0.249 mg/g) in the month of June and then there was sudden drop (12.499 ± 0.276 mg/g) in July. Liver proteins were highest (31.515 ± 0.227 mg/g) in the month of February. It declined to 19.442 ± 0.319 mg/g in June and became lowest (13.4 ± 0.255) in July. Liver proteins increased (20.525± 0.198 mg/g) in November. The serum protein levels showed a clear increasing trend and reached maximum (29.387 ± 0.227 mg/ml) in July. Gradually there was a decline and minimum was in February (12.499 ± 0.266 mg/ml) (Graph.1).

Graph 1: Monthly variation in protein content of Muscle, Liver and Serum of male *H.fossilis* .





Protein profile in female *Heteropneustes fossilis*:

The muscle proteins showed a highest value (28.485 ± 0.227 mg/g) in February, and then there was a gradual decrease (16.415 ± 0.248 mg/g) in June and sudden drop (12.499 ± 0.276 mg/g) in July. Liver protein was highest (35.525 ± 0.211 mg/g) in February. It declined (22.416 ± 0.249 mg/g) in June and became lowest (17.444 ± 0.217 mg/g) in July. Liver proteins increased (27.547± 0.252 mg/g) in November. Serum protein levels showed a clear increasing trend and reached maximum level (32.792 ± 0.157 mg/ml) in July. There was gradual decrease and reached minimum in February with 15.547 ± 0.145 mg/ml (Graph.2).

Naik et al., (2004) reported the total protein content significantly decreased in the tissues of freshwater fish, *Cyprinus carpio* due to environment factors like temperature variations. Reduction in total protein content in the muscle, liver and serum of *H.fossilis* might be due to either arrested metabolism in the liver or to use it to build up new cells or enzymes to reduce the stress. Further, the change in the total protein content in the liver indicates their repaid utilization to provide excess energy in order to cope with stressful conditions. Protein content in muscle and liver is worked out by Pathan and Baile (2005) in *O.mossambicus*. Fish muscle biochemical profiles can be used as a stress indicator for biological systems such as aquatic life. Various differences in the muscle, liver and serum biochemical parameters appeared in *Heteropneustes fosilis* fish. Variations in muscle, liver and serum protein content have been described as indicative of environmental stressors (Mayer et al. 1992). Biochemical responses in muscle, liver and blood serum can be affected by environmental factors, such as physico-chemical profiles of aquatic medium, season, fish nutritional status, age, different phases of reproductive cycle and health (Lohner et al. 2001).

Masram et.al.,(2019) recorded gradual decrease in protein, in blood serum from resting phase to spawning phase of reproductive cycle and subsequent rise in postspawning phase. Relationship of fluctuation of serum protein with plasma volume was revealed in Caspian kutum, Rutilus frisil kutum (Imanpoor et al., 2011). Decline in plasma volume and serum protein further would in turn influenced by prolonged starvation or stress (Azarin et al., 2012) to which females of teleosts fish are subjected during the spawning. With respect to tissue like liver and muscles lowest protein content was reported in blood serum during preparatory phase in *Notopterus notopterus* (Khaparde et al., 2016).

Primarily, proteins are building blocks and basic biochemical substances which maintain the glucose level in blood and provide energy during stress. It also play important role in interaction mechanisms in cells of

individuals and play important role in physiological processes. Also, involved in catalyzing different metabolic functions within living organisms (Magar and Shaikh, 2012).

IV. CONCLUSION

The inferences of this study showed the variation in Total Protein Contents in muscle, liver and serum of fish *Heteropneustes fosilis*. Evaluation of fish proteins is a good indicator of fish health affected by environmental factors, pollutants and pathogens in aquatic bodies.

V. CONFLICT OF INTEREST

Author declared that there is no conflict of interest regarding publication of this article.

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A Comparative Study of the Vegetation of Five Selected Hills in Pune

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ABSTRACT

The hills around Pune need to be protected as there are few remaining green spaces available for conservation of biodiversity and to maintain ecological balance. For conservation it is vital to understand the ecology of any region.This study was conducted from October 2019 to June 2022. Five hills namely Taljai, Vetal, Katraj, Chaturshringi and Hanuman were selected.

The comparison of the 5 hills in and around Pune were done using Nonmetric Multidimensional Scaling (nMDS) and Jaccard's index. For nMDS with two dimensions (k=2), the trees and shrubs analysed showed the species association between the hills.

Jaccard's index was used to calculate the beta diversity between the different hills. nMDS showed that Katraj and Hanuman hills were distinct from the other three hills with Katraj hill being the farthest from the rest implying a distinct flora. Species like Cipadessa baccifera and Senegalia ferruginea were only observed on Katraj hill. Albizia lebbeck, Bombax ceiba and Ehretia aspera were the common species obsereved on all the hills.

This was also reflected in the beta diversity values which showed a high dissimilarity between Katraj and other hills (<0.3 for all hills as compared to Katraj). The results imply significant effect of anthropogenic activities. This research indicates that there could be more effective conservation measures to preserve the biodiversity of the Katraj hills. Although the dissimilarity was not as significant for the other hills, preservation of the biodiversity of all the hills is the need of the hour.

Key words: Anthropogenic activities, conservation, vegetation, biodiversity.

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A Freshwater Fish Biodiversity in Bori Reservoir Near Vasant Nagar, Naldurg Dist.-Osmanabad (MH)

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ABSTRACT

A study on the biodiversity of freshwater fishes at several lotic systems around the Bori Reservoir has been conducted for 12 months starting June 2020 to May 2021. The study areas covered four river feeders namely Vasant Nagar, Chikundra,Horti,Manewadi.Forty two fish species out of 16 families with 1856 specimens were recorded during the study period. No endemic fish species has been recorded whereas only one exotic fish species i.e. Tilapia mossambica has been recorded at Lotic system vasant nagar recorded the highest number of species with 26 species followed by Chikundra 25 species ,Horti 21 species and Manewadi 19 species. The first three dominant families were Cyprinida, which represent 38.1% of the total species caught followed by Bagridae (11.8%) and Channidae(9.5%).Cyprinids became the most abundant fishes that represents 38.1% of the total individuals caught followed by Bagridae(12%) and Channidae(10%).

keywords- Bori Reservoir, Vasant Nagar, Biodiversity, Fish Species.

I. INTRODUCTION

Reservoir construction and the fisheries industry both have a long history in Asia. Reservoirs in Maharashtra are constructed for various purposes such as water resources for irrigation, hydropower, aquaculture and ecotourism activities.

Fish assemblages studies are important to gather more information about the function of river basins and their catchment status. The relationship between aquatic and terrestrial was determined by the interaction between habitat and fish in terms of food resources. Therefore, this information is important for conservation management (Lagler et al 1977). Then, differences in fish assemblages and structure depends on food availability,stream structure land use of stream area, water temperature(Lorion and Kennedy,2009) Physical and morphological adopts of fishes to the environment, water flow and complexity of habitat (Gorman and 1978)

India's inland water resources are the single largest inland fishery resources both in terms of size and production potential . Fish fauna of a reservoir basically represents the fish diversity and their abundance.Indian reservoirs preserve a rich variety of fish species, which supports the commercial fisheries. Fish species are also an important indicator of ecological health. The abundance and health of fish will show the health of water bodies.

The objectives of the present study were to document the fish diversity and productivity in Bori Reservoir and suggest appropriate conservation and management strategies.

II. MATERIAL AND METHODS

Bori dam is constructed on Bori River near Vasant Nagar, Naldurag. The height of the dam above lowest foundation 20m (66 ft) while the length is 3,365 m(11,040 ft).The volume content is 0.05534km³ (0.01328 cu.mi) and gross storage capacity is 0.040960km³(0.009827 cu.mi) purpose of the dam is irrigation.Fish sampling was done at tour landing centres of Bori dam namely Vasant Nagar, Horti,Chikundra, Manewadi using gillnet, prawn trap,angling, needles and the commercially important species were only taken into consideration. The selected landing centres represent all the three stretches of the reservoir i.e lower,middle and upper. The fishes were either collected personally or fishermen were instructed to collect during every sampling operation and preserved in 5% formalin solution for further studies. Fishes were identified based on standard taxonomic literature and grouped into two categories based on their abundance viz major and minor.

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The fish productivity was calculated by using following formula given by Agarwal

P=NS

where, P=Fish productivity (kg/ha/yr)

N=Constant including natural mortality 0.25 and accidental mortality 0.40 i.e 0.65

S=Number of Fish seed stoked per header per year

III. RESULTS AND DISCUSSION

Generally, in situ water parameters reading for eight sampling stations can be considered as good quality. Dissolved oxygen (DO) reading are between 5.23 to 7.64 mg/L, pH (6.89-7.57), conductivity (12.29-32.63 µS/cm), temperature (24.25-28.16 °C), velocity (0.22-0.52 m/s), TDS (8.21-20.29 mg/L) and depth (30.2-56.3 cm). This finding was not much different that the reading that has been reported at river feeders of Muda Reservoir and Temengor Reservoir (Sha et al., 2012; Zarul Hazrin et al., 2012)

Family	Species	Reservoir			
		Vasant Nagar	Chikundra	Horti	Manewadi
Akysidae	Akysis hendricksoni Alfred 196	-	1	-	-
Ambassidae	Parambassis siamensis (Fowler 1937)	4	-	7	1
Bagridae	Hemibagrus capitulum (Popta 1906)	-	-	-	1
	Hemibagrus planicep (Valenciennes 1840)	-	-	2	-
	Leiocassis micropogon (Bleeke 1852)	-	-	-	1
	Mystus castaneus Ng, 2002	-	2	2	-
	Mystus singaringan (Bleeker 1846)	-	2	1	14
Channidae	Channa Gachua(Hamilton 1822)	-	-	-	3
	Channa lucius (Cuvier 1831)	1	-	1	-
	Channa marulioides (Bleeker, 1851)	-	1	-	-
	Channa striata (Bloch 1793)	1	-	-	-
Clariidae	Clarias batrachus (Linnaeus 1758)	6	-	-	-
Cobitidae	Acantopsis dialuzona van Hasselt 1823	11	1	2	49

Cyprinidae	Barbodes binotatus (Valenciennes 1842)	34	24	38	44
	Barbonymus gonionotus (Bleeker 1849)	3	-	-	8
	Barbonymus schwanenfeldii (Bleeker 1854)	20	8	27	108
	Crossocheilus oblongus Kuhl & van Hasselt 1823	-	8	1	7
	Cyclocheilichthys apogon (Valenciennes 1842)	51	191	4	36
	Devario regina (Fowler 1934)	263	23	-	94
	Hampala macrolepidota Kuhl & van Hasselt 1823	2	10	15	3
	Labiobarbus leptocheilus (Valenciennes, 1842)	34	1	2	19
	Mystacoleucus obtusirostis (Valenciennes 1842)	34	32	12	5
	Neolissochilus soroides (Duncker 1904)				
	Osteochilus vittatus (Valenciennes, 1842)				
	Osteochilus waandersii (Bleeker 1853)				

	Oxygaster anomalura Van Hasselt, 1823	42	-	-	132
	Rasbora vulgaris Duncker, 1904	22	8	5	20
	Systomus rubripinnis (Valenciennes 1842)	11	16	8	20
	–	1	5	1	8
		60	62	66	82
		-	-	-	1
		—			

Mastacembelidae	Macrognathus maculatus (Cuvier, 1832)	-	4	-	4
	Mastacembelus notophthalmus Roberts	-	-	2	2
	Mastacembelus tinwini Britz 2007	-	-	-	3
Notopteridae	Notopterus Notopterus(Pallas 1769)	-	-	-	1
Osphronemidae	Betta Pugnax(Canter 1849)	-	-	1	-
	Trichopodus trichopterus(Pallas 1770)	-	1	-	1
Pristolepididae	Pristolepis fasciata(Bleeker 1851)	-	-	-	1
Siluridae	Ompok Siluroides Lacepede	2	3	-	1
	Silurichthys hasseltii (Bleeker 1858)	24	4	1	1
Sisoridae	Glyptothorax siamensis(Hora 1923)	1	3	4	1

Synbranchidae	Monopterus albus(Zuiew 1793)	-	-	-	3
Syngnathidae	Doryichthys martensii(Peters 1868)	3	1	-	3
Zenarchopteridae	Dermogenys pusilla Kuhl & van Hasselt 1823	2	-	-	3

IV. CONCLUSION

Generally, water quality at four rivers feeders of BMR can be classified as better quality and supports a variety of aquatic organisms such as fish and macroinvertebrate. As the results, 42 fish species have been recorded during the study period, of which Cyprinidae was the dominant fish family. The presence of Tilapia Mossambica, an exotic fish in BMR lotic environment is not alarming yet as this species is present in small number of individual (< 0.1 % of the total specimens caught). Nevertheless, this species checklist is not completed yet as more fish species will be recorded if using a variety of fishing gears. Further and long term study should be carried out to acquire more details regarding this type of finding.

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Faunal Diversity of Divegaon, Purandar Taluka, Pune District, M/S, India

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ABSTRACT

Animal survey was conducted in Divegaon located in Purandar Taluka, Pune District, M/S, India. Divegaon is surrounded by Haveli Taluka towards west, Pune Taluka towards west, Bhor Taluka towards South, Khandala Taluka towards South. The total geographical area of village is 274.98 hectares. Survey area is about 585 meters above sea level. A checklist of 51 animals was prepared by walking survey method. Out of these, 11 animals belong to 8 families of phylum Arthropoda and 40 animals belong to 30 families of phylum Chordata.

Keywords: Insect, Reptiles, Birds, Mammals, Divegaon, Biodiversity.

I. INTRODUCTION

Most of the biodiversity hotspot are located in Maharashtra, India. The common animals found in Maharashtra are tiger, bison, Gawa, Neelgai, wild deer, sambar, crocodile, uncommon migratory birds etc. To safeguard these areas and market them as tourism attractions, the state has made appropriate steps to establish numerous wildlife parks and sanctuaries. Biodiversity is necessary for all species on Earth, including humans, to function properly. We cannot have healthy ecosystems that give us with the air we breathe and the food we consume without a diverse range of animals, plants, and microorganisms.

Biodiversity is necessary for maintaining ecological processes such as water cycle stabilization, soil fertility maintenance and replenishment, pollination and cross-fertilization of crops and other vegetation, soil erosion protection. The preservation of biological diversity leads to the preservation of vital ecological diversity, which is necessary for food chain continuance.

II. OBJECTIVES OF THE STUDY

The main objective of present study was to observe animal diversity in study area and to study key indicators species found in study area.

HYPOTHESIS:

This area is located in eastern portion of Western Ghats with semi-arid area, loamy soil with seasonal grasslands and other ecosystems. Rich biodiversity was expected in study area. There is no detailed survey record found previously. There is urgent need of study.

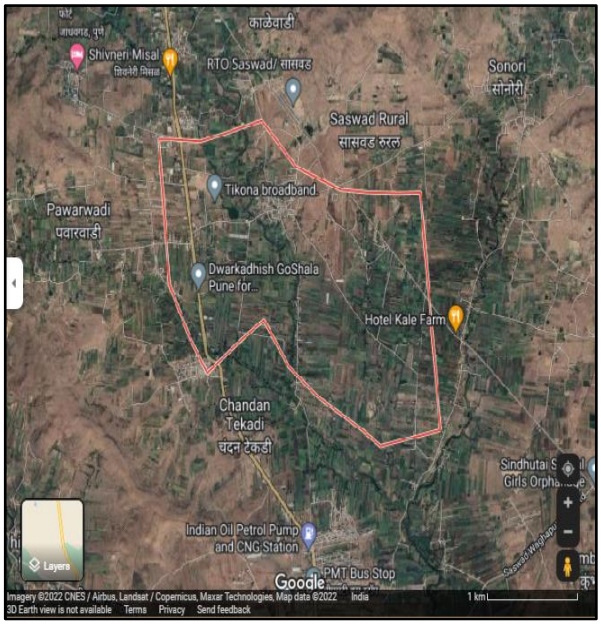
III. MATERIALS AND METHODS:

Study area:

The Divegaon village of Purandar Taluka is located in Pune district of Maharashtra state (18.38269N, 74.02264W). Dive village has a population of 3484 people, according to the 2011 census. Dive village is home to 768 families. The study area was in and around Dive Village, measured approximately about 1174 hectors. Selected survey site comprises different ecosystem such as grassland, agricultural and domestic area, temporary water bodies and water canal.

Data collection:

Animal presence data was collected by walking surveys. Survey was conducted in the months of December 2021 to March 2022. Walking survey was conducted along all pathways of village. Members of animal species were observed, photographed and identified with the help of standard scientific keys.



(i)

(ii)

Figure 1 (i): Map of Divegaon village of Purandar Taluka, District Pune and **(ii)** Actual site photographs (a) Grassland ecosystem, (b) Temporary water body, (c) Local water body, (d) Terrestrial ecosystem.

IV. RESULT AND DISCUSSION

Total 51 animal species were reported during the survey. Out of these, 11 animal species belonged to 8 families of phylum Arthropoda. These belonged to three classes such as Insecta, Arachnida and Melacostraca. Members

of class Insecta belonged to six families such as Apidae, Nymphalidae, Coccinellidae, Acrididae, Pieridae and Tridactylidae (Figure-2 iv and v). Semi-arid and grassland ecosystems consist of a variety of insects (Rasheed and Buhroo, 2020). Members of the Lycosidae family observed in the study area were *Pardosa milvina* spiders (Figure-2iii). Spider diversity is more in the wetland ecosystem (Karthikeyani et al. 2017 and Pandit 2020). Freshwater Asian crabs of the family Potamidae were observed in the local water body. These crabs are commonly used as a food source in villages of India (Samuel et al. 2016).

In the present study, we observe 40 animal specimens from phylum chordata. These animals belonged to 04 classes such as Pisces, Reptilia, Aves and Mammals along with 30 families of phylum chordata. The observed members of Rohu (*Labeo rohita*) and Maral fish species belong to Family Cyprinidae and Channida respectively. We observed that members of class Reptilia belong to three different families such as Gekkonidae, Chamaeleonidae, Viperidae. Study area is the natural habitat of mammals such as common bats, wild dogs, wild cats and domestic mammals. Agriculture is a primary activity in the rural area of India and has a rich diversity of mammals (Nameer PO, 2015; Sharma et. al. 2015 and Talmale et al. 2018).

	Class	Family	Local name	Scientific name
Phylum: Arthropoda	Insecta	Apidae	*Honey bee*	*Apis florea*
				Apis dorsata
		Acrididae	Long-nosed Grasshopper	*Acrida*
			Rufous grasshopper	*Gomphocerippus*
		Coccinellidae	Fungus-eating Ladybird	*Illeis galbula*
		Nymphalidae	Common crow butterfly	*Euploea core*
		Pieridae	Common yellow butterfly	*Eurema*
			Common Jezebel butterfly	*Delias eucharis*
		Tridactylidae	Crickets	*Ellipse minuta*
	Arachnid	Lycosidae	Spider	*Pardosa milvina*
	Malacostraca	Potamidae	Asian freshwater Crab	*Nanhaipotamon*
Phylum: Vertebrata	Fish	Cyprinidae	Rohu	*Labeo rohita*
		Channidae	Snake headed fish	*Channa*
	Reptile	Gekkonidae	Wall lizard	*Hemidactylus*
		Chamaeleonidae	Chameleon	*Chameleon*
		Viperidae	Russell Viper	*Daboia russelii*
	Mammal	Sciuridae	Three-striped palm squirrel	*Funambulus palmarum*
		Pteropodidae	Bat: Flying fox	*Pteropus*
		Bovidae	Jersey cattle	*Holstein Friesian*

Table 1: Animals from phylum Arthropoda and Vertebrata (Class: Fish, Reptile and Mammal)

Bird survey in study area was conducted and we observed 32 different species of birds belong to 26 families (Table-2). Increase in population and pollution in study area affect on biodiversity of Aves. Birds are useful indicator of environmental changes (Jaiswal P 2017; Pandey et al. 2008 and Praveen et al. 2016).

Phylum: Vertebrata	Class: Aves	Family	Local Name	Scientific Name
		Accipitridae	Black eared kite	*Milvus lineatus*
			Hen harrier	*Circus cyaneus*
		Aicedinidae	White throated Kingfisher	*Halcyon smyrnensis*
		Anatidae	Goose	--
		Apodidae	Swift	*Apus*
		Ardeidae	Indian pond heron	*Ardeola grayii*
			Intermediate Egret	*Egretta intermedia*
		Casuariidae	Emu	*Dromaius*
		Charadriidae	Red wattled lapwing	*Vanellus indicus*
		Columbidae	Dove	*Streptopelia*
		Corvidae	Indian common crow	*Corvus splendens*
		Cuculidae	Asian koel	*Eudynamys scolopaceus*
			Greater coucal	*Centropus sinensis*
		Dicruridae	Black drongo	*Dicrurus macrocercus*
			Ashy Drongo	*Dicrurus leucophaeus*
		Estrildidae	Scaly breasted munia	*Lonchura punctulata*
		Laniidae	Great grey shrike	*Lanius*
		Meropidae	Little green bee eater	*Merops orientalis*
		Muscicapidae	Oriental Magpie Robin	*Copsychus saularis*
			Indian black Robin	*Saxicoloides fulicata*
		Nectariniidae	Purple sunbird	*Cinnyris asiaticus*
		Paridae	Great tit	*Parus major*
		Passeridae	House sparrow	*Passer domesticus*
		Phalacrocoracidae	Indian shag (Cormorant)	*Phalacrocorax*
		Ploceidae	Baya weaver	*Ploceus philippinus*
		Psittacidaeq	Parakeet	*Psittacula*
		Pycnotidae	Red vented Bulbul	*Pycnonotus cafer*
		Rhipiduridae	White spotted fantail	*Rhipidura albogularis*
		Scolopacidae	Sandpiper	*Tringa*
		Sturnidae	Brahmni starling	Temenuchus pagodarum
			Common myna	*Acridotheres tristis*
		Timaliidae	Large grey babler	*Turdoides malcolmi*

Table 2: Birds from phylum: Vertebrata (Class: Aves)

Figure 2: Animal of Divegaon (i) *Nanhaipotamon* (Asian freshwater crab), (ii) Termites, (iii) *Pardosa milvina* (Spider), (iv)*Ellipse minuta* (Cricket), (v) *Illeis galbula* (Fungus-eating Ladybird), (vi) *Acrida* (Long-nosed Grasshopper), (vii) *Daboia russelii* (Russell Viper), (viii) *Dromaius* (Emu)

V. CONCLUSION

We found rich animal diversity in study area and require frequent animal survey due to seasonal variation in study area

VI. CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest.

VII. ACKNOWLEDGMENTS

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Comparative, Quantitative HPTLC Analysis of Solasodine from In Vivo And In Vitro Leaf Sample of Solanum Virginianum L.

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ABSTRACT

Solanum virginianum L. is an important medicinal plant belongs to family Solanaceae. It is effective on Gonorrhea, Bronchial asthma, tympanitis, misperistalsis, Piles, Dysuria and for Rejuvenation in ayurveda. In this plant various types of important secondary metabolites is presents like Solasodine, Rutin, Ellagic acid and Diosgenin. During the present investigation efforts have been made to evaluate standard protocol for quantitative analysis of secondary metabolite solasodine from in vivo and in vitro leaf samples of Solanum virginianum L. by using HPTLC technique. In vitro leaf was grown by using tissue culture technique by using MS media and different growth hormones like auxin (IAA, IBA) and Cytokinin (BAP, KIN) in various quantities (mg/l).

Keywords: HPTLC, Solasodine, in vivo, in vitro, MS media, metabolites.

I. INTRODUCTION

Solanum virginianum L. is an important medicinal plant in ayurvedic medicines belongs to family *Solanaceae.* It is commonly known as yellow berried nightshade, and in Marathi Bhuiringani or Ran Wangi. The genus *Solanum* is comprised of about 1500 species and well represented all over the world.

Description and distribution of plant: It is native to Asia (Saudi Arabia, Yemen, Afghanistan, Iran, China, Bangladesh, India, Nepal, Pakistan, Sri Lanka, Myanmar, Thailand, Vietnam, Indonesia and Malaysia) and is adventives in Egypt. In India it is recorded in tropical, subtropical and all four geographical regions. Frequently it has been considered as weed plant but in Ayurveda and folklore medicine since time immemorial there are meagre reports in literature about its other potentials (Madhavi *et al.*, 2014).

Morphologically *Solanum virginianum* is prickly diffuse bright green perennial herb, somewhat woody at the base while stem is zigzag, branches are numerous. The younger ones clothed with dense stellate tomentum.

Medicinal and chemical properties: In ancients Ayurveda, plant is described as pungent, bitter, digestive, alternative astringent. Stems, flowers, fruits are bitter and contains carminative properties. Root decoction used as febrifuge, effective diuretic and expectorant. Charaka and Sushruta used the extract of entire plant and fruits in internal prescription for bronchial asthma, tympanitis, misperistalsis, piles and dysuria and for rejuvenation.

Kantkari Ghrita of Charakais was specific for cough and asthma. The whole plant is used traditionally for curing various ailments (Atul *et al*., 2013).

Decoction of the plant isused in gonorrhea; paste of leaves is applied to relieve pains. Seeds act as expectorant in cough and asthma and roots are expectorant and diuretic. They are useful in the treatment of catarrhal fever, coughs, asthma and chest *Solanum virginianum* is a well-known medicinal plant in traditional medicinal system and recent scientific studies have emphasized the possible use of *Solanum virginianum* in modern medicine (Reddy *et al*., 2014). Chemically Okram and Thokchom (2010) reported it is a valuable source of alkaloids, sterols, saponins, flavonoids and their glycosides and also carbohydrates, fatty acids, amino acids (Gnana *et al*., 2013).

Plant tissue culture and phytochemical analysis:

Plant tissue culture techniques are playing an important role in the enhancement of secondary metabolites. Plants possess several bioactive elements which are used to treat several diseases of human and animals. Phytochemicals are metabolic products which are of two types i.e., primary and secondary metabolites. Primary metabolites include proteins, amino acids, chlorophyll and carbohydrates. Secondary metabolites of this plant include alkaloids, sterols, phenolics and terpenoids. Ethanomedicinal reports of this plant indicate that this plant contains antifungal, antibacterial and anti-inflammatory activities (Pandey and Singh, 2014).

Solasodine is an alkaloid which occurs as an aglycone part of glycoalkloid, which is a nitrogen analogue to sapogenins. It is a steroidal alkaloid based on a C 27 cholestane skeleton. Solasodine has diuretic, anticancer, antifungal, cardiotonic, antispermato genetic, antiandrogenic, immun omodulatory, antipyretic and having various effects on central nervous system (Patel *et al*., 2013).

II. MATERIALS AND METHODS

Surface sterilization of explant: Explants viz. leaves and stem node were collected from different localities of University campus of Dr. Babasaheb Ambedkar Marathwada University, Aurangabad. All explants were washed with tap water twice in laboratory, followed by 70% ethanol for 30seconds and then surface sterilized of with HgCl2. Surface sterilization of explant was carried out in laminar air flow. Explants were rinsed with sterile distilled water followed by 0.3% Mercuric chloride (HgCl2). Finally all these explant were dissected in to small pieces and inoculated on MS medium aseptically.

Culture media: For induction of shoot Murashige and Skoog media (MS) (1962) was used for stem node and leaf explants of *S. virginianum.* Stem node and leaf were inoculated on MS medium supplemented with different concentrations of auxins IAA with combinations of cytokinin BAP and KIN for shoot induction. MS medium fortified with 3% sucrose and gelled with 3 gm/L clarigar and the pH was adjusted to 5.8. The media was sterilized in an autoclave under 15 psi and 121°C.

Culture condition: After inoculation culture bottles were transferred to culture room under a 16 h photoperiod supplied by cool white fluorescent cool tubes light and temperature 25± 2°C. Maximum humidity was adjusted with air conditioner. Each experiment set in three set, five of each.

Biochemical analysis (HPTLC): It has been learnt that *Solanum virginianum* contains secondary metabolites from the group of alkaloids, flavonoids, tannins and saponins. For the detection of these secondary metabolites, HPTLC analysis of plant material was carried out during the present work. Modern high-performance TLC (HPTLC) is an efficient instrumental technique and the optimized Quantitative HPTLC by using a densitometric evaluation, can produce results that are analogous to those obtained with GC and HPLC. The chromatographic technique such as gas chromatography (GC) or high-performance liquid chromatography (HPLC), which now a days are used considered could be as the leading techniques for undertaking the biochemical work (Gupta *et al.,* 2012).

Biochemical analysis can be carried out through the qualitative and quantitative measurements. The present investigations were aimed to enhance the secondary metabolites in plants as they were growing under stress conditions in the tissue culture laboratory. GCMS and MS were utilized to screen the qualitative aspects while the HPTLC technique was frequently used to screen the quantitative aspects of secondary metabolites. All ayurvedic plants have secondary metabolites like alkaloids, tannins, phenolics, flavonoids and terpenoids present in them. It was felt that a detailed biochemical work of such secondary metabolites in the present work would throw a good amount of light on their medicinal capabilities and utility aspects as well.

III. PREPARATION OF PLANT EXTRACT

The *in vivo* leaf sample of *Solanum virginianum* were collected from the campus Dr Babasaheb Ambedkar Marathwada University Aurngabad, *in vitro* leaf sample was collected from the tissue culture laboratory Department of Botany Dr BAMU Aurangabad. Both the samples were cleaned and shade-dried were considered for testing of secondary metabolites. The each dried part of *Solanum virginianum* was pulverized by a mechanical grinder and passed through a 20-mesh sieve. Powdered samples (5gm) were separately extracted with ethanol using a Soxhlet apparatus. The extraction was carried out for 24h at room temperature with mild shaking. The extracts were filtered and concentrated at 35°C (Kameshwara *et al*., 2003). It was used for further analysis of HPTLC at Institute of Science, Mumbai.

Chemicals and reagents:

Standard secondary metabolites solasodine was purchased from Sigma-Aldrich Chemical Co. besides the petroleum ether anisaldehyde, sulphuric acid and HPLC grade ethanol. All the organic solvents and chemicals used for extraction during the study were of analytical grade (A.R. grade) obtained from S.D. Chem. Pvt. Ltd., Mumbai, India.

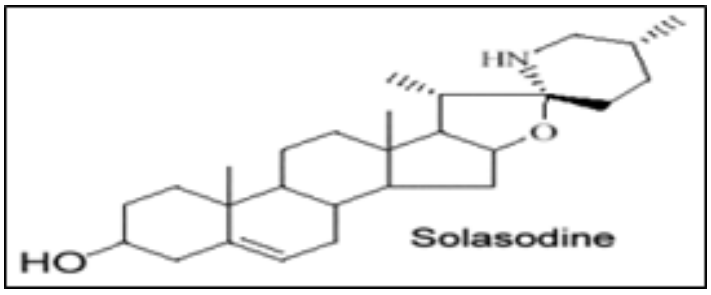

Fig A: Structure of Solasodine

HPTLC quantification in test samples

Samples

Sample R1- *in vivo* leaf, R2- *in vitro* leaf and standard Solasodine.

Test solution preparation

The ethanol extract of *S. virginianum* was weighed in electronic balance and dissolved in ethanol and kept for ultra-sonication at 100 rpm for 25 minutes. This solution was used as test solution for HPTLC analysis.

Mobile phase

Solasodine: - Toluene: ethyl acetate: formic acid: methanol in the volume ratio of 12:9:4:0.5.

Sample application

20µl of test solution and 2 µl of standard solution were loaded as 8mm band length in the 20 × 10 silica gel $60F_{254}$ TLC plate using Hamilton syringe and CAMAG LINOMAT – 5 instruments.

Spot development

The sample loaded plate was kept in TLC developing chamber and the plate was developed with respective mobile phase.

Photo – documentation

The developed plate was dried by hot air to evaporate solvents from the plate the plate was kept in photo–documentation chamber (CAMAG TLC Scanner) and captured the image at White light, UV 254nm and UV 366nm.

Derivatization

The developed plate was sprayed with anisaldehyde – Sulphuric acid reagent dried at 100º C in hot air oven. The plate was photo – documented in white light and UV 366nm mode using photo-documentation (CAMAG visualiser) chamber.

Scanning

After derivatization, the plate was fixed in scanner stage and scanning was done at UV 366nm. The peak table, peak display and peak densitogram was noted.

IV. RESULT AND DISCUSSION

HPTLC fingerprinting profile comprises a very important methodological approach of herbal drug standardization for the proper identification of medicinal plants and quantitative analysis of secondary metabolites. Solasodine is an important starting material for partial synthesis of steroidal harmones, it acts as a potent for biological, physiological and antimicrobial activity (Barbosa-filho *et a*l., 1991).

Gangwar *et al.,* (2013) undertook the phytochemical screening and studied the analgesic activity of Kantkari through TLC, HPTLC, IR and NMR techniques and observed the secondary metabolite solasodine to be present in different plant parts of the kantakari plant.

The HPTLC analysis for the solasodine compound *in vitro* and *in vivo leaf* samples showed good results and separation (Fig., B and C). The extracts were spotted on HPTLC plate and developed using toluene: ethyl acetate:

formic acid: methanol in the volume ratio of 12:9:4:0.5 resulted in good separation of the solasodine. TLC plate was observed under UV light for the presence of solasodine, this was detected by prominent dark brown spots (Photoplate, 1). The Rf value (0.62) for solasodine in both sample (Fig., B and C) and reference standard (Fig., D) was found comparable under UV light at 366 nm (observation - 1).

From the standard calibration curved of solasodine (Fig., D), the maximum amount was obtained in the *in vitro* grown leaf extracts yielded 0.0616 ± 0.02 µg/ml µg of solasodine and in the *in vivo* leaf extracts, 0.0102 ± 0.06 µg/ml of solasodine. (Table-1).

HPTLC analysis of various *in vitro* and *in vivo* leaf samples of *Solanum virginianum* revealed the presence of solasodine in both analysed samples.

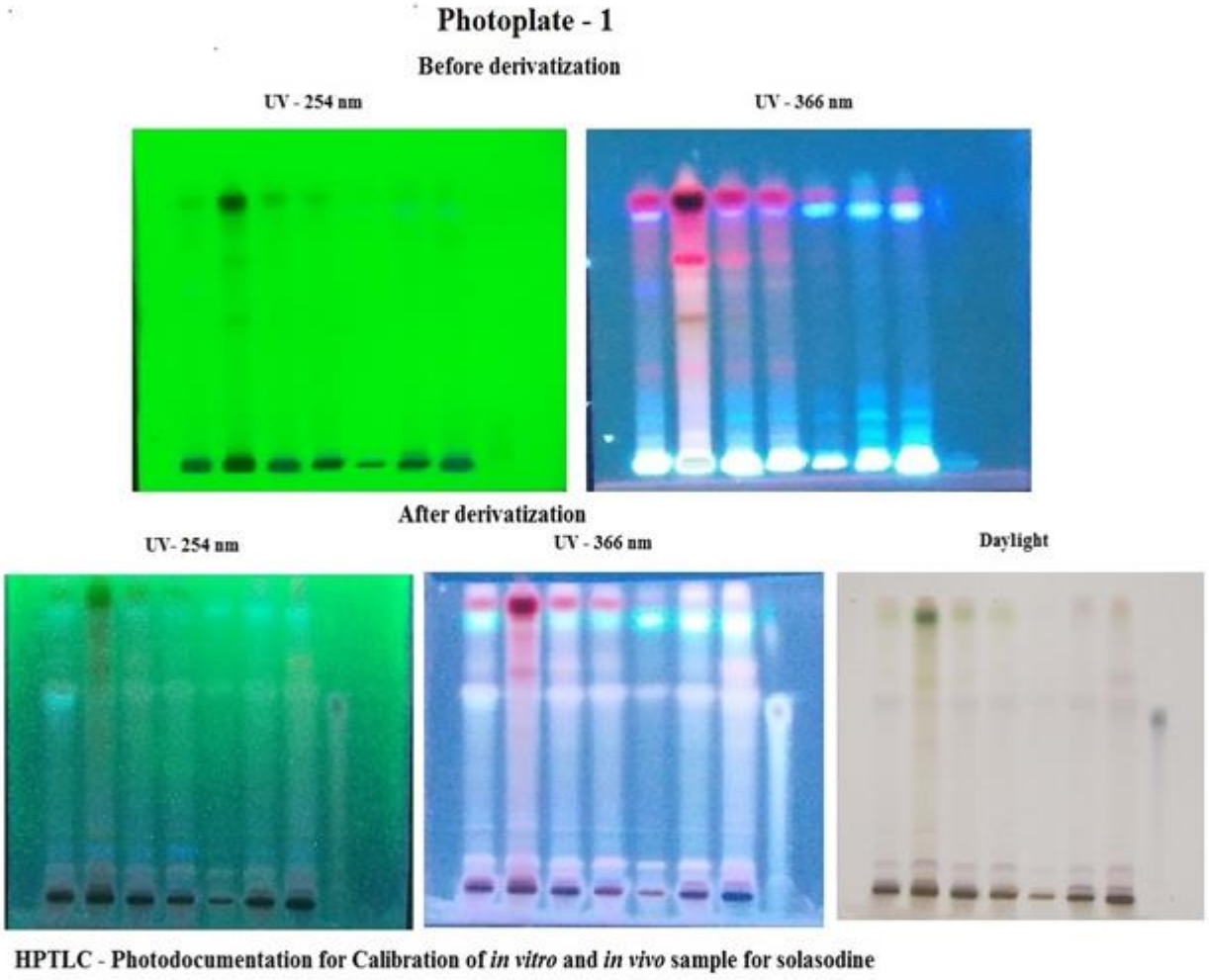

Fig: B. HPTLC - Densitogram of *in vitro* leaf for solasodine.

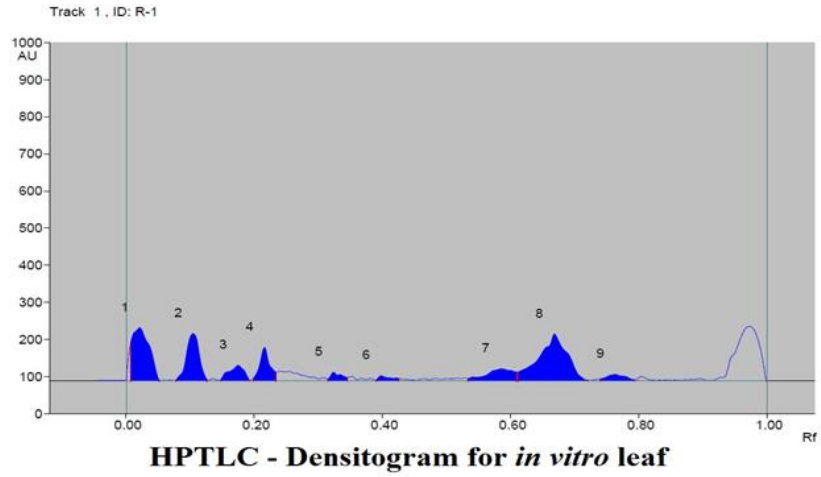

Fig: C. HPTLC - Densitogram of *in vivo* leaf for solasodine.

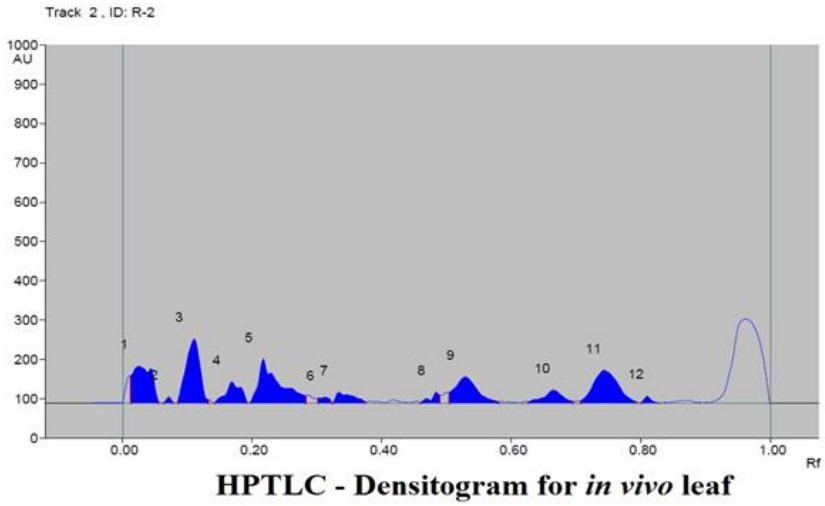

Fig D: Calibration curve for standard solasodine.

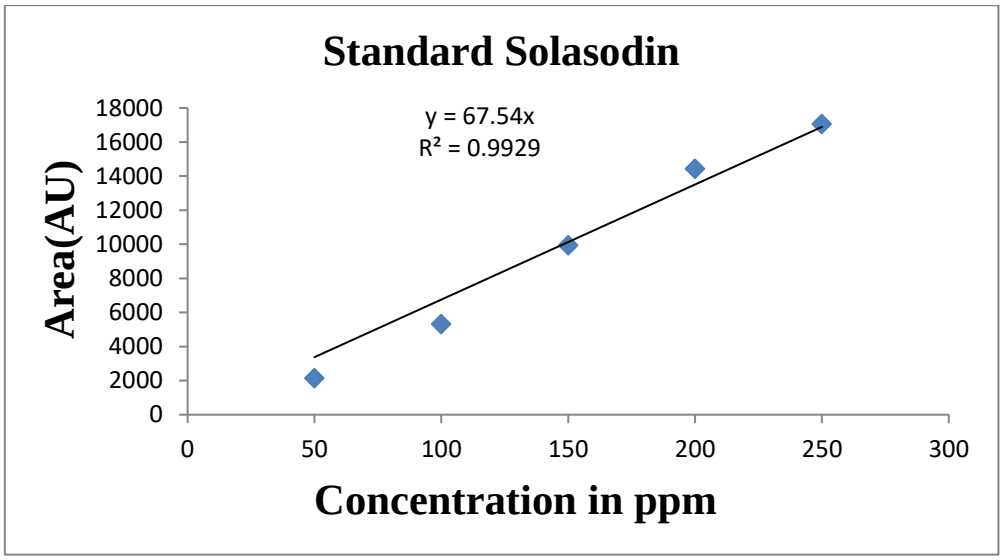

Table: 1. Quantitative HPTLC analysis of solasodine from *in vitro* and *in vivo* leaf samples of *Solanum virginianum.*

Sr. No.	Sample	Applied quantity	Peak area	Solasodine in µg
1	*In vitro* leaf powder (R1)	20.0 µl	4163	0.0616
2	*In vivo* leaf powder (R2)	20.0 µl	695	0.0102

V. CONCLUSION

Medicinal plants are voraciously collected for treatments of many disorders. These plants are bioreactors. If these plants propagated through modern techniques like tissue culture, raw Material could be utilized for therapeutic purpose. Present piece of work is useful for the study of comparative quantitative HPTLC analysis for different *in vivo* and *in vitro* samples of medicinal plants.

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Prevalence of Protozoan Parasites in Captive Semnopithecus Entellus inhabiting AMC ZOO Siddharth Garden, Aurangabad Dist. (M.S.), India

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ABSTRACT

Monkeys as Non Human Primates (NHPs) known to maintain and promote the transmission of certain GIT protozoan infections particularly at AMC, Zoo, where human and wild primates shared the same environment.The presence of parasitic protozoa in old world monkeys- OWMSemnopithecus entellus of study area being as tourist place is a high risk to human welfare. Some of the protozoan parasites in monkeys are reported to be zoonotic in some literature. However this work have been done for detection of seasonal incidence of protozoan parasites (Ciliated, Flagellated, Amoeboid) from year July 2017 to June 2018.By coprodiagnostic study, comparative analysis of protozoan parasites in Gray langurs in relation with seasonal fluctuation at their in-captive place helping in prevention of spreading of protozoan infections among monkeys to human and vice versa and conservation of monkeys by investigating effects of protozoa on health of these NHPs. Prevalence percentage of Protozoan parasites was 19.48%.

KEYWORDS: Captive NHPs, Semnopithecus entellus, Entamoeba Spp., Ciliates & Flagellate, Direct Smear, Faecal floatation & sedimentation

I. INTRODUCTION

Although parasite infections are common in nature and low intensity infections are often asymptomatic (May and Anderson, 1979), Loss of stability associated with altered transmission rates, host range, and virulence results due to anthropogenic change(Daszak *et al.,* 2000*;* Patz *et al.,*2000).

The exhibit of Captive Non-Human Primates (NHPs) are important highlights for visitors to zoological garden. Captive monkeys however are susceptible to Gastro-Intestinal (GIT) protozoan parasitic infections, which are often zoonotic (Mei Li *et al*, 2015).Social organizations and behavioural processes were heavily influenced by parasitic infections (Freeland, 1970s)

Numerous studies of GIT protozoan parasitic in captive NHPs worldwide report that GIT protozoan parasites infect all NHP groups, including captive animals, and cause high morbility and mortality rates. Yet few studies have quantified prevalence data of GIT parasites in zoos. And existing studies have limited their focus on specific OWM *Semnopithecus entellus* (Northern Plain Gray Langur monkeys), specific protozoan parasite

species, and seasonal prevalence. To date little is known about the prevalence of GIT protozoan parasitic infections in captive NHPs of AMC zoo

In Siddharth garden AMC - Zoo, specific food like Bananas, Leaves, Onion, Tomato, Bread, Milk, Ground Nut, Bhunna Gram, Potato/Sweet potato, Cucumber/Carrot, Water melon, Corn, Guava, Chicku, Beat root with seasonal available food in varying quantity used to serve in caged Semnopithecus entellus.

Ecological factors i.e.Temperature, humidity, rainfall, feeding habitats of host, availability of infective host, parasite maturation, distribution, environment of host, the diet and mode of feeding of host and parasites are influencing parasitic development (Kennedy C.R., 1971, 1975 and 1977. Rodhe, 1993).

II. MATERIAL AND METHODS

Ethical statement: Institutional Ethical and Animal Care guidelines were adhered to, during faecal sample collection and for whole research work. The study was entirely non-invasive and observational.

Faecal sample collection and Examination

From July 2017–June 2018, **474** fresh faecal samples in morning hours were collected from AMCzoological garden.The faecal samples belonged to captive OWM (Northern Plain Gray Langur monkeys: *Semnopithecus entellus*). Detailed information i.e sampling date, times, species etc. was gathered using double labelling methods, which means using a label paper inside and outside the plastic storage bagsand stored at 4°c prior to laboratory analysis.

Faecal samples were examined for the presence of protozoan cyst and trophozoites by Direct smear, faecal flotation, Faecal sedimentation, Direct smear staining with Lugol's iodine solution (0.3%iodine) was firstly used to detect trophozoites of amoeba and flagellates in all faecal samples. Cyst were then scanned under microscope with 10 times and 40 times objectives with the methods of faecal flotation and faecal sedimentation technique, on the basis of their morphology, shape, colour, size and other visible structures.

Prevalence

GIT protozoan parasitic infection in captive Gray langurs (*Semnopithecus entellus)* i.e NHPs ofSiddharth Garden AMC-Zoo from July 2017 to June 2018, Of total 474 faecal samples 103 (19.48%) were infected (Table-1). However prevalence of parasitic infection in captive non human primates of Assam state Zoo, India was 13.63% in captive NHPs of Assam state Zoo(Bitchitra *etal.,*Aug 2009- Dec 2009)

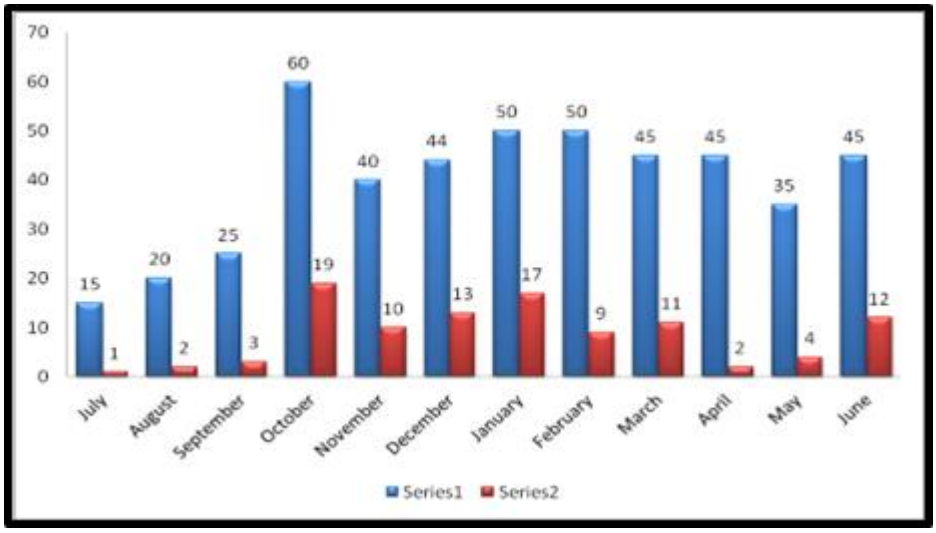
Current study reveals that prevalence of GIT protozoan parasitic infections in these NHPs differed amongst according to seasonal variation from 4.44% to 34% ((Table-1, Fig.1).We detected four amoeboid *(Entamoeba histolytica, Entamoeba dispar/Entamoeba coli* (MA Huffman *et al.,* 2013), *Iodamoeba butschlii)*, One ciliated (*Balantidium coli)* and one flagellar (*Giardia lamblia)* protozoan parasitic species, Of which Amoeboid species were the abundant clade of protozoan parasites observed ((Table-2, Fig.2).ELISA is useful to distinguish *E. histolytica* and *E. dispar* (Fotedar *et al.,* 2007).We found that GIT parasite species vary greatly according to seasonal changes amongst monkeys of case study area. These Gray langurs exhibited a higher prevalence of *Entamoeba* spp. Infections (Table-2, Fig.2).

A month wise analysis of prevalence showed that maximum prevalence were during January (34%), October (31.67%), December (29.54%), June (26.67%). Moderate prevalence were in November (25.00), March (24.44%), February (18%), September (12%).The lowest prevalence were during May (11.43%), August (10%), July (6.67%) and least most in April (4.44%).

In Aurangabad, the rainy season starts from the month of June to September. Winter season October to February and Summer season from March to May. By considering this parameter and observed highest prevalence in January (34%). The data indicates that the peak is nearly in the mid of winter to the starting ofmonsoon The prevalence gradually reduces after the mid of winter and onset of monsoon with little fluctuations((Table-1, Fig.1).

Table-1 Seasonal incidence (month wise prevalence) of protozoan parasites showing In Captive (IC) Monkeys of Siddharth Garden, AMC Zoo Aurangabad (M.S) during the year July 2017 to June 2018.

Sr. No.	Period July 2017-June2018 Months	Number of Samples InCaptive (IC)		Prevalence %
		Examined	Positive	
1	July	15	01	6.67%
2	August	20	02	10%
3	September	25	03	12%
4	October	60	19	31.67%
5	November	40	10	25.00%
6	December	44	13	29.54%
7	January	50	17	34%
8	February	50	09	18%
9	March	45	11	24.44%
10	April	45	02	4.44%
11	May	35	04	11.43%
12	June	45	12	26.67%
Total		**474**	**103**	**19.48%**



Series 1: **Examined Samples,** Series 2: **Positive Samples**

Fig.1: Month wise prevalence of protozoan parasites IC Monkeys of Siddharth Garden,AMC Zoo Aurangabad (M.S) during the year July 2017 to June 2018.

Table -2 Showing the prevalence of Protozoan *parasitic* species IC monkeys in AMC Siddharth Garden Zoo, Aurangabad, Maharashtra

SrNo	Species with total no. of positive samples		Prevalence percentage	
	Protozoan parasitic Species	+ve samples 103/474	Prevalence %	Total samples **Mean 12.22%**
1.	*Entamoeba coli*	90	87.37%	18.98%
2.	*Entamoeba histolytica/ dispar*	85	82.25%	17.93 %
4.	*Balantidium coli*	57	55.33%	12.02%
5.	*Iodamoeba butschlii*	38	36.89%	08.16%
6.	*Giardia lamblia*	19	18.44%	4.00%

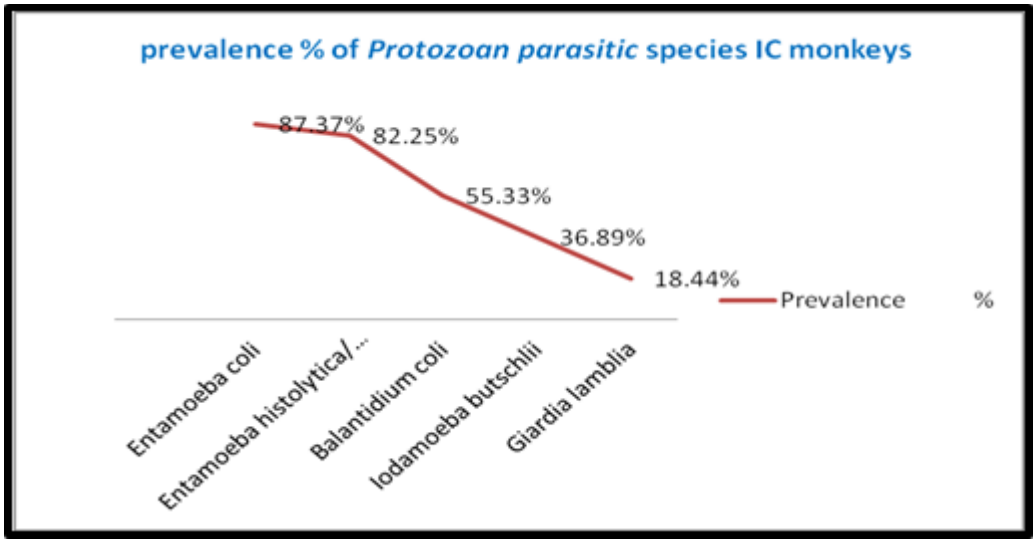


Fig.2: **Prevalence of *Protozoan parasitic* spp .in IC monkeys in AMC Siddharth Garden Zoo, Aurangabad (M.S)**

III. DISCUSSION

For best of our knowledge this current work seems to be first attempt of this kind inIndia to make a comparative study regarding seasonality and habitat of GIT protozoan parasites in Captive Semnopithecus *entellus* gray langurs of Siddharth Garden AMC Zoo. Monkeys as Non-Human Primates (NHPs) known to maintain and promote the transmission of certain GIT protozoan infections particularly at Zoo where human and wild primates shared the same environment (Mubashshera et.al.,2022)

By non-invasive coprodiagnostic study we found overall low prevalence of GIT protozoan parasites. In many samples prevalence found highest during January i.e Winter season (Mubashshera et al.,2022) and lowest during April i.e summer season (Table-1, Fig-1), However *Entamoeba* spp.the most (Sergio Aurelio Zanzani et al., Jan 2016) and *Giardia lamblia* were the least (R C Thompson, 2004) prevalence parasites among Captive case NHPs (Table-2, Fig-2). However, Monjila Khatun et.al., 2014reported75% among primates were infected of which 62.5% were protozoan infection, with highest prevalence of Balantidium coli in captive animals at Rangpur Recreational Garden and Zoo, Bangladesh.

This supports the finding of previous studies. Entamoeba spp seems to be globally distributed protozoan parasites in NHPs OW monkeys and should be considered inthe management practices of captive NHPs.Individual within a given group harboured identical gastrointestinal protozoan faunas (Freeland, 1979). *Entamoeba histolytica* and *Entamoeba dispar* cysts are morphologically indistinguishable, where *Entamoeba histolytica* are pathogenic and *Entamoeba dispar* are not. Protozoan parasites with some coccidia oocyst showing higher prevalence of protozoan infections among monkeys which may be zoonotic as reported in various parasitological literatures as given by Karen and Nairobi, parasitic research division, Institute of primate research, Kenya.

Protozoan parasitic infections were of low prevalence within our samples, which may be aconsequence of host susceptibility or behaviour (Davies TJ Pedersen AB, 2008) e.g OW monkeys in the wild may harbour high

parasitic infection rates as result of their ground-dwelling habits, although in zoos they were housed in clean cages. But because of space limitations in zoological gardens captive animals succumb more frequently to parasitic infections (HobergEP *et al.*, 2008). All captive primates were more infected with GIT protozoan parasites than those under free roam at the Afi mountain Primate conservation area in Calabar, Nigeria (Mbaya and Udendeya, 2011). Wild primates in their natural habitat, often self medicate themselves with medicinal plants in their environment (Clayton and Wolf, 1993; Robles et.al, 1995). The absence of protozoan infection was speculated to be the result of the specialised digestive tract of NHPs as aresult oftheir folivorous diet (Freeland, 1979).

The presence of parasitic protozoa in NHPs (Northern plain Gray Langurs) of study area being as historical and tourist place is a high risk to human welfare because of direct or indirect contact through contaminated food, water and hands. The GIT protozoan parasites detected in this study are amongst those known to represent human public health concerns. Hence our results highlight that proper precaution should be taken by zoological gardens with large number of animals to mitigate against parasite transmission. This includes adhering to basic hygiene standards, ensuring cages should be cleaned and disinfected daily.

IV. ACKNOWLEDGEMENT

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Turbidity, TDS And Transparency in Water Bodies of Jakkapur from Omerga Taluka (M.S.) India

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ABSTRACT

The present investigation deals with the study of turbidity, TDS and transparency in water bodies of Jakkapur from Omerga Taluka (M.S.) India. The work was carried out during the year June 2018 to May 2019. The Jakkapur water tank is earthen man made them this Dam has been completed in 1978. Its having a maximum height of 14.83 m. Distance from Omerga to dam is about 08 km. The catchment area of the Dam is 89 sq. km. Its live storage capacity is 3.33 m3 and having full tank level 11.70 m. The water bodies are mainly used for irrigation, drinking water, domestic activity, cloth washing, plantation nursery and fishery purposes. The same the turbidity, TDS and transparency were studied in water of three spots A, B and C selected during a study period the average of turbidity is 21.6 NTU TDS is 129.6 mg/lit and transparency is 28.9 cm recorded the detail of results in next.

Keyword: Turbidity, TDS & Transparency, Jakkapur water bodies.

I. INTRODUCTION

The water is one of the abundantly available substances as in nature which man has exploited more than any other resources for the sustenance of life water in a good quality is required for living organism. Dam is the most important water resource water is a universal solvent and renewable source this properties of water on the earth is not clear so far availability of water on the earth is only one percent and 2% water occurs always in frozen state while 97% water is in the sea water is important resource and basic need of a human being the addition of excess materials which are harmful to living organism is the water pollution which makes water harmful to use for drinking domestic or agricultural, fishery purpose. The great solvent power of water makes its contaminated by pollutants the water pollution caused by organic compounds as a protein, carbohydrates, fats or by the synthetic compound as pesticides herbicides dyes etc. The organic pollutants originate from sewage Industrial waste which are toxic in natural and difficult to register due to addition of pollutants to water makes the water polluted water quality rippers to the chemical physical and biological characteristics of water. It is a measure of the condition of water relative to the requirement of one or more biotic species and are to

any human need or purpose. It is the most frequently used by reference was set of standard agents which compliance can assessed. The most common standard used to access water quality relate to health of ecosystem, safety of human contact and drinking water. Turbidity into water is due to the colloidal and extremely small dispersion. The TDS are the total amount of mobile charged ion including minerals salts are metal ions dissolved in water if water containing more than 500 mg/lit of a TDS is not considered for drinking water but in unavoidable cases 1500 mi/lit TDS is allowed. Transparency of water is inversely proportional to turbidity created by suspended solids in water it becomes too important to investigate this water body for Turbidity, TDS and Transparency measured. This Jakkapur water bodies located near Omerga; a taluka place in Osmanabad District of Maharashtra state.

II. MATERIAL AND METHOD

The present study of Turbidity, TDS and Transparency in water bodies in Jakkapur from Omerga taluka during a year June 2018 to May 2019. Its location is Jakekur wadi longitude 76^0- 38'-0" and latitude 17^0 -48'- 30. Water sample for analysis is selected from three spots A, B and C monthly. Samples from water bodies collected and measured in each month during the morning time. Turbidity and total dissolve solid TDS of water sample were measured on the spot using Portable water and soil analysis kit. Transparency was measured with the help of Secchi disc 20 cm diameter on black and white iron plate for a spot A, B and C. It has described in APHA (1989), Trivedi and Goyal 1984 Khedekar (1992), Jhingran (1982) and Laglar (1967)

III. RESULT AND DISCUSSION

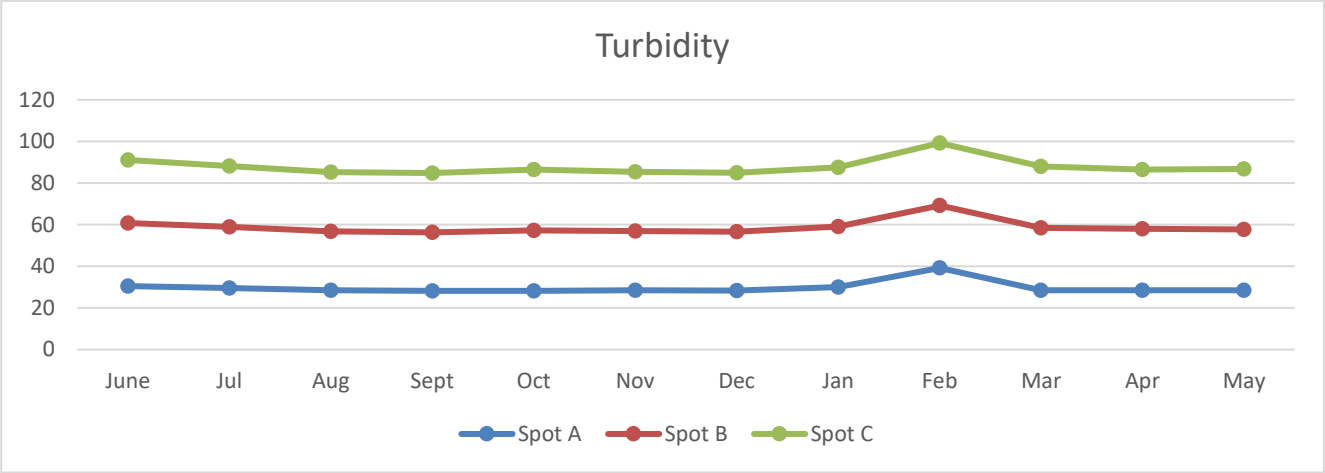
Table 1:-Turbidity, TDS & Transparency in water bodies of Jakkapur from Omerga taluka MS. India during a year June 2018-19

Aspect spot→ Month ↓	Spot A			Spot B			Spot C		
	Turbidity	TDS	Transparency	Turbidity	TDS	Transparency	Turbidity	TDS	Transparency
June	28.5	75	30.5	25	76	30.2	25	77	30.3
Jul	31.5	81	29.5	30	80	29.4	30.5	81	29.3
Aug	24.5	79	28.5	24	81	28.3	25	80	28.5
Sept	24.5	91	28.2	24	91	28.1	24	90	28.5
Oct	18.2	82	28.2	19	82	29.1	19	81	29.1

Nov	16	83	28.5	15	81	28.5	16	82	28.4
Dec	10	89	28.3	09	90	28.3	09	92	**28.3**
Jan	**09**	121	30	**08**	120	29.1	**08**	121	28.5
Feb	24	172	39.2	24	171	30	24.5	170	30
Mar	28	**249**	28.5	27	**250**	30	28	**251**	29.5
Apr	28	221	28.5	28	221	29.5	30	220	28.5
May	25	224	28.5	24.5	224	29.2	25	225	29.1
Avg	21.51	130	28.86	21.54	129	29.1	22	130	29

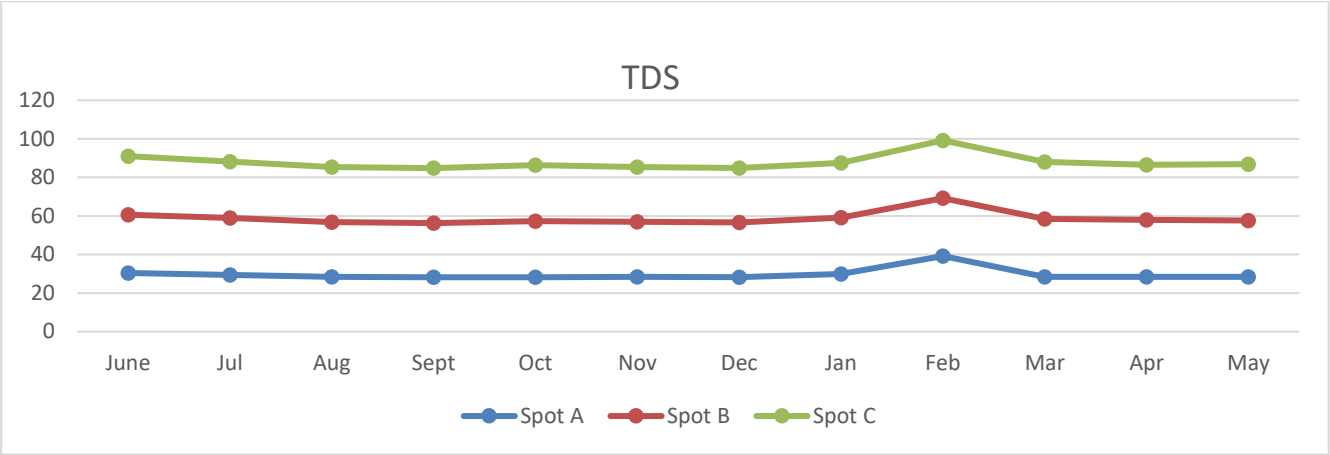
The analysis of Turbidity, TDS and Transparency in water bodies in Jakkapur (Table 1). We are observed and recorded the water of turbidity. It is found in the range between 8 to 31.5 NTU average found in 21.6 NTU at spot A it was a maximum 31.5 in July month and minimum 9 NTU in January month. At spot B maximum 30 NTU is found in month of July and minimum 8 NTU in month of January and spot C is measure maximum 30.5 NTU in month of July and minimum 8 NTU in month of January (Graph 1). Turbidity is caused due to presence of suspended matter clay, silt, colloidal particles planktons and other microorganisms Kataria et, al- (1996)

Graph 1. Turbidity in water bodies of Jakkapur from Omerga taluka MS. India during a year June 2018-19



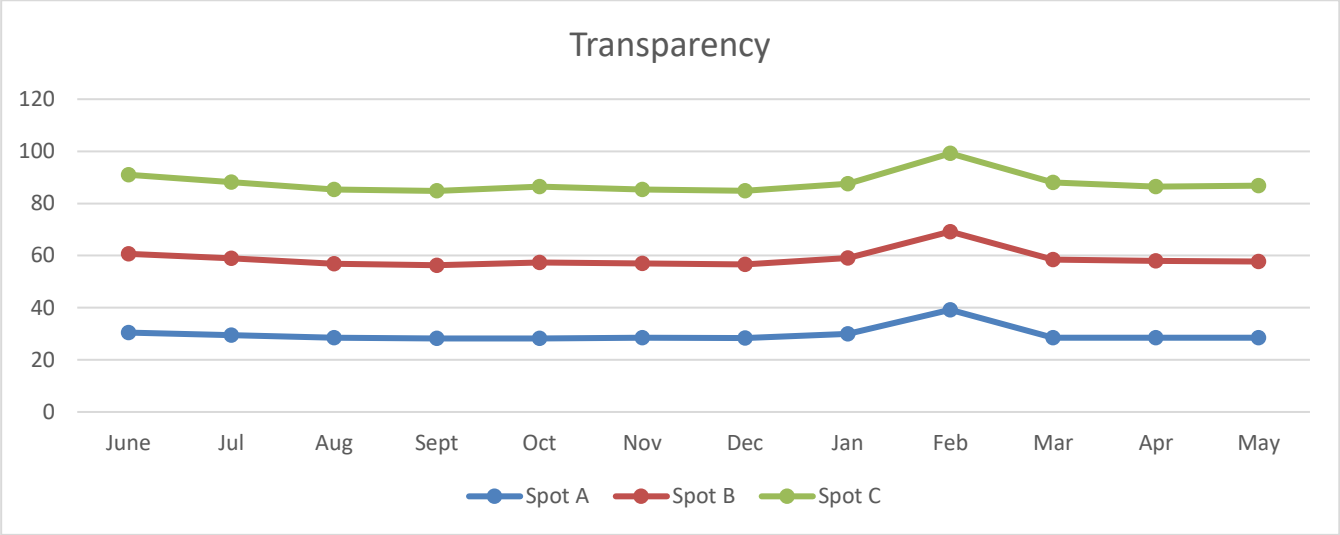
Total dissolved solid (TDS) refer to solid matter dissolved in water. It is observed and recorded (Table 1). The TDS of water bodies were found in the range between 75-25 mg/lit and average TDS is 129.6 mg/lit at spot a maximum 249mg/lit. in month of March and minimum 75 mg/lit. in month of June, the spot B is a maximum 250 mg/lit. in month of March and minimum 76 mg/lit. in month of June and the spot C is a maximum 251 mg/lit. in month of March and minimum 77 mg/lit. in month of June in 12 months (Graph 2). TDS were high in summer and medium in monsoon and winter season. According to the TDS up to 200 mg/lit. were in medium productivity reservoirs and more than 200 mg/lit. were in highly productive reservoirs Pawer and Phule (2005)

Graph 2. TDS in water bodies of Jakkapur from Omerga taluka MS. India during a year June 2018-19



The transparency of natural water is an indicator of productivity the extended to which height can penetrate depends on the transparency of standing water column. It was observed and recorded (Table 1). The transparency of water was found to be in the range between 28.1 to 30.5 cm and average of transparency is 28.9 cm.at spot A transparency is a maximum value recorded 30.5 cm. in month of June and minimum 28.2 cm in month of September and October. The spot B is maximum 30.2 cm. in month of June and minimum 28.1cm. in month of September.

Graph 3. Transparency in water bodies of Jakkapur from Omerga taluka MS. India during a year June 2018-19



At sports C is a maximum 30.3 cm. in month of June and minimum 28.3 cm.in month of December in the 12-month record (Graph 3). The transparency of water bodies affected by the factor like planktonic growth, rainfall, suns position in the sky angle of incidence of a rays, cloudiness. Visibility and turbidity due to suspended inert particulate matter Kadam et.al. (2007).

IV. ACKNOWLEDGEMENT

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Wild Tubers : Traditional Medicines of Kinwat Tribes

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ABSTRACT

An extensive survey of medicinal plants of kinwat forest has been done during 2020-21. Forest survey yields medicinal uses of variety of plants including wild tuberous plants. It is observed that, most of the wild tuberous plants used by local tribes for health care. The present paper focused on some important wild tuberous plants and their traditionial medicinal uses.

Keywords: Wild tubers, Traditional medicnes, Kinwat forest.

I. INTRODUCTION

Kinwat tahsil is a hilly, tribal remote area surrounded by dense forest in Nanded district. Kinwat forest is rich in variety of plants including wild tuberous plants. This station is located in Marathwada region of Maharashtra in India. Andh, Gond, Pardhan, Naikda and Kolam are the tribal communities, accomodate very close to the forest and have lot of knowledge about the medicinal plants and using wild tuberous plants for their health issues. This kind of use of wild tuberous plants as medicines comes from their ancestors. The studies related to such types of practices comes under a field i.e. Ethnobotany deals with the study of direct relationship of man and his surrounding plants. Many of the workers contributed a lot mainly wild ethnomedicines of different areas including kinwat forest by tribes. (Gogte, 1982; Jain, 1990; Upadhye *et.al.*1994; Gopan and Bhadane, 2005; Patil and Ramaiah, 2006)

The floristic survey of different ranges of kinwat forest has been done by Zate, 1983; Naik, 1998; Chavan, 2002 with short ethnomedicinal uses of some few plants of this forest. The wild tuberous plants remain unexplored as far as their medicinal values and uses by local tribes is concerned hence this topic has been undertaken.

II. OBJECTIVE

With the passage of time, the traditional knowledge of tribal medical science is on the decline. In the age of globalization, the tribal communities has been affected by urbanization due to which there is a set back to the tribal medical science and the production of herbal medicine. Even today, herbal medicines are considered to have no side effects on health, but due to availability of new medicines, peoples hardly prefer to use the ages

old herbal medicines. The tribal medical practitioners prepare herbal medicines with the available plant materials collected from forest such as roots, stem, leaves , flowers, fruits, barks including tubers. Objectives of the study includes to know the wild tuberous plants of kinwat forest to know their traditional medicinal value and uses by local tribes, provide the basic informations about such plant for further scientific studies including phytochemical studies,chemical analysis, drug extractions etc., and aware the peoples for their conservation, motivate the farmers / cultivators to take such valuable rare plants under cultivation.

III. METHODOLOGY

Forest exploration trips were arranged to different locations of kinwat forest with tribal medicinal practitioners for the study of wild medicinal plants of the area. The tribal practitioners were interviewed by visiting their houses also and know the preserved medicines inform of plant parts including undergrounds.

During exploration the tribal practitioners also taken to the forest to observe the habitats and collection of plants. Interviews, enquiries and cross questioning was also conducted. A special questionnaire was made in proforma and it has been adopted for interview. The questions were framed in such a way that, they may yield maximum informations of medicinal plants including the bio-data of practitioners. The mode of appproch, communication skill, construction of simple questions and answer recorded yielded the valuable information about wild tuberous medicinal plants. The collected wild tuberous plants from different locations of kinwat forest were brought to the laboratory and indentified with the help of Flora of Marathwada (Naik-1998), Flora of Kolphaur (Yadav and Sardesai, 2002), Flora of Sawantwadi (Almeida-1990), Flora of Maharashtra by BSI, Pune (2000) and preserved in form of herbarium in the department of botany, Baliram Patil ACS College, Kinwat.

IV. RESULT AND DISCUSSIONS

This study yields the traditional medicinal uses of wild tuberous plants, arranged alphabetically with their botanical name, family, local names, morphological description and medicinal uses as below.

1) *Amorphophallus sylvaticus Roxb.*- Araceae- Kolmaka / Jangli Suran :

Perennial, glabrous herb with underground tuber (corm) . Tubers depressed,globose with numerous fibrous roots. Leaf usually solitary. Spathe ovate dull greenish enclosing spadix. Female neutral & male flowers arranged in a specific manner. Fruits 4-5 angled.

Traditional medicinal use: Tuber (corm) and its prepared tablets used to relief the painful piles as well as stomach pain.

Exsiccata- Maregoan hill top.

2) *Ceropegia bulbosa Roxb.*- Asclepiadaceae – Hanuman Gadda :

Twining perennial herbs, tuber globose, leaves opposite, cymose, corolla inflated at base narrow in middle and funnel shaped below, grayish outside, purlish and hairy outside. Follicles linear and gradually tapering to a point.

Traditional medicinal use : Tubers are used as medicine. The sweet tubers are used as energetic tonic. The patients suffering from weakness due to long illness, they are supplemented with fresh pieces of tubers for a weak.

Exsiccata- Malkolhari.

3) *Chlorophytum tuberosum Roxb.*- Lilaceae- Pandhari Musali :

Errect, perennial herb, roots ending with ellipsoid tubers. Leaves linear lanceolate with undulate margins, racemose, capsule obovoid, 3-angled.

Traditional medicinal use: Tubers are used as medicine. The powder of tubers or raw tubers consumed as highly energetic tonic with milk.

Exsiccata- Ambadi ghat.

4) *Cissus reticulata- Linn.*-Vitaceae- Tinpani Gadda :

Climbers, tendrils simple, stems reticulate, leaves trifoliate, leaflets broadly elliptic ovate, flower in corymb, berries.

Traditional medicinal use: Root tuber is used as medicine for nails abscess. The tuber is made into paste. It is directly applied and tied with a cloth on infected nails for three days and found to recover the abscess.

Exsiccata- Bendi tanda.

5) *Corallocarpus epigaeus Rottl. & willd.* – Cucurbitaceae- Mirchikand.

Monoecious climbing herb, root tuberous, tubers small ovate creamy, branches zig-zag leaves broadly ovate, 3-5 lobed, male and female flowers separate, fruits ellipsoid.

Traditional medicinal use: The tubers are used as medicine in snake bite. Row or dried tubers in form of slices or powder directly given to the snake bitten person and feels sweet taste. He / she starts severe vomiting through which snake poison remove from the body.

Exsiccata- Maregaon (Upper)

6) *Curculigo orchiodes Gaerth. Fruct. Hypoxidaceae*- Kalimusali.

Perennial herb with elongate cylindric root stock (tuber) and fleshy root fibres. Leaves basal, linear, lanceolate, flower arranged in receme, lower bisexual and upper males, yellow, capsule, oblong, seeds black, ovaid.

Traditional medicinal use: The root stock is used as medicine in impotent man. A small pieces of root given to the patient with betel pan for three to seven days. It improves the sexual debility in man.

Exsiccata- Rajgad Ghat.

7) *Curcuma pseudomontana Grah. Cat.* – Zingiberaceae- Ranhalad.

Perennial herb with short root stocks bearing tubes. Tubers white inside. Leave elliptic lanceolate to along. Flowers in lateral / terminal spike. Calyx pale yellow hairy outside. Corolla oblong pink. Capsules ellipsoid avoid.

Traditional medicinal use: The tuber (Rhizome) is used as medicine. It is used in hepatitis. The paste of tuber given to the patient with cow milk three times in a day for three days and cures hepatitis.

Exsiccata- Dhanora range.

8) *Dioscorea penta phylla L. Dioscoreaceae*- Nuska.

Tuberous twiner, stem slender, pricky at base, bulbils in axils. Upper leaves ovate, lower leaves 3-5 lobed, male and female flower in spike, capsule oblong, seeds apically winged.

Traditional medicinal use: Tubers are used medicine in kidney stone. Fresh juice of tuber given to the patient early in the morning with water for three days to dissolve the kidney stone.

Exsiccata-Ambadi Forest.

9) *Gloriosa superba L. Liliaceae*- Kal Lavi / Khadya Nag.

Climbing herb with tuberous root stock, leaves alternate, opposite linear to ovate, tip modified into tendril. Flowers yellow, axillary sotilary, capsule ellipsoid globose, seeds globose numerous.

Traditional medicinal use: Tuberous root stock is used as medicine in rheumatism and skin disease. The entire plant is extremally used for easy child birth.

Exsiccata- Near Ambadi dam.

10) *Habenaria grandifloriformis Blatt.*.- Orchidaceae- Tinpani :

Errect perennial herbs with white root tubers. Leaves 1-3 one above the others, attached to the substratum. Broadly ovate cordate and acute at base. Flowers in recemose, capsule oblong, ribbed, seeds numerous.

Traditional medicinal use: Tubers are used as medicine as a tonic. Its consumption improves the body strength and useful for body build.

Exsiccata- Zendiguda forest.

11) *Tacca leontopetaloides L.* - Taccaceae- Penghagra :

Perennial herb with globose whitish brown tuber (corm). Leaf solitary with long petiole, leaf lamina slightly dissected. Flowers long pedicelled, Perianth globose, greenish yellow, fruits globose, six ribbed, seeds many.

Traditional medicinal use: Tuber are used to cure cellulitis and stomach pain. A small piece of tuber with betel pan given to the patient. Once in a day for seven days found to cure cellulitis.

Exsiccata- Malkolhari.

V. CONCLUSION

This kind of study indicates that, the kinwat forest consists of variety of tuberous plants and play a vital role to treat various diseases of the local communities. Such type of traditional medicinal uses proves that, these plants may have some important disease curing drugs. This study is helpful for further scientific and systematic work in the field of pharmacology, drug industries chemical extractions. This study may attract the young researchers to extend more form traditional to advance.

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Photographs of Tuberous plants

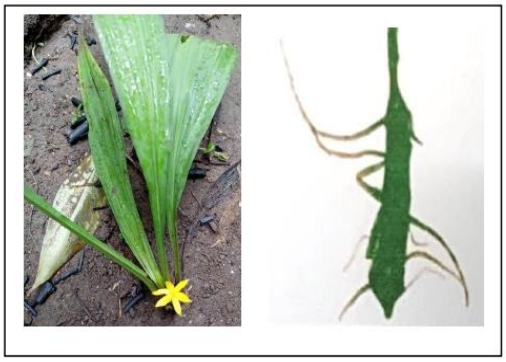
Amorphophallus sylvaticus

Ceropegia bulbosa

Chlorophytum tuberosum

Cissus reticulate

Corallocarpusepigaeus



Curculigo orchiodes

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Dioscorea pentaphylla

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Prevalence of Helminthosporium Spores over Sunflower Fields

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ABSTRACT

Present paper deals with the aerobiological investigation over Sunflower fields by using Volumetric continuous Tilak Air Sampler was employed for exploringfungal airspora over a Sunflower field at Kada, Tal.Ashti and Dist.Beed, from 5th July to 30th September 2016 for first Kharif season and from 1st July to30thSeptember 2017 for second Kharif season. The present paper deals with airborne concentration of Helminthosporium spores over sunflower fields. The concentration of airborne Helminthosporium spores was assessed and the roles of the metrological parameters over the spore concentration were discussed. The spore concentration was maximum (8540/m3and10221/m3of air) in the month of September 2016 and September 2017 during first and second Kharif season respectively.

Keywords: Aerobiology, Helminthosporium, Air Sampler, Sunflower field.

I. INTRODUCTION

Aerobiology is an interdisciplinary science which deals with the study of biological component like pollen grains, fragments of fungal spores, hyphal fragments, bacteria, viruses, algae, lichens, minute insects & insect parts, protonzoancyst, etc. In the atmosphere a biotic particulates & gases affecting living organisms have been recently included in the concept of aerobiology. The aerobiological studies are mainly concern with interrelationship between the biological component in the atmosphere, source of biological component, their release in the atmosphere, their deposition & impact on health of plants & animals including human beings. Airborne infections & the resulting diseases threaten the lives & productivity of plants. Airborne diseases still pose a challenge to mankind.

The role of fungi in causing diseases to crop plants, man, domestic animal, in bringing deterioration of food grains in storage, valuable monuments has been subject of great interest for long time. Standing vegetation has a great influence of Aerospora of any place and it changes with changes in weather. Aerobiological survey conducted in various part of India revealed richness of Aerospora.

Sunflower (*Helianthus annus* L.) is one of the most important oil seed crops being grown all over the world. It is mainly grown for its oil, which is generally for culinary purposes in preparation of vanaspati and in manufacture of soaps and cosmetics .The sunflower oil is chemically a tri-glyceride. It contains 68% linolic acid,

so it is especially recommended for patients having heart troubles. Sunflower seed cake or meal is a protein reach feed and is used as a concentrate for cattle, animals like pig, sheep, goat and poultry feed. Sunflower is native of North America. In Germany and Russia it is grown on large scale. Now a day's sunflower crop cultivation has become more popular among the farmers of Marathwada region. As considering survey of this crop that since last few years sunflower is subjected to various type of fungal diseases which may be soil borne, seed borne, airborne etc. The aim of present study was to find out the atmospheric concentration of *Helminthosporium* and its correlation with meteorological parameters. It was with the aim to find out the important airborne pathogens, their distribution and seasonal variation in the concentration these investigationswere undertaken, the prediction of airborne fungal disease could be attempted. If well in advance information of airspora of this crop is made timely available. In view of the above fact using by continuous Volumetric Tilak Air Sampler carried out an aero mycological survey over sunflower field for two Kharif season.

II. MATERAIL AND METHODS

In the present investigation an exploration of airborne spores of *Helminthosporium* (Tilak and Kulkarni 1970) was undertaken over the fields of sunflower field for two Kharif season. Tilak Air Sampler was installed at a constant height of 1.5 meters above the ground level at Kada Tal Ashti Dist Beed (M.S.) for two Kharif season i.e. 5th July to 30th September 2016 for first Kharif season and from 1st July to30thSeptember 2017 for second Kharif season. The air was sampled at the rate of 5 liters/minutes which left traces of deposition over cellophane tape, affixed on the outer surface of drum. The slides were prepared every offer eight days. Before the scanning, the slides were marked with a ball pen point pen in the six equal parts, each part,indicating the spore catch of two hours of sampling period. Area of 9600sq.micron of the total area of the trace obtained was scanned under 10Xx45X eye piece objective combination of binocular research microscope. The transformation of spore was done which was based on visual characteristics of spore such as size, shapes. The metrological data was recorded during period of investigation.

III. RESULT AND DISCUSSION

Spores obclavate to cylindrical, slightly curved or bent, apex somewhat rounded, sub-hyaline to darkbrown, with three or many pseudosepta, with prominent basal scars, 35-95x11-18 um long.Spores occurred continuously. The spores contributed 3.86% and 4.59% during first and second Kharif season respectively.

The maximum monthly mean concentration (8540/^{m3}and10221/^{m3}of air) was recorded in the month of September 2016 and September 2017 during first and second Kharif season respectively. The maximum daily mean concentration (370/m^{3}and 1135/m^3) was recorded on 25thSeptember 2016 and 9thSeptember 2017 during first and second Kharif season respectively.

Krameret.al. (1959), recorded0.3% spores at Kansas. Kramer and Pady (1960) atKansas reported these spores more frequently during growing season. Dransfield (1966) in Samaru reported these spores with 0.85% with maximum incidence in the air between September and November months. In Hong Kong, Turner (1900)

recorded 0.2% spores. Kulkarni (1971) at Aurangabad reported 2.83% spores. Gaikwad (1974) at Ahmednagar, reported 9.38%, Kamal and Singh (1975) also reported two species of *Helminthosporium* at Gorakhpur. Pande (1976), Tilak and Bhalke (1978), Verma (1979), Shastri (1981), Saibaba (1982), Patil (1983),Venugopalachari (1986),Ramakrishna Reddy (1987), Minhaj (1988), Meghraj (1989),Vaidya (1900),Ahuja (1992),Patil (1992),Zahid (1994),Thite (1998) and Pawar (1998),Tuljaputkar (2000) and Garje (2000) also recorded these spores from airspora at Aurangabad. Mali (2002) and Banswadkar (2002) also reported these spores at Kada and Udgir respectively.Gopan (2004) and Pathare (2004) reported these spores over sunflower fields at Beed and Kada respectively. The climatic factors generally are responsible to influence the sporadic outbreak at certain disease, however during period of present investigation did not occur. Thus the regional climate not only determines the profitable growth of crop but also influences the dangerous of disease to which crops are proned, the relation between the development of disease and weather is the basis on which incidence and occurrence of diseases can be predicted. At matter of fact, plant disease forecasting is the natural corollary of plant disease epidemiology. Thus the atmospheric microbial population in relation to phytopathology has an ample scope for further investigations. Such studies would bring many useful results like disease forecasting which would ultimately help in projecting our crop.

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Chronic Impact of Sub Lethal Concentration of Malathion on Glycogen Content of Liver of Juvenile Labeo Rohita

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ABSTRACT

Pesticides have an innate capacity to cause damage to biological system. Considering above fact the present study deals with the effect of malathion for short duration(24 to 96 h) Labeo rohita. The liver showed reduction in glycogen content during sublethal treatment.

KEYWORDS: Labeo rohita, Malathion, Liver, Biochemicals.

I. INTRODUCTION

Malathion is commonly used organophosphorous pesticide. While most of the malathion will stay in the areas where it is applied, some can move to areas away from where it was applied by rain, fog and wind Once malathion is introduced into the evironment, it may cause serious intimidation to aquatic organisms and is notorious to cause severe metabolic disturbances in non target species like fish and fresh water mussels (USEPA, 2005).

Labeo rohita is common fresh water fish abundantly present in local river Godavari Dist. Nanded. It is one of the major source of food of poor population in local area. The present study was designed to study impact of sublethal concentration of 0.8 ppm of malathion on liver glycogen in fresh water fish Labeo rohita during exposure period of 7,14,21 and 28 Days.

II. MATERIAL AND METHODS

For present study, commercial grade malathion (50% manufactured by Coromandal fertilizer limited, Coromandal house, pesticide division, Ranipet, Veiare (TN), India) was procured from the local market. Healthy specimens of Labeo rohita were collected from local river Godavari Dist. Nanded. Their average length and wet weight (14.5+ 1.7cm and weight 13.2 + 0.5gm) respectively. Fishes were treated with 0.1 % Km No_4 solution for 2 min. to avoid any dermal infection. The fish stock was then maintained in 100
liter glass aquaria for 14 days to acclimatize under laboratory condition. The fishes were fed with pieces of live earth warm on alternate days. A stock solution was prepared in acetone and mixed in water to obtain required dilutions. The LC50 value for 96 hours of malathion was determined by procedure of Finney (1971). The LC50

of malathion for 96 hours for Labeo rohita was 2 mg/liter. Fishes were exposed to sub lethal concentration (0.8 ppm) of malathion, simultaneously control group was also maintained. Glycogen content was estimated by Anthrone method (Hedge and Hofrciter, 1962).

III. RESULTS

In the present investigation the glycogen content at control 13.02 compare with experiment in 7, 14, 21 and 28 days was 10.28, 9.17, 8.21 and 6.71 mg/gm liver. Different concentration of organophosphates malithion at 0.8 ppm the glycogen content in liver of *Labeo rohita* Changes in glycogen of liver of Labeo rohita is presented in Table 1. The glycogen level of liver fluctuated during different intervals of treatment.

IV. DISCUSSION

Venkatraman and Sandhya Rani (2006) showed similar result depletion in glycogen was studied by Veeraiah and Prasad (1998) In present study, the depletion in glycogen content in body muscle might be due to possible glycogenolysis, resulting in anaerobic glycolysis in body muscles to cope up with adverse condition as reported by Dezwaan and Zandee (1999) and Chaudhari (2000).

Nagabushanam et al. (1972) showed decline in lipid content in the hepatopancreas of the fresh water prawn Macroranchium kristensis in response to pesticide. The decreased glycogen content in cardiac muscle is attributed due to inhibiton of hormone and enzymes when the fish is under the influence of toxicant. During this time the conversion of carbohydrate into amino acid may be possible. Hence the decreasing trend in glycogen ontents was noticed. Similar observations were made by (Gaiton et al. 1965; Edwards, 1973; Anita Susan et al. 1999).

Lomte and Sabiha Alam (1984) showed effect of malathion on the biochemical components of the proso branch, Belamia bengalnsis and reported that the decrease in glycogen, protein and lipid under pesticidal stress. Decrease in tissue lipid and proteins might be partly due to their utilization in cell repair and tissue organization with the formation of lipoproteins, which are important cellular constituents of cell membranes, and cell organelles present in the cytoplasm (Harper, 1983).

Table1. Glycogen content (mg/gm) in liver of Labeo rohita

Concentration (ppm)	Duration in days 7	14	21	28
control	13.2± 0.3	13.27± 0.2	13.66± 0.3	13.39± 0.3
Experimental	10.28 ± 0.4	9.17 ± 0.5	8.21± 0.2	6.71±0.3

(Values are mean SD of six replicates, * P<0.05, * P <0.01, ** P>0.01, significant when student's test was applied between control and experimental groups)

V. CONCLUSION

In the present investigation the effect of organophosphate malathion of the glycogen content in liver of Labeo rohita changes is found the glycogen content is decreases during the study period.

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Recent Trends in Artificial Intelligence in Education

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ABSTRACT

This research study examines artificial intelligence strategies used in the field of educational administration. The author discusses intelligent learning systems in this article. Expert systems that are integrated into the design of platforms for online learning are given special consideration. The elements of intelligent systems that allow for the organisation of an optimum digital learning process are highlighted. As an example, the establishment of an interactive training project aimed at the successful acquisition of knowledge by students attending philosophy courses, as well as the improvement of the quality of this knowledge, is offered. Design and development of software required constructing and managing online platforms; systematic methodology, including databank formation and classification of data; and approach to intelligent data processing to activate interactive learning models are among the project implementation approaches.

The goal of this study was to see how Artificial Intelligence (AI) might affect schooling. The study's scope was limited to the use and effects of AI in administration, instruction, and learning, based on a narrative and framework for analysing AI identified through preliminary investigation. A qualitative research approach was adopted, which effectively assisted the accomplishment of the study objective by leveraging the utilisation of literature review as a research design and approach. Artificial intelligence is a field of study that has resulted in computers, machines, and other artefacts having human-like intelligence defined by cognitive capacities, learning, adaptability, and decision-making capabilities. According to the findings, AI has been widely accepted and employed in education, notably by educational institutions, in various forms. AI began with computers and computer-related technologies, progressing to web-based and online intelligent education systems, and finally, the use of embedded computer systems in conjunction with other technologies, humanoid robots, and web-based chat bots to perform instructor duties and functions independently or in collaboration with instructors. Instructors have been able to accomplish improved quality in their teaching operations by using these platforms to handle various administrative responsibilities, such as evaluating and grading students' assignments more effectively and efficiently. On the other hand, because the systems rely on machine learning and flexibility, curriculum and content have been modified and individualised to meet the needs of students, fostering uptake and retention and so boosting the overall quality of learning.

Keywords: - Administration, Digital learning, educational process, Online platforms,

I. INTRODUCTION

Educational management in the modern era refers to a set of policies and practises aimed at increasing the quality of the educational process. The efficacy of the methodologies used in the educational process, as well as the competence of the teachers themselves, determines the quality of the educational process today. Without tactics as an auxiliary to the structure of an educational system tailored by teachers, today's educational process would be unthinkable. The digitalization of education as a tertiary activity is linked to instructional practises. In this way, digital education is becoming increasingly integrated into the larger trend of economic digitalization. The digitalization of the economy has an impact on all aspects of the educational system.

Artificial intelligence and machine learning techniques are essential components of modern school management. In this context, the educational industry is currently facing significant challenges as a result of the widespread usage of artificial intelligence. This includes not only professional skill redistribution, but also the quality of specialist training in the rising labour market. Based on the study of data-mining systems that may be used in the real educational process, new learning strategies have become the most in demand in terms of their usage in education. Educational administration is now a multi-vector process that includes economic, social, political, and high-tech growth vectors. In digital education, high-tech is becoming increasingly important. Furthermore, this process affects both technical and humanistic branches of study.

However, in addition to its benefits, the technologicalization of education has additional drawbacks. The author believes that the greatest danger to education's technologization is its excessive standardisation and formalism, particularly in the human sciences. As a result, in order to create a dynamic and engaging learning environment, projects with the qualitative potential to change the teaching and learning process in the human sciences are critical. As an example, consider a project in which machine learning techniques relevant to the discipline of philosophy are used to create it. This is an interactive educational initiative intended at helping students learn philosophy more effectively and improve the quality of their knowledge.

II. ARTIFICIAL INTELLIGENCE IN EDUCATION

Development Trends and Thoughts

Artificial intelligence (AI) is a set of information technologies with intelligent capabilities that are based on large data and machine learning. It incorporates artificial intelligence into the field of education and optimises educational development via the employment of essential technologies and intelligent tools in an intelligent education environment. The system encourages collaboration and integration between developing intelligent technologies and the education sector. In general, artificial intelligence's application in the field of education is constantly increasing and deepening, and the introduction of new concepts, methods, and ideas is bound to have a significant impact on educational reform.

2.1. Artificial intelligence techniques

1. AI-Related Techniques in Al Education Scenarios
2. Student and school evaluations-Academic analytics, adaptive learning method, and individualised learning approach Paper and exam grading and evaluation
3. Computer vision- image identification, and prediction system Intelligent, personalised instruction
4. Intelligent education systems, learning analytics, data mining or Bayesin knowledge interference
5. knowledgeable school- Face recognition, speech recognition, virtual labs, A/R, V/R, hearing, and sensing technologies are all examples of face recognition, speech recognition, and virtual labs.
6. Remote teaching through the internet and mobile devices-Real-time analysis, edge computing, and virtual tailored assistants

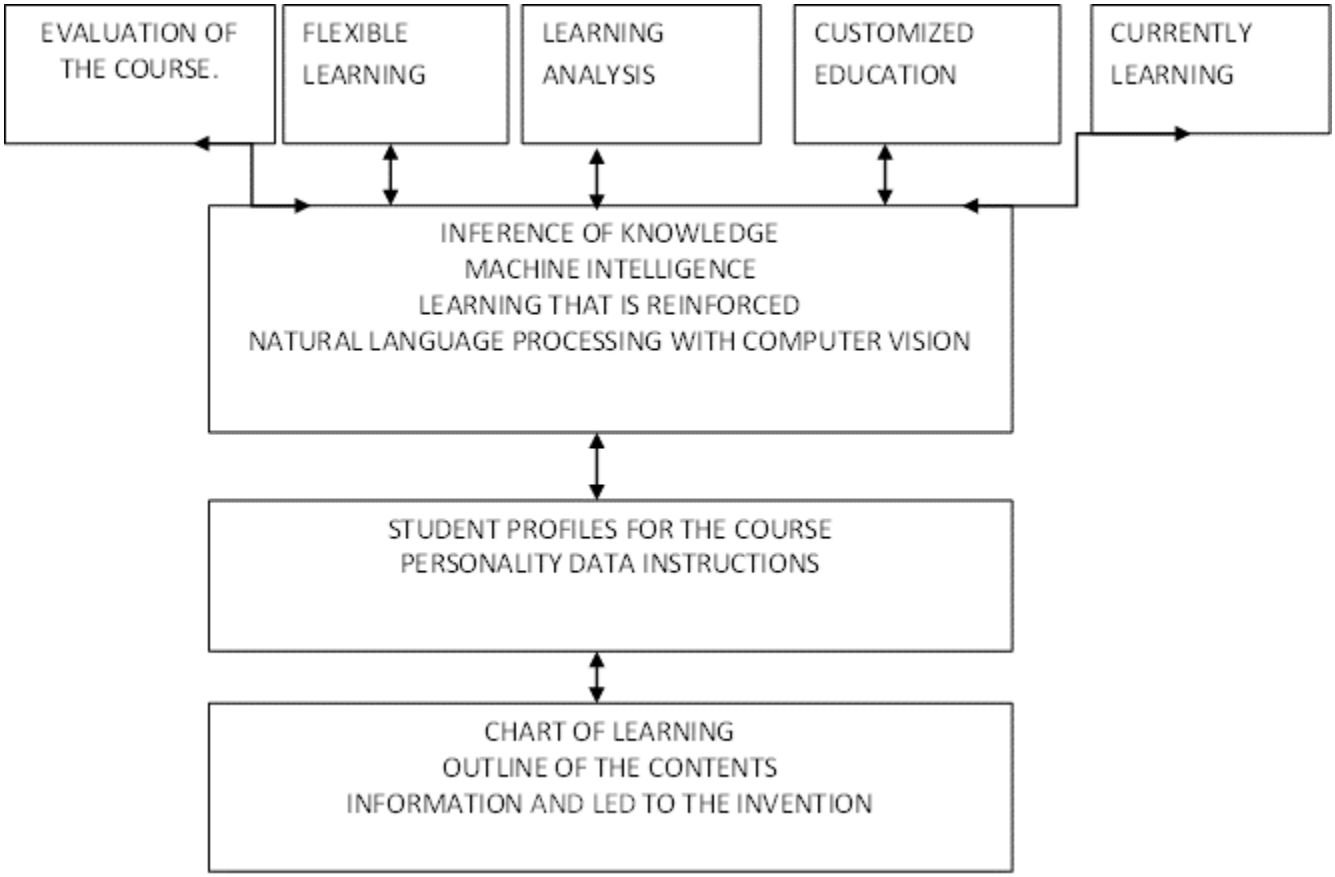

Fig 1 AI education has a technology foundation.

Based on machine learning, data mining, and knowledge models, many strategies are included into AI systems for learning analysis, recommendation, knowledge understanding, and acquisition. In general, an AI education system consists of teaching materials, data, and intelligent algorithms, which are classified into two categories: system model (which includes learner, teaching, and knowledge models) and intelligent technologies As demonstrated in Fig. 1, a model's contribution to the creation of a data map, which develops structures and association rules for acquired educational data , is critical for increasing learning. The model serves as the brain of an AI system, with technologies supplying the system's power.

2.2. The educational work that Al is capable of

A. Administration

- Perform administrative duties that take up a lot of time for teachers, such as grading examinations and de livering feedback, faster.
- Determine each student's learning styles and preferences, allowing them to create a customised learning plan.
- Assist educators with data-driven work and decision assistance.
- Give timely and straightforward comments and work with students.

B. Instruction.

- Estimate how effectively a student will exceed expectations in projects and exercises, as well as the likeli hood of dropping out.
- Examine the syllabus and course materials to come up with personalised content.
- Allow instruction to extend beyond the classroom and into higher education, so encouraging collaboratio n.
- Adapt the teaching strategy for each student depending on their own information.
- Assist educators in creating individual learning strategies for each student.

C. Learning

- Discover a student's learning weaknesses and address them early in their education.
- Students' university course selection can be customised.
- By analysing data, you can predict each student's professional path.
- Detect students' learning states and provide intelligent adaptive intervention.

III. THE USE OF ARTIFICIAL INTELLIGENCE TECHNOLOGY IN THE CONSTRUCTION OF SMART CAMPUSES IS EXAMINED

Smart campus is a growing trend in educational information architecture, particularly with the extensive use of artificial intelligence technologies. Smart campus applications have substantially improved as a result of the development and promotion of the Internet of Things, mobile learning equipment, wireless network equipment, and smart software. The purpose is to build an education ecosystem, as well as to investigate the field of artificial intelligence's use in smart campus building and to suggest a transition strategy from smart campus to "smart" campus construction.

Educational information construction has become the driving force behind the new format of educational informationization, from the initial application of modern information technology to the construction of smart campuses characterised by artificial intelligence, technological progress, and innovation [1]. Artificial intelligence is built on data, which is also wisdom. Campus construction's "fuel." Big data, cloud computing, and other technologies are propelling artificial intelligence forward, as well as providing technical support for

the development of "smart" campuses[2]. In his book "Schools and Society," American educator John Dewey proposed: The substantial advancement of social progress must have an impact on educational reform. There are gaps in the current educational environment and the development of modern information society, particularly the rapid development of Internet technology, which has resulted in the establishment of "smart campuses." Wisdom Artificial intelligence technology, which covers campus teaching, management, learning, life, and many other sectors, is at the heart of the campus. Artificial intelligence has made its way into campus, bringing new life to educational service models and promoting the multi-modal development of the "smart campus."

IV. ARTIFICIAL INTELLIGENCE APPLICATION FIELDS IN THE "SMART CAMPUS"

A. Artificial intelligence aids in the delivery of precise instruction

The reform of instructional work is the most significant influence of artificial intelligence technology on the "smart campus"[3]. "Fine" and "quasi" are examples of so-called "precision teaching." "Quasi" is the refining of knowledge, "spirit" is the refinement of knowledge. It is the consequence of students putting what they have learnt into practise. Precision teaching has become the standard for measuring the success of topic instruction in the classroom, as well as the basic guide for establishing efficient and interesting classroom teaching. Precision teaching stresses student-centered learning. As shown in Figure 1, this education concept is based on emphasising teaching students based on their aptitude, as well as measuring and recording students' learning behaviours, performances, and processes in order to analyse students' learning needs and optimise teaching content or teaching methods to meet those needs. As can be seen, "precision teaching" is based on the use of big data and artificial intelligence technology to alter and optimise instructional modes while also increasing teaching efficiency. Assess students' classroom engagement and concentration, and change teaching tactics to meet the needs of students' individualised teaching plans by identifying, recording, summarising, and integrating learning behaviours.

Classroom behaviour analysis and emotion recognition based on facial expression recognition have already appeared in some cases, according to current developments. The Paris Business School, for example, used the artificial intelligence technology Nestor in two online courses in September 2017. Its working idea is to track students' eye movements and facial expressions using a computer network camera, and then evaluate the data obtained. In May 2018, a smart classroom behaviour management system was deployed in a secondary school in Hangzhou, India, to assess students' classroom participation and concentration. The system analyses classroom behaviours of students in the classroom environment and provides reference for teachers to carry out precise teaching and adjust teaching strategies.

Online teaching is another type of "precision teaching" approach. Artificial intelligence technology is also being utilised to design learning programmes and exact services for learners, particularly in the current MOOC trend. As the largest organisation in the field of artificial intelligence education, Knewton, for example, delivers personalised education, continues to create adaptive education using AI, and employs adaptive learning technology to identify each student's knowledge gaps through data collecting. It can also perform a more in-

depth analysis of the causes and make recommendations for improvement. Civitas Learning specialises in the selection of university-level independent courses. It forecasts the key patterns of learners' curriculum scores and attendance rates using machine learning technology.

B. Artificial intelligence helps people make better decisions.

The study of objective data ensures the correctness of decision-making. Artificial intelligence technology's rigour of logical operation thinking gives rational analysis for scientific decision-making and has become a significant technical technique to support decision-making. Traditional data-assisted decision-making, however, still has flaws as compared to artificial intelligence[4]. Traditional computing looks to be focused on the data-driven model and cannot go far into the neural reasoning stage. Artificial intelligence, which blends data-driven and knowledge-driven intelligence, can "from experience" emphasise knowledge-driven intelligence in India. For example, you can employ sensors to collect relevant data and construct a data analysis model using emerging technologies such as artificial intelligence (AI). It can deliver fast and dependable school management and teaching when combined with the features of the school. Opinions on intelligent decision-making. Future artificial intelligence might be described as a "smart brain" that will improve campus decision-making by leveraging its tremendous data processing, computation, and logical reasoning capabilities to provide schools with scientific and visual decision-making resources.

C. Quantitative evaluation is aided by artificial intelligence.

Scientific and effective evaluation is the key to increasing educational quality in education and teaching practise. The existing evaluation approaches are primarily restricted to the analysis of educational large data, which limits their application. According to certain studies, adopting educational big data as the basis for evaluation will limit the accuracy of evaluation due to the unidirectionality of data generation. Based on big data analysis, artificial intelligence technology will employ multi-modal machine learning technology to improve the assessment system and eliminate the one-sided problems that data mining has generated in the past.

To increase the accuracy of the assessment and reflect the evaluation object more accurately, multi-dimensional data alignment technology is used to process the evaluation acquired from the visual information database and the evaluation gained from the text information database.

Artificial intelligence technology has introduced modifications and innovation to the development of school informatization in the context of the "Education Informatization 2.0 Action Plan." Promote the modernization and transformation of the "smart campus" construction system, but focus on how to get there. What is the best way to exchange and distribute data? How can we encourage the management of several applications in a collaborative manner? To drive the constant development of the "smart campus" construction process, it is even more important to find a deep integration of artificial intelligence and education.

Online education, as a growing trend in recent years, not only boosts students' learning passion, but also assists teachers in comprehending the situation. The education industry may greatly increase the quality of learning and provide a firm foundation for future development if it strengthens the construction of learning education space. online learning; education

With the advancement and growth of Internet technology, an increasing number of sectors have begun to incorporate Internet technology into their development plans. The impact of Internet technology, as the most important industry in society, is far higher than that of other industries. As a result, education should include modern Internet technologies in order to reform the educational system. As a prominent presentation of the contemporary artificial intelligence education model, the online learning education space has changed the single flaw of the traditional teaching model and considerably improved the quality.

V. CONCLUSION

As a result, the education industry should expand its research into the online learning education arena and strive to improve teaching quality on a continuous basis. However, when it comes to the current state of online learning and education space construction, most educational administrators are still unaware of the significance. in the context of artificial intelligence training When developing an online learning education, the developed education space model is inappropriate and does not fully match the learning classroom subject status [1]. However, when it comes to space building in various educational institutions, the majority of system designers do not take the dominant position into account. The construction of space in the form of learning has an impact on learning efficiency and is not conducive to the establishment of an efficient online learning education space. As a result of the new teaching criteria, various educational institutions should develop learner major modules based on their own circumstances.

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Bioinformatics Study of Operational Taxonomic Units of Fish Amblypharyngodon Mola

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ABSTRACT

DNA barcoding based on COI gene is the tool used in classifying animal species. The fish mola carplet Amblypharyngodon mola being a native fish has been compared in the present study with different individuals belonging to different states of India. The software for the present alignment is MEGA version 5.05. However there are negligible differences in the individual's gene sequence imply the effectiveness of COI gene in identifying species in the present study.

I. INTRODUCTION

to DNA barcoding is one of the methods of species identification in which short section of DNA from specific gene or genes is used. It is used to obtain the taxonomic information about the new unidentified organisms. It involves sequencing of a short fragment of the mitochondrial cytochrome c oxidase subunit I (1) and remains reliable method (2-3). Random genetic drift and domestication affects change in gene frequency and reduces genetic variation when fishes are placed from natural to cultured environment(4). Fishes found at low altitude show greater diversity than those at high altitudes (5). For the comparison of the same we have chosen the fish *Amblypharyngodon mola* (Mola carplet) belonging to low altitude of three different riverine systems in Maharashtra. The fish is found in Afghanistan, Pakistan, India, Bangladesh and Myanmar. It belongs to carp family cyprinidae which is also known as carp family or minnow family.

II. MATERIAL METHOD

DNA barcoding is an emerging science of species identification and can elaborate understanding of both phylogenetic signal and population level variation (6). However it is not easy to obtain 652 bases of the region (7). The COI gene sequences of fishes from Maharashtra, West Bengal and Gujarat state were obtained from

NCBI and were aligned using the software Molecular Evolutionary Genetic Analysis (MEGA) version 5.05 (8) using the Clustal W alignment method.

The accession numbers of the fishes used for the study are as follows:

No.	Name of fish	Site	Accession number
1	*Amblypharyngodon mola*	Maharashtra state	JX260818.1
2	*Amblypharyngodon mola*	Maharashtra state	KX946586.1
3	*Amblypharyngodon mola*	Maharashtra state	KX946584.1
4	*Amblypharyngodon mola*	West Bengal state	MG954367.1
5	*Amblypharyngodon mola*	Gujarat State	JX983212.1
6	*Amblypharyngodon mola*	Gujarat State	JX983211.1

III. RESULTS

The output of the sequence alignment has been exported in the results showing different point mutations. The point to be noted in the results is the presence of single point mutation in the first gene sequence at 606th base of 654 bases compared. The length of nucleotide has increased from 652 nucleotides to 654 because of frame shifting done to get rid of stop codons appearing in the table.

JX260818.1 *Amblypharyngodon mola* voucher GF679 cytochrome oxidase subunit 1 (COI) gene partial cds mitochondrial		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KX946586.1 *Amblypharyngodon mola* voucher KF194 cytochrome oxidase subunit 1 (COI) gene partial cds mitochondrial		-	-	C	C	T	T	T	A	T	C	T	C	G	T	A	T	T	T
KX946584.1 *Amblypharyngodon mola* voucher KF83 cytochrome oxidase subunit 1 (COI) gene partial cds mitochondrial		-	-	C	C	T	T	T	A	T	C	T	C	G	T	A	T	T	T
MG954367.1 *Amblypharyngodon mola* cytochrome oxidase subunit I (COI) gene partial cds mitochondrial		-	-	C	C	T	T	T	A	T	C	T	C	G	T	A	T	T	T
JX983212.1 *Amblypharyngodon mola* voucher NF770 cytochrome oxidase subunit 1 (COI) gene partial cds mitochondrial		-	-	-	C	T	T	T	A	T	C	T	T	G	T	A	T	T	T
JX983211.1 *Amblypharyngodon mola* voucher NF771 cytochrome oxidase subunit 1 (COI) gene partial cds mitochondrial		-	-	-	C	T	T	T	A	T	C	T	C	G	T	A	T	T	T
JX260818.1		-	-	-	-	-	-	-	-	-	G	C	C	G	G	A	A	T	A
KX946586.1		G	G	T	G	C	C	T	G	A	.	.	.	.	.	.	.	.	.

KX946584.1		G	G	T	G	C	C	T	G	A	.	.	.	.	.	.	.	.	.
MG954367.1		G	G	T	G	C	C	T	G	A	.	.	.	.	.	.	.	.	.
JX983212.1		G	G	T	G	C	C	T	G	A	.	.	.	.	.	.	.	.	.
JX983211.1		G	G	T	G	C	C	T	G	A	.	.	.	.	.	.	.	.	.
JX260818.1		G	T	T	G	G	A	A	C	A	G	C	C	C	T	T	A	G	T
KX946586.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
KX946584.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
MG954367.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX983212.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX983211.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX260818.1		C	T	T	C	T	T	A	T	C	C	G	T	G	C	T	G	A	G
KX946586.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
KX946584.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
MG954367.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX983212.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX983211.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX260818.1		C	T	A	A	G	C	C	A	G	C	C	T	G	G	A	T	C	A
KX946586.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
KX946584.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
MG954367.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX983212.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX983211.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX260818.1		C	T	T	C	T	G	G	G	G	G	A	T	G	A	C	C	A	A
KX946586.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
KX946584.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
MG954367.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX983212.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX983211.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX260818.1		A	T	T	T	A	T	A	A	C	G	T	A	A	T	T	G	T	A
KX946586.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
KX946584.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
MG954367.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX983212.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

JX983211.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX260818.1		A	C	T	G	C	T	C	A	C	G	C	T	T	T	C	G	T	A
KX946586.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
KX946584.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
MG954367.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX983212.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX983211.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX260818.1		A	T	A	A	T	T	T	T	C	T	T	T	A	T	A	G	T	T
KX946586.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
KX946584.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
MG954367.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX983212.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX983211.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX260818.1		A	T	G	C	C	T	A	T	G	C	T	T	A	T	C	G	G	G
KX946586.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
KX946584.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
MG954367.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX983212.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX983211.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX260818.1		G	G	G	T	T	T	G	G	A	A	A	C	T	G	A	C	T	T
KX946586.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
KX946584.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
MG954367.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX983212.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX983211.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX260818.1		G	T	A	C	C	A	C	T	A	A	T	A	A	T	T	G	G	G
KX946586.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
KX946584.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
MG954367.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX983212.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX983211.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX260818.1		G	C	A	C	C	A	G	A	C	A	T	G	G	C	A	T	T	C

KX946586.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
KX946584.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
MG954367.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX983212.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX983211.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX260818.1		C	C	A	C	G	G	A	T	A	A	A	T	A	A	C	A	T	A
KX946586.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
KX946584.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
MG954367.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX983212.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX983211.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX260818.1		A	G	C	T	T	C	T	G	A	C	T	G	C	T	A	C	C	A
KX946586.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
KX946584.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
MG954367.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX983212.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX983211.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX260818.1		C	C	A	T	C	A	T	T	C	C	T	C	C	T	T	C	T	A
KX946586.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
KX946584.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
MG954367.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX983212.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX983211.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX260818.1		C	T	A	G	C	C	T	C	C	T	C	T	G	G	T	G	T	A
KX946586.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
KX946584.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
MG954367.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX983212.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX983211.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX260818.1		G	A	A	G	C	G	G	G	G	G	C	C	G	G	A	A	C	A
KX946586.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
KX946584.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
MG954367.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

JX983212.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX983211.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX260818.1		G	G	G	T	G	A	A	C	A	G	T	C	T	A	C	C	C	C
KX946586.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
KX946584.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
MG954367.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX983212.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX983211.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX260818.1		C	C	T	C	T	A	G	C	A	G	G	C	A	A	C	C	T	T
KX946586.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
KX946584.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
MG954367.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX983212.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX983211.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX260818.1		G	C	C	C	A	C	G	C	A	G	G	A	G	C	A	T	C	A
KX946586.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
KX946584.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
MG954367.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX983212.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX983211.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX260818.1		G	T	A	G	A	C	C	T	G	A	C	A	A	T	C	T	T	T
KX946586.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
KX946584.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
MG954367.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX983212.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX983211.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX260818.1		T	C	A	C	T	T	C	A	C	T	T	A	G	C	A	G	G	T
KX946586.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
KX946584.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
MG954367.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX983212.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX983211.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

JX260818.1		G	T	C	T	C	A	T	C	T	A	T	T	T	T	A	G	G	G
KX946586.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
KX946584.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
MG954367.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX983212.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX983211.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX260818.1		G	C	T	A	T	T	A	A	T	T	T	T	A	T	C	A	C	A
KX946586.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
KX946584.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
MG954367.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX983212.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX983211.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX260818.1		A	C	A	A	T	T	A	T	T	A	A	C	A	T	G	A	A	A
KX946586.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
KX946584.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
MG954367.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX983212.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX983211.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX260818.1		C	C	A	C	C	A	G	C	C	A	C	T	A	C	T	C	A	A
KX946586.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
KX946584.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
MG954367.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX983212.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX983211.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX260818.1		T	A	T	C	A	A	A	C	T	C	C	A	T	T	G	T	T	C
KX946586.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
KX946584.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
MG954367.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX983212.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX983211.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX260818.1		G	T	G	T	G	A	T	C	T	G	T	T	C	T	A	A	T	T
KX946586.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
KX946584.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

MG954367.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX983212.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX983211.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JX260818.1		A	C	A	G	C	C	G	T	A	C	T	A	C	T	C	C	T	A
KX946586.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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JX260818.1		G	A	C	C	C	A	G	C	A	G	G	G	G	G	A	G	G	A
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JX983212.1		.	.	.	.	.	.												
JX983211.1		.	.	.	.	.	.												

Table 1: Nucleotide comparison COI gene sequence of individuals belonging to *Amblypharyngodon mola*.

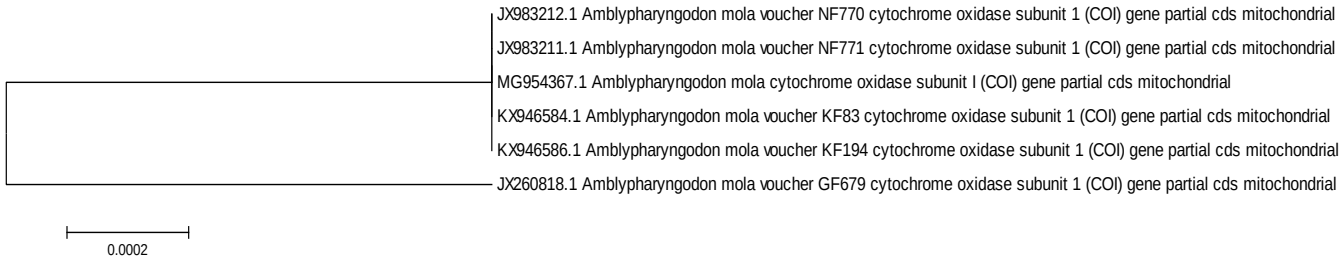

Image 1: Cladogram of individuals belonging to *Amblypharyngodon mola*.

IV. CONCLUSION

Through the present study it can be concluded that COI gene is one of the most successful tools that does not vary within single species at all and can be used as a tool for molecular taxonomy for further studies effectively. The reason behind the individual of Godavari river to stand apart is the single nucleotide change and shorter length of the COI gene.

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Ethnobotanical Report on Some Wild Edible Fruits of Beed District of Maharashtra

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ABSTRACT

Wild edible fruits consumed as food and medicine by tribes Dhangar, Phase Pardhi, Mahadeo Koli, Bhil, and local inhabitants in Beed district of Marathwada region. The study area is fragmented in small hilly and plateau forest patches of highly diversified flora. Under field investigations, about 48 wild edible fruit plant species belongs to 41 genera of 27 families were reported. About 39 edible fruits plants species are utilized as raw, 14 for vegetable purpose, 10 for medicinal use, and remaining 07 used for the preparation pickles or jams. The wild fruits are edible and enriched with high nutritional value. The purpose of this investigation is identification, documentation and recommendation of wild edible fruits used by tribes and local peoples, also needs to conserve the edible fruit yielding plant species and traditional knowledge from its decline recently.

Keywords: Ethnobotany; Wild edible fruits; Nutraceuticals; Traditional knowledge; Beed district

I. INTRODUCTION

The present research work aims at making an in-depth exploration and critical appreciation of the wild edible fruit plants. Term ethnobotany states that the use of natural resources and products in humans domestic life. Utilization of the natural resources is based on very ancient religious knowledge from Vedic periods (Deb, 2013). Rising human population affects the natural resources due to their daily need. The forest exploits numerous resources in their metabolic life cycle. The study area is varied in climatic, edaphic, and environmental factors which affect the plants distribution at varied geographic regions. The wild edible fruits are most important basic need as a food of tribes and local residents in food scarcity and daily needs. The wild edible fruits are the current need to recommend as the cultivated fruit thereby it can serves as food material for ever rising population (Valvi, 2011). They are rich source containing high minerals, fibers, vitamins, proteins, and carbohydrates which are necessary to fulfill the demand of our body (Khaple, 2012). As they are highly edible having nutritional properties contains minerals and ions such as calcium, sodium, magnesium, iron, phosphorous and potassium. The documentation of wild edible fruits plays significant role to enhance the natural food resources and its utilization with the help of religious traditional knowledge (Nandini, 2014). The

local inhabitants acquired the knowledge about wild edible plant species based on trials in the fields and knowledge of wild edible fruit plants can be used to solve food insecurity and malnutrition problems (Sivakumar, 2005; Oak, 2015). Utilization of wild edible fruits has progressively decreased due to the introduction of new cultivated fruit crop plants.

The wild edible fruits not only the food but also contributes the beneficial nutrition source to ever increasing population throughout the year and in food scarcity (Sasi, 2012). The wild edible fruits play an important role in sustainable lives of tribal communities and local inhabitants residing in forest areas (Deshpande, 2015). Rising food demand can be overcome through use of these wild edible fruits could be a solution on problem of malnutrition or nutrient deficiency in human being (Oak, 2015). The wild edible fruit resource contributes as a substitute for cultivated edible fruits. In India, about 54 million native people of different ethnic groups inhabiting various provinces and possess their own distinct traditions, food habit and a rich traditional knowledge (Shaikh et al., 2014).

II. OBJECTIVE OF THE STUDY

The main objective of the investigation is to explore wild edible fruit bearing plants used by tribes and their utilization as nutrient rich wild edible food for the better human health.

III. STUDY AREA

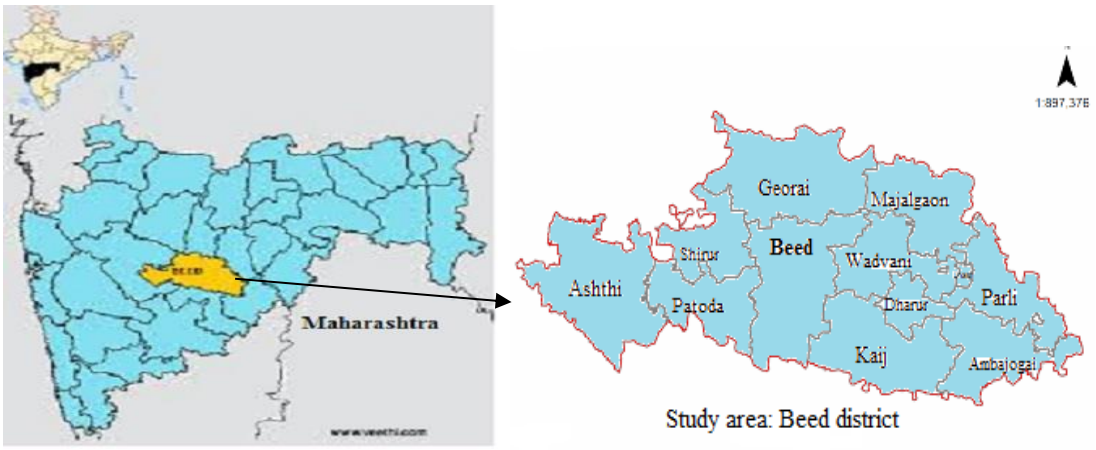

Fig 1. Study area

Beed district is a central region of Maharashtra state in India. Area falls into two parts are plain area in North is bank of Ganga-Godavari while elevated parts of the Deccan black basalt stone ranges of Balaghats (Jaju et al. 2014; Choudhari 2019). The present investigation of this study was carried out in the study area like Dharur Tahsil, Kapildhar, Godavari, Bindusara, Manjra, Sindhphana river belts, and Majalgaon dam surrounding area in Marathwada region, Maharashtra state of India (Fig. 1). The villages where the survey was done at Waghora, Talkhed, Rajegaon, Kalegaon, Gavhan, Ridhori, Dubbathadi, Hivra (B.), Rampuri, Javla, Sadola, Tadsonna, Mothewadi, Manjrath, Rakhachiwadi, Tigaon, Shimpe Takli, Golegaon, Ghalatwadi, Laul, Sautada, Vida,

Umapur, Chausala, and Sirsala etc. The study area lies between ranges from N18º98.021' to N19º28.006' latitude while E070º76.645' to E075º73.513' longitude and an altitude of plains 1200 to 1500 and elevated areas 2000 to 2200 feet above mean sea level was recorded (Salave and Reddy 2012; Mandale et al. 2019). The average annual rainfall is around 66.6 cm (Mandale et al. 2019). Total area of Beed district is 10615.3 Sq. Kms. The soil profile varied in textures as black cotton soil, red soil and some part occupy arid soil (Dhamak et al. 2014). The vegetation is classified as dry deciduous forests, in the plains or high altitudes (Mandale et al. 2019; Jeph and Khan 2019). The study area is highly diversified and also comprising rare, endemic, endangered, and threatened (RET) category species.

IV. METHODOLOGY

The present study was carried out by organizing several field tours and procures the information regarding wild edible fruits from tribal communities and local inhabitants. Field tours were arranged at each time, different season chosen to procure the plant information, identification, and collection of voucher specimens. Almost all investigated plant species were found to occur at ground vegetation and high elevation. The collection of wild edible fruits from several localities where daily consumed by tribes and local residents in their food or medicine. Plant material were collected in their flowering and fruiting period and identified by referring Flora of Maharashtra State (Singh *et al.* 2001) and by using various databases. Herbarium specimens were prepared, mounted, and deposited to Department of Botany, Sunderrao Solanke Mahavidyalaya, Majalgaon 431131, Beed, (M.S.), Maharashtra. The present study was carried out in the duration of February 2020 to March 2022. The wild edible fruit trials were investigated from tribes and local residents. Edible fruits are consumed by tribes and local residents as ripe, raw, vegetables and pickles.

4.1. Tribes and local inhabitants

The tribes belief on ancient religious knowledge and use of natural resources in their daily needs. They entirely depend on the available natural resources. The wild edible fruits are used by tribals and local peoples in their day to day life. Tribes and local citizens where resident at several villages and forest patches in the study area. Tribes provided the information about folk medicine as per our traditional knowledge which play essential role in the conservation of natural resources.

4.2. Statistical analysis

The investigated data was statistically analyzed using MS Excel program for calculating ethnobotanical utilization of plants in graphical representation (Fig. 2).

V. RESULTS AND DISCUSSION

Results revealed that, the use of traditional knowledge of wild edible fruits by *Dhangars*, *Phase Pardhi* and local people in their daily food. The total number of 48 wild edible fruit plants species belongs 41 genera and 27

families have been recorded during investigation. Under investigation 4 plants each from Papilionaceae, Cucurbitaceae and Solanaceae, 3 from Boraginaceae, Euphorbiaceae, Mimosaceae and Moraceae, 2 from Annonaceae, Anacardiaceae, Caesalpinaceae, Combretaceae, Rutaceae, Sterculiaceae and Tiliaceae, and remaining each species belongs to rest of families (Table 1).

Majority of the ripe fruits are eaten as raw. Pulp or fleshy pericarp and mesocarp of the ripe berries or drupes of *Balanites aegyptiaca, Ziziphus jujuba, Madhuca indica, Mangifera indica, Limonia acidissima, Capparis zeylanica, Cordia gharaf, Cordia dichotoma, Phoenix sylvestre, Tamarindus indica, Azadirachta indica, Annona reticulata, Annona squamosa, Aegle marmelos, Securinega leucopyrus,* and *Syzigium cumini* are usually consumed. The unripe fruits used as vegetable and pickles are of *Canvalia gladiata, Cordia dichotoma, Cordia gharaf, Cucurbita maxima, Ficus racemosa, Limonia acidissima, Luffa acutangula, Solanum torvum, Tribulus terrestris, Trichosanthes dioica* etc. (Table 1). Traditional knowledge on wild edible fruits is now frequently restricted to aged persons, as the new generations have modified to intense and refining the new high yielding varieties. Wild fruits are not only rich in nutrients but also have certain curative properties against various diseases. Recent times, traditions of several tribal communities are gradually decline, so there is urgent need to investigate the traditional knowledge for mankind (Rasingam, 2012; Kamatchi and Parvathi, 2020).

The purpose of this study is documentation, identification, and recommendation of wild edible fruits used by tribes and local inhabitants in the study area. Wild edible fruits are easily accessible and cost effective natural resources to enhance the dietary habit and nutritional values for the healthy growth and indirectly curing related diseases and disorders.

Table 1 Study of wild edible fruits, and their mode of administration

Wild edible plants	Family	Common Name	Flowering and Fruiting	Mode of administration (utilization)
Acacia nilotica (L.) Willd. ex. Del	Mimosaceae	Babhul	Sept-Feb	Mature ripe legumes are used to treat toothache and also eaten as raw.
Aegle marmelos (L.) Corr.	Rutaceae	Bel	Apr- Sept	Aromatic pulp of fruits is eaten with sugar for stomach disorder.
Annona reticulata L.	Annonaceae	Ramphal	Feb-April	Ripe fruits are eaten as a raw.
Annona squamosa L.	Annonaceae	Sitaphal	May-Aug	Ripe fruits eaten as a raw.
Argyreia nervosa (L.f.) Sweet.	Convolvulaceae	Samudrashok	Sept-Mar	Pulp of ripe fruits is eaten as a raw.
Artocarpus heterophyllus Lam.	Moraceae	Phanas	Jan-May	Ripe fruits eaten as a raw and also used as pickles, jams and chips.
Azadirachta indica A. Juss	Meliaceae	Kadu-nimb	Feb-June	Fully ripe fruits are edible.

Balanites aegyptiaca (L.) Del.	Balanitaceae	Hingan	Nov-Apr	Ripe fruits pulp eaten as raw and also used to treat the stomach problems, fever, and jaundice.
Bauhinia racemosa Lam.	Caesalpinaceae	Kanchan	Mar-Aug	Young legumes are used as a vegetable.
Cajanus lineatus (Wight & Arn.)	Papilionaceae	Ran-Tur	Aug-Jan	Mature legumes are eaten as a raw.
Canvalia gladiata (Jacq.) DC.	Papilionaceae	Patad sheng	Oct-Mar	Young legumes are used as a vegetable.
Capparis zeylanica L.	Capparidaceae	Waghati	Dec-May	Mature unripe fruits are used as vegetable and ripe pulpy berries are eaten as a raw.
Cassia fistula L.	Caesalpinaceae	Bahava	Mar-Oct	Juvenile fruits (Legumes) are used as vegetable and pulp of mature fruits is eaten as a raw.
Cordia dichotoma L.	Boraginaceae	Bhokar	Mar - Aug	Mature fruits are used as pickle and ripe fruits are eaten as a raw.
Cordia gharaf Ehrenb. ex Asch.	Boraginaceae	Chhota Bhokar	July-Oct	Ripe fruits are eaten as a raw.
Cucurbita maxima Duch.	Cucurbitaceae	Kashiphal	June-Sept	Mature fruits are eaten as vegetable, fruit is very holistic.
Diospyros peregrina Roxb.	Ebenaceae	Tendu	Mar-May	Ripe fruits are eaten as a raw.
Ehretia laevis Roxb.	Boraginaceae	Ajaanvruksha, Datrang	Mar-July	Ripe fruits are eaten as a raw.
Emblica officinalis Gaertn.	Euphorbiaceae	Avla	Sept-Mar	Mature fruits are eaten as a raw and also used as Pickles and Murabba.
Ficus hispida L.f.	Moraceae	Genda Umbar	Jan-July	Unripe fruits are used in curries.
Ficus racemosa L.	Moraceae	Umbar	Jan-June	Mature unripe fruits are used as vegetable and ripe fruits are eaten as a raw.
Grewia hirsuta Vahl	Tiliaceae	Makadmeva	Sep-Jan	Ripe fruits are eaten as a raw.
Grewia tiliifolia Vahl	Tiliaceae	Dhaman	May-Aug	Ripe fruits are eaten as a raw.
Helicteres isora L.	Sterculiaceae	Murud sheng	Dec-May	Pulp of mature fruits are used in childs.

Leucaena leucocephala L.	Mimosaceae	Subabhul, Shevri	Nov-Apr	Legumes are used as a vegetable.
Limonia acidissima L.	Rutaceae	Kavath	Mar-Sep	Pulp of ripe and unripe fruit eaten as raw or vegetable, also eaten with sugar or salt.
Luffa acutangula (L.) Roxb.	Cucurbitaceae	Jangli Dodka	Aug-Dec	Fruits are used as vegetable and also used in Pakoda.
Madhuca indica Gmel. Syst.	Sapotaceae	Moha	Nov-Mar	Ripe fruits are eaten as a raw and on cook.
Mangifera indica L.	Anacardiaceae	Amba	Jan – July	Fruits are eaten as a raw or by preparing Juice, Jams and Pickles.
Mukia maderaspatana (L.) Roem	Cucurbitaceae	Kamuni	Sep-Dec	Mature unripe fruits are eaten as a raw.
Opuntia elatior Mill.	Cactaceae	Nivdung	Jan-Dec	Ripe fruits are eaten as a raw.
Passiflora foetida L.	Passifloraceae	Krishna Kamal	July-Dec	Ripe berries are eaten as a raw.
Phoenix sylvestre (L.) Roxb.	Arecaceae	Sindhi	Feb- May	Ripe fruits are eaten as a raw also used as jams and jellies.
Physalis minima L.	Solanaceae	Ran Popati	Oct-Mar	Fruits are eaten as a vegetable.
Pithecellobium dulce (Roxb.) Benth.	Mimosaceae	Vilayti Chinch	Jan-June	Mature or ripe fruits are eaten as a raw.
Securinega leucopyrus (Willd.) Mull. Arg.	Euphorbiaceae	Pulan	Feb-Sept	Ripe fruits are eaten as a raw.
Semecarpus anacardium L.f.	Anacardiaceae	Bibba	Nov-Apr	Ripe or dry fruits are eaten as raw and also used as oil source and holistic.
Solanum anguivi Lam.	Solanaceae	Mothi Ringni	Aug-Dec	Ripe fruits are eaten as raw and also unripe fruits are eaten as a vegetable.
Solanum nigrum L.	Solanaceae	Kanguni	Aug-Jan	Ripe fruits are eaten as a raw.
Solanum torvum Sw.	Solanaceae	Marang	Jan-Apr	Fruits are eaten as raw or on cooked.
Syzigium cumini (L.) Skeels	Myrtaceae	Jambhul	April-July	Ripe fruits are eaten as a raw.
Tamarindus indica L.	Papilionaceae	Chinch	Nov-May	Ripe and unripe fruits are eaten as a raw.

Terminalia bellirica (Gaertn.) Roxb.	Combretaceae	Behda	Feb-June	Mature fruits are used to making churna.
Terminalia chebula Retz.	Combretaceae	Hirda	Feb-May	Used as making pickles and jams, churna.
Tribulus terrestris L.	Zygophyllaceae	Sarrata	Aug-Oct	Juvenile and mature fruits are eaten as raw or as a vegetable.
Trichosanthes dioica Roxb.	Cucurbitaceae	Padval	Aug-Sep	Fruits are eaten as raw and as vegetable on cooked.
Vigna spp.	Papilionaceae	Mugi	Aug-Oct	Juvenile and mature legumes are eaten as a raw or vegetable.
Ziziphus jujuba (L.) Gaertn.	Rhamnaceae	Bor	Oct-Jan	Ripe fruits are eaten as a raw.

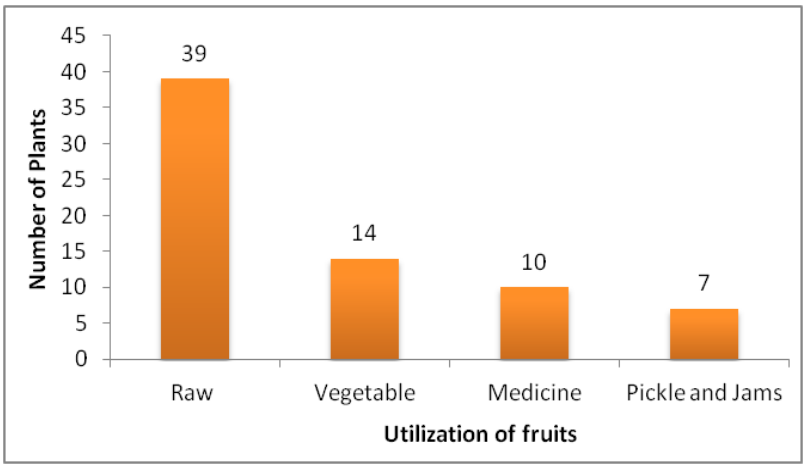

Fig. 2 Ethnobotanical utilization of wild edible fruits

VI. CONCLUSION

The use of wild edible fruits provides seasonal foods and alternative to the agriculturally cultivated crops. Wild edible fruits are not only for food and nutrition, but it could be an income source when on sustenance and recommend commercially. The administration of wild edible fruits by tribes and local inhabitants in their daily food or medicine, but there is need to further study to analyze the quantity and quality of nutrition status and how the edible fruits used to maintain supplement of our body and in the recovery of some nutrient deficiency-caused diseases. Therefore, there is need to create awareness in the local inhabitants about the plants conservation for future prospects.

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Physico-Chemical Parameters as Tool of Water Pollution Assessment with Reference to Aquatic Ecosystem

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ABSTRACT

Ecologists have long been fascinated by the aquatic ecosystem. Many researches, water supply organizations, and pollution control authorities study stagnant and rushing waterways on a regular basis for a variety of reasons. The aquatic ecosystem is a great place to learn about different ecological roles. The study of these systems is not only fascinating, but also vital to human well-being and survival. Dissolved oxygen, Carbon dioxide, pH, temperature, Nitrogen, Phosphorus and Nutrients are some of physico-chemical properties which we are acquainted with. Toxicants like pesticides, herbicides, and metals are also measured with this. Physico-chemical analysis reveals what is affecting the ecosystem. Although physico-chemical analysis can pinpoint the source of the problem, they only provide a limited picture of how contaminants are affecting organisms and plants. Contaminants are lastly being absorbed by aquatic ecosystems. Anthropogenic activities such as urbanization, industrialization, and agricultural operations contribute to water pollution. Pesticides and fertilizers used excessively, as well as waste from residential and industrial sectors, end up in the aquatic environment. Contamination of aquatic environments is one of the most common kinds of pollution, and it has serious health and death consequences. Water has a natural ability to neutralize pollution, but when contamination becomes uncontrollable, water loses its ability to self-generate. As a result, pollution discharge into neighbouring aquatic environments must be monitored and controlled on a regular basis.

Keywords: Physicochemical parameter, Water pollution, Assessment, Aquatic ecosystem

I. INTRODUCTION

1.1. Background:

Water is everywhere on earth in the various forms, without water life can't exist over earth, in other words it is elixir of life. All form of life specifically the organism which acquire aquatic mode of life need a water of specific contents. The lentic or lotic form of aquatic ecosystem resources provides the good benefits of its vital nature of water to all the life forms. Water also used for various purposes viz. irrigation to agriculture and as

potable for domestic purposes. Before water is used for drinking, residential, agricultural, or industrial purposes, it must be tested for physicochemical properties. A variety of physicochemical properties must be assessed on water. The properties assessed are solely determined by the intended use of the water and the degree to which its quality and purity are required.

Figure 1: Main sources of water pollution [13]

The physicochemical properties are significant for obtaining an accurate picture of the water quality, and the findings are then compared to standard values. It is critical to conduct water quality tests in order to safeguard the natural ecology.

1.2. Conceptual issues:

Aquatic ecosystems, such as lakes, rivers, and coasts, are national treasures for any country, and constant attempts are made to exploit them for the benefit of its citizens. Water bodies have high primary productivity and a diverse biodiversity, which contribute to their ecological worth. They act as carbon sinks, allowing global climate change to be tempered. It provides water, recharges groundwater, regulates the biogeochemical cycle, and supports a diverse range of species, among other things (Kodarkar, 2008)[1]. During the International Decade for Action 'Water for Life': 2005-2015, freshwater biodiversity is the top conservation priority. Fresh water accounts up only 0.01 percent of the world's water and around 0.8 percent of the Earth's surface, but it sustains at least 1000000 species out of 1.8 million, or about 6 % of all documented species. Because of the wide variety of aquatic habitats, freshwater ecology is an enthralling study. The genesis, geographical position, hydro-biological regimes, and substrate characteristics all play a role in the diversity of freshwater habitat. Ponds and lakes are more productive ecosystems, and wetland experts all around the world recognize their value as life-sustaining systems for controlling water cycles and cleansing the environment. The faunal composition of the lake was generally diverse, and it was active and responsive to deviations from normal ecological balance. Unfortunately, they are degrading and becoming contaminated as a result of inflows of home effluents, washing clothing, automobiles, animals, and immersion of idols, among other things, resulting in harmful chemicals and sludge accumulation, leading to ecological imbalance. The physicochemical environment has a significant impact on the biotic components of an aquatic ecosystem. In time and space, it regulates the variety, biomass, and spatial dispersion of biotic communities. Individually and collectively,

physical and chemical factors exert impact, and their interplay creates a biotic environment that ultimately influences the creation, development, and succession of biotic communities (Salaskar and Yeragi, 1997)[2]. As a result, the entire ecosystem is always in a state of flux and equilibrium. All of the physicochemical parameters in a well established and balanced ecosystem are in optimum ranges, allowing for maximal biota variety. However, due to the system's open nature, matter and energy continue to flow. Because different species of flora and fauna respond differently to changes in water quality, any change in the physicochemical environment has an impact on the biotic community. As a result, very sensitive species are wiped out entirely, leaving only more robust and tolerant species to dominate the medium.

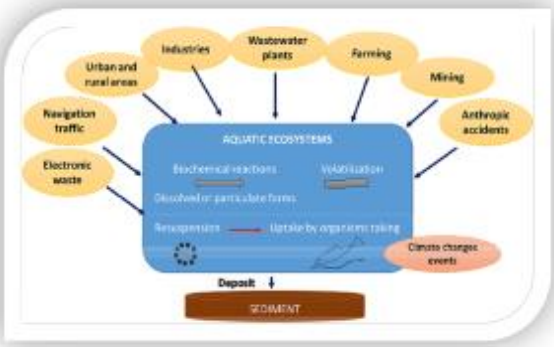

Figure 2: Sources of pollution of aquatic ecosystems [14]

It is widely accepted that a single element never operates as a limiting factor on its own, but rather through interactions with others. Knowledge of physicochemical parameters as well as biological traits can provide a comprehensive picture of a water body's tropic condition. The biological characteristic of aquatic creatures provides the best indications of overall health and environmental state. Human actions that modify a watershed and interfere with natural water body processes have immediate and long-term consequences for the creatures that dwell there. Physicochemical analysis was the exclusive method of environmental assessment until recently. When chemical and biological environmental analysis methods are compared, the latter has distinct advantages over the former because it is more sensitive and organisms are better indicators than chemical factors. The composition, quantity, productivity, and physiological state of aquatic ecosystems are all influenced by the water quality. Water quality can be determined by the structure and makeup of these communities. Bio-monitoring refers to all strategies that use living organisms to collect data on abiotic and biotic environmental components. It's a useful assessment technique that's seeing more use in water quality monitoring programmes of all types. Aquatic ecosystems have been altered at many sizes in recent decades as a result of anthropogenic activity, and this has been recorded as a negative outcome.

II. ESSENTIALS OF PHYSICOCHEMICAL ANALYSIS OF WATER

Organic and inorganic dissolved solids are found in the water bodies. Carbonates, chlorides, sulphate, nitrate, and other anions make up inorganic solids. Within a freshwater body, the concentrations of cations such as

Magnesium, Sodium, and Potassium, as well as anions such as Chloride, fluctuate slightly. The ionic composition of water is a key factor in the metabolism of numerous aquatic creatures and serves as a productivity indicator. Microbial metabolism affects calcium, inorganic carbon, and sulphate concentrations. Calcium, Magnesium, Chloride, and Sulphate have been found to have a direct link. The presence of Calcium and Magnesium bicarbonates causes temporary hardness. Eutrophic water has a high calcium level. Munawar (1970)[3] discovered that blue green algae thrive in calcium-rich water. Bacillariophyceae thrive in this calcium-deficient environment. Chloride in water is not hazardous, although it has a unique flavor when it exceeds 250 mg/liter. Dissolution of salt deposits, effluents from chemical enterprises, sewage discharge, irrigation drainage, and other sources of chlorides are the most common. Using limnological knowledge, man was able to manipulate and use water to his advantage. The identification of extremely fruitful zones in reservoirs has been aided by environmental parameter indicators of aquatic production. Temperature, pH, Turbidity, Total Dissolved Solids (TDS), Dissolved Oxygen (DO), CO_2, Alkalinity, Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Oxygen Demand (OD), and Salinity are just a few of the physico-chemical characteristics that can be used. Phytoplankton, zooplankton, benthic hydrophytes, and fish fauna production are all directly or indirectly interrelated.

Parameter	Standard
DO	6 mg/L
pH	6.5-8.5
Color	15 ptcu
Turbidity	10 NTU
BOD	0.2 mg/L
Hardness	200-500 mg/L
TDS	1000 mg/L
Cl^-	0.2 mg/L
CO_2	-
COD	4 mg/L

Figure 3: Limiting Values of Different Water Quality Parameters [15]

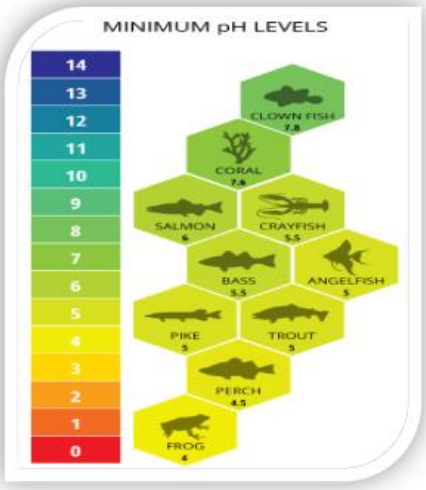

Figure 4: Recommended pH levels for aquatic life [16]

2.1. pH:

The pH level of water indicates how acidic or basic it is. The scale runs from 0 to 14, with 7 serving as a neutral value. Acidity is indicated by pH values less than 7, while base is indicated by pH values greater than 7. The pH of water is really a measure of the relative number of free hydrogen and hydroxyl ions present. Acidic water has more free hydrogen ions, whereas basic water contains more free hydroxyl ions. pH is an essential indication of water that is changing chemically because it may be influenced by substances in the water. The aquatic species that live in it will perish if the pH of the water is too high or too low. The solubility and toxicity of chemicals and heavy metals in water are also affected by pH. When pH levels go outside of this range (up or down), animal systems are stressed, and hatching and survival rates are reduced. Changes in pH have a greater impact on species that are more sensitive. Excessive pH levels enhance the solubility of elements and compounds, making harmful substances more "mobile" and raising the danger of absorption by aquatic life. Although most aquatic species require a pH range of 6.5 to 9.0, some can survive in water with pH levels outside of this range. When it comes to evaluating how corrosive water is, pH is the most essential factor. The corrosive tendency of water increases when the pH value drops. Electrical conductivity and total alkalinity were positively associated with pH (Gupta 2009)[4]. The lower rate of photosynthetic activity, absorption of carbon dioxide and bicarbonates, which is ultimately responsible for an increase in pH, and the low oxygen values, coincided with high temperatures throughout the summer months. The pH of water fluctuates due to a variety of variables. Higher pH values indicate that changes in physicochemical conditions have a greater impact on carbon dioxide, carbonate-bicarbonate equilibrium (Karanth 1987)[11]. High photosynthetic activity lowers aquatic bicarbonates. Carbonates rise as a result of this. Many researchers believe that an excessive amount of carbonate precipitated, resulting in a high pH. This property is crucial for supplying nourishment, a favourable environment, and optimal metabolism for fish growth (Wetzal, 1975)[5].

2.2. Temperature:

Biological activity and growth are heavily influenced by temperature. The type of creatures that may exist in rivers and lakes is determined by the temperature. Temperature preferences vary among fish, insects, zooplankton, phytoplankton, and other aquatic organisms. The number of individuals in the species declines as temperatures rise or fall too much above or below their optimum range, until there are none left. The temperature of the water plays a vital effect in the aquatic biota. It has a significant impact on the ecology as well as fundamental stratification in zonation (Odum, 1971)[12]. Temperature affects the growth of microorganisms such as bacteria, algae, protozoans, and plankton. The population of the biological diversity is affected by a minor fluctuation in a statistically significant way.

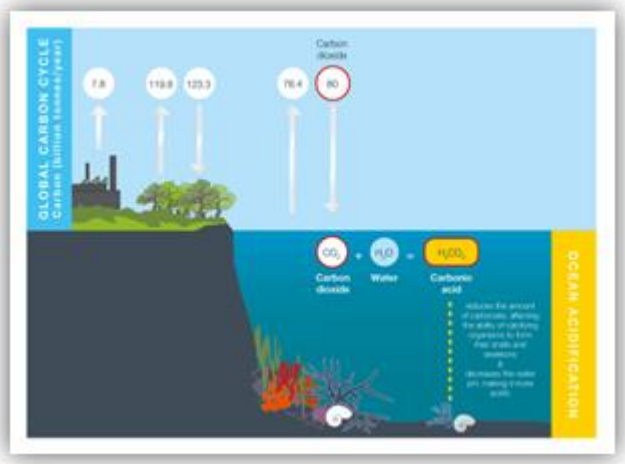

Figure 5: CO2 and acidification of water body [17]

2.3. CO2:

Carbon dioxide is an important ecological component and one of the photosynthesis reaction's critical gradients. They are produced by biota respiration and organic matter breakdown. A small amount of CO_2 is dissolved in water and the atmosphere, with concentrations ranging between 0.42 mgL^{-1} to 30°C and 0°C, respectively. Generally known concept of total CO_2 are mostly owing to carbonate and bicarbonate contained in water. It's reasonable to believe that there existed a balance between CO_2 intake in photosynthesis and CO_2 liberation during respiration. Low autotrophic consumption, decreased release during organic matter decomposition, or increased dissolved O_2 could be the culprits, according to Wetzel (1975)[5], Bagde and Verma (1985)[6], and Takamura et al. (1989)[7]. The absence of free CO_2 in water is due to either total absorption by autotrophs or reactivity to bicarbonate.

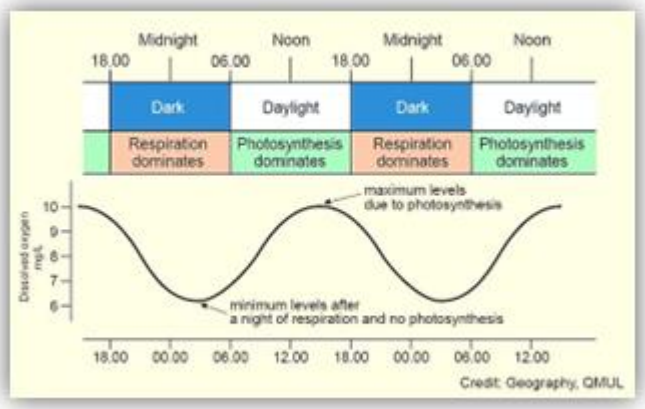

Figure 6: Variation of DO during day and night [18]

2.4. Dissolved Oxygen:

The amount of dissolved oxygen in an aquatic habitat is important as a regulator of metabolic activities in communities and as an indicator of water quality. The level of dissolved oxygen determines physical, chemical, and biological activity in water; any change in dissolved oxygen in a fresh water body can be regarded an essential physicochemical parameter. The principal source of dissolved oxygen is the action and temperature of runoff water. In water, oxygen is thought to be weakly soluble. Its solubility is affected by temperature and pressure. Water should contain at least 4 mgL^{-1} of DO for live organisms. The oxygen-depleting chemicals lower the amount of DO that is accessible. The rate of biological oxidation is greatly boosted during the summer months. Due of the greater temperature, the DO content is at its lowest. In a 24-hour period, the amount of dissolved oxygen can change substantially. Photosynthesis produces more DO during the day. DO levels will drop during the night when oxygen is taken from water by respiration, the process by which plants and animals consume oxygen and produce carbon dioxide as they convert organic matter to energy. DO levels are often highest around sunset and lowest soon before dawn as a result. Temperature and DO have a significant correlation: the warmer the water is, the less oxygen it can carry. Fish's metabolism speeds up in warm water, which increases their oxygen demand. As they degrade organic substances, bacteria also absorb oxygen. Because of higher oxygen needs from fish, warmer water that contains less oxygen and greater bacterial breakdown of dead plant and algal debris near the end of the growing season, DO levels will be lower throughout the summer months.

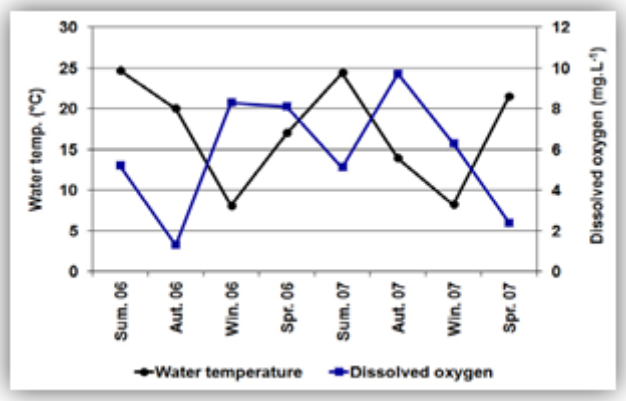

Figure 7: Variation of DO with temperature [19]

2.5. BOD:

It is a measurement of organic material pollution in water expressed in mgL^{-1}. The amount of dissolved oxygen necessary for the biological decomposition of organic molecules as well as the oxidation of certain inorganic elements is referred to as BOD (e.g., iron, sulfites). The BOD test is usually done over a five-day period. The amount of oxygen required for bacteria to eat organic matter in water is measured in BOD. Organic material thrown into natural waters promotes the rapid growth of microbes, depleting the oxygen available to other aquatic life. The oxygen depletion of a diluted aqueous sample treated with microorganisms is measured in the laboratory to estimate BOD.

Figure 8: BOD as water quality indicator [20]

Water type	Expected COD
Rivers	5 – 50 mg L^{-1}
Treated effluent and polluted rivers	25 – 250 mg L^{-1}
Primary/secondary effluent	250 – 750 mg L^{-1}
Raw municipal sewage	500 – 1200 mg L^{-1}
Contaminated industrial effluent	1000 – 50000 mg L^{-1}

Figure 9: Typical COD level found in natural water [21]

2.6. COD:

COD is a measurement of organic material pollution in water expressed in mgL^{-1}. The amount of dissolved oxygen required to cause chemical oxidation of organic matter in water is referred to as COD. Both BOD and COD are important markers of a surface water supply's environmental health. This parameter is routinely employed in waste water treatment, but only used in general water treatment on rare occasions. The amount of oxygen consumed during the oxidation of oxidizable organic matter in the presence of a strong oxidizing agent is measured by COD. It is commonly used to assess the amount of organic compounds in aquatic systems in an indirect manner. High COD shows the presence of all types of organic matter, both biodegradable and non-biodegradable, as well as the level of pollution in the water. As a result, COD can be used to detect organic pollution in surface waters .

2.7. Alkalinity:

The ability of water to neutralize acid is referred to as alkalinity. This is a measurement of buffering capacity. A buffer is a solution to which an acid can be introduced without significantly affecting the concentration of accessible H^+ ions (pH). It works by absorbing excess H^+ ions and protecting the water body from pH changes.

Fish and aquatic life benefit from alkalinity because it shields or buffers them from fast pH shifts. A pH range of 6.0 to 9.0 is ideal for living organisms, especially aquatic life. Alkalinity refers to how much acid may be given to a liquid without creating a significant pH shift. Acid rain and other acid pollutants will be buffered by higher alkalinity levels in surface waters, which will prevent pH shifts that are hazardous to aquatic life.

Alkalinity Parts Per Million (or mg/L)	**Effect(s)**
30 - 400 ppm	Reasonable range for alkalinity domestic drinking water
150 - 200 ppm	Perhaps the ideal range for drin water alkalinity
<150 ppm	May be corrosive to pipes if the underlying water has a low pH
>200 ppm	Potential for scale formation on and fixtures (clogging risk)

Figure 10: Various effects of alkalinity of water [22]

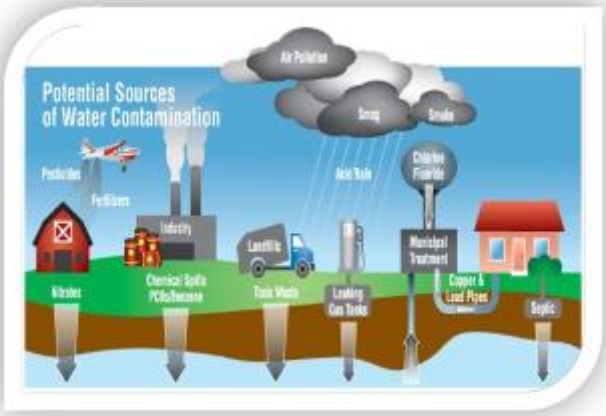

Figure 11: Potential sources of water contamination [23]

III. SOURCES OF CONTAMINATION AND POLLUTION

Contamination is defined by Chapman (2007)[8] as the presence of a material where it should not be or at concentrations above normal levels, whereas pollution is defined as contamination that can have harmful biological consequences on humans, plants, and animals that rely on this water for survival. Not all contaminants are pollutants, but not all pollutants are contaminants. In India, surface water is extremely polluted. Because of inadequate sewage disposal systems, the majority of untreated sewage is discharged into rivers and lakes, which act as microbiological reservoirs. Waterborne infections are prevalent in the nation due to a lack of access to potable water and toilets, as well as open defecation and inadequate washing practices.

The unregulated discharge of industrial and pharmaceutical wastes into surface water sources has resulted in unsafe levels of organic and inorganic pollutants in India's surface water bodies, rendering it unsuitable for human use. The quality of water in various rivers varies depending on where they are found. The foregoing variances are caused by environmental variables such local atmospheric conditions, local vegetation, kinds of soil and rocks in the riverbed, river distance from the sea, and so on. However, industrial wastes, agricultural regions, and home wastes are the sources of the pollutants at first. Industries send toxic chemical pollutants into rivers such as zinc, mercury, cyanide, lead, and copper, which are extremely detrimental to aquatic species and may kill them. Furthermore, if the concentration of these compounds becomes too high and they remain in the water for an extended period of time, they may affect not only aquatic ecosystems but also people and terrestrial animals by entering, accumulating, and cycling in the food chain. In addition, factories dump heated, contaminated water into rivers, raising the temperature of the water, lowering the quantity of dissolved oxygen, and causing an imbalance in aquatic life. Chemical fertilizers and pesticides are utilized excessively in farming nowadays to boost agricultural productivity. These pollutants wash into the rivers during irrigation and rainy seasons, resulting in high levels of PO_4^{-3} and NO_3^- in the water. Eutrophication, which turns water green, occurs as a result of these circumstances. These overabundant algae die and are destroyed by bacterial activity, which multiplies and consumes dissolved oxygen at a faster rate, resulting in a primary cause of mortality in aquatic life. Apart from that, residents who live near water sources often dump their debris there.

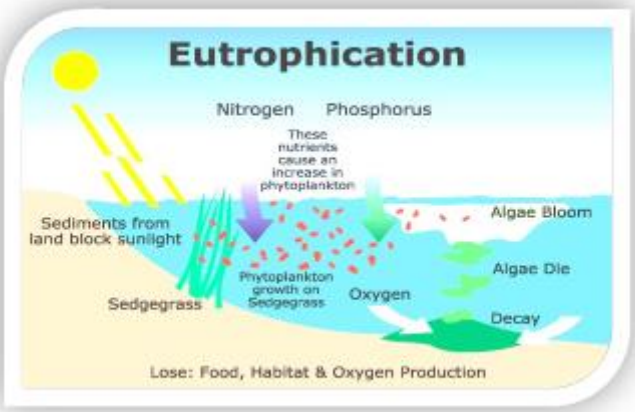

Figure 12: Nitrogen and phosphorus as a cause for eutrophication [24]

IV. WATER POLLUTION IS BECOMING A GREATER THREAT TO FLORA AND FAUNA

Freshwater biodiversity provides essential ecological services such as food, construction materials, and flood and erosion avoidance, as well as contributing to economic output and serving as a genetic repository. Aquatic ecosystems are badly harmed by pollution. For industrial and domestic trash, rivers and lakes are frequently used as open sewers. Pesticides, herbicides, oil products, heavy metals such as mercury, lead, and zinc, detergents, and industrial wastes may all harm aquatic life by altering the environment, making it exceedingly difficult for tiny and big aquatic animals to live. Toxic wastes spread across a large region in aquatic ecosystems.

Many aquatic settings are inherently poor in important minerals like nitrates and phosphates, and aquatic animals have evolved the capacity to filter huge amounts of water and concentrate these minerals to cope with the shortage. When these animals handle contaminated water, they concentrate hazardous compounds with important minerals, putting aquatic organism at risk of poisoning. Other organisms in the food chain that eat these aquatic species consume the poisonous compounds in high doses. Excessive levels of heavy metals heavy metals from industrial operations, can harm aquatic organisms. Increased biological oxygen demand, chemical oxygen demand, total dissolved solids, total suspended solids, and faecal coli form are all caused by high amounts of pollutants, mostly organic materials, in river water (Kulkarni 1997)[9]. They render water unfit for human consumption, irrigation, or any other use (Hari 1994)[10].

V. CONCLUSION

Water has a natural ability to neutralise pollution, but it loses this ability when pollution becomes uncontrollable. As a result, pollution discharge into adjacent aquatic environments must be regularly monitored and controlled. Physicochemical parameters such as dissolved oxygen, carbon dioxide, pH, temperature, nitrogen, phosphorus, and nutrients are used to measure toxicants such as pesticides, herbicides, and metals in surface and ground water. The effects of the ecosystem can be revealed by physicochemical analysis. While physicochemical analysis can identify the source of the problem, it only gives a partial picture of how contaminants affect aquatic organisms.

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Foliar Micromorphology of the Genus Cyathocline Cass. (Asteraceae) Species : A Scanning Electron Microscopy Screening

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ABSTRACT

The genus Cyathocline Cass. represents three species belonging to the highly advanced, largest dicotyledonous family Asteraceae (alt. nom. Compositae). Two species namely Cyathocline purpurea (Buch.-Ham. ex D. Don) Kuntze and Cyathocline lutea Law ex Wight are screened for scanning electron microscopy (SEM). SEM foliar micromorphological data revealed that both species show the presence of glandular and non-glandular trichomes.

Keywords: Cyathocline, foliar, SEM, trichomes, micromorphology

I. INTRODUCTION

The genus Cyathocline Cass. represents three species and is mainly distributed in the Western Ghats and Eastern Ghats of India belongs to the highly advanced, largest dicotyledonous family Asteraceae (alt. nom. Compositae). *Cyathocline purpurea* (Buch.-Ham. ex D.Don) Kuntze is common in distribution but *Cyathocline lutea* Law ex and *Cyathocline manilaliana* CP Raju & RRV Raju are restricted to India only [1]. Out of these three species two species are screened for scanning electron microscopy (SEM). It has been observed that the micromorphology of the foliar surface is a very useful tool in the characterization of the genus *Cyathocline* Cass. for a systematic point of view. Epidermal outgrowths have a significant role in the growth and development of plants. It was stated that trichomes possess taxonomic value, that both glandular & non-glandular hairs are present in the Compositae, and that the non-glandular hairs are of various morphological types, whereas the glandular hairs are more or less homogeneous with a uniform structure [2]. One pioneer anatomical worker, Solereder has stated that trichomes are very much important in a systematic investigation of Angiosperms which is used for determining many generic circumscriptions in the Compositae [3]. Anatomically, a trichome or hair is an epidermal outgrowth of diverse forms, structures, and functions [4]. Amphianomocytic type of stomata was reported in several genera of the family Asteraceae and it was concluded that stomatal characters are an important tool in the taxonomic study of plants [2-4]. It was shown that the

ultrastructural study of plant surfaces using electron microscopic data (SEM) has a significant role in solving taxonomical problems [5]. Several species belonging to many genera of the family Asteraceae have been screened for scanning electron microscopy technique showing the variety of trichomes diversity that have significant taxonomic value [6-9]. The objective of this study is to (a) characterize detailed *Cyathocline* Cass. foliar micromorphological peculiarities and (b) to describe the taxonomic significance of foliar micromorphological data using scanning electron microscopy (SEM).

II. MATERIALS AND METHODS

Plant Material Collection

The plant material was collected from the Durgawadi Plateaus of Junnar Tahsil (Pune District) at 800 to 1200 meters altitude (Maharashtra state) during the flowering season. The voucher specimen was submitted to Shrimant Pratap Shethaji Herbarium, Department of Botany, K.E.S. Pratap College, Amalner for identification purposes.

Scanning Electron Microscopy (SEM)

For SEM analysis, leaf samples (foliar samples) were prepared using a simple air-drying method [10]. Prepared leaf samples were coated with gold particles (05-10 nm) using Emitech Sputter Coater. Then all the foliar surface micromorphological characterization of the prepared sample was done using Zeiss MA15 LaB6 Based Scanning Electron Microscope at High Vacuum Mode.

III. RESULTS AND DISCUSSION

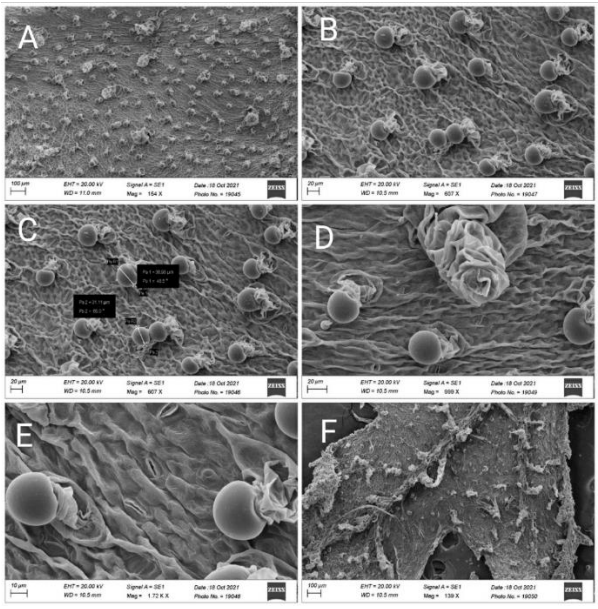

Figure 1 (A-F): Scanning Electron Microscopic images of *Cyathocline purpurea* (Buch.-Ham. ex D.Don) Kuntze foliar sample

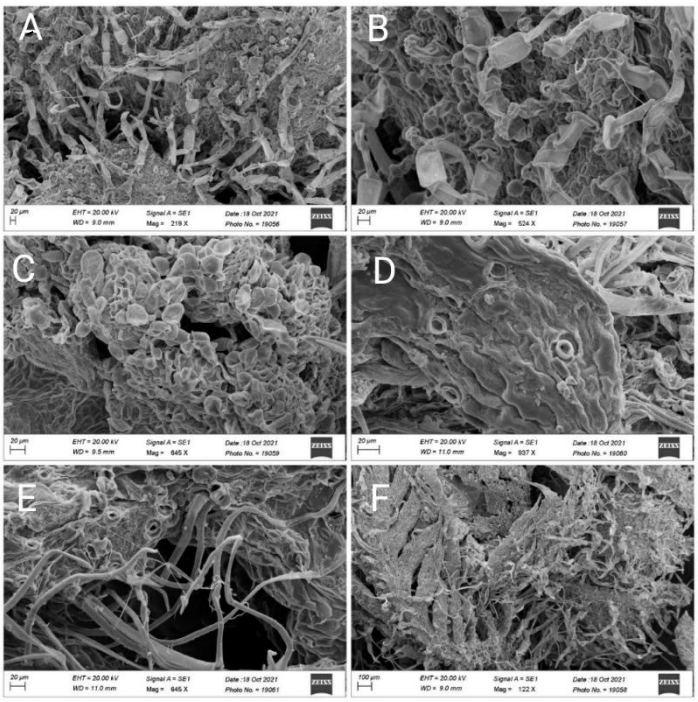

Figure 2 (A-F): Scanning Electron Microscopic images of *Cyathocline lutea* Law ex Wight foliar sample

Based on the micromorphological data obtained from the SEM study shows the following characteristics.

***Cyathocline purpurea* (Buch.-Ham. ex D.Don) Kuntze:**

The epidermal cuticular membrane has a smooth ornamentation layer (Fig. 1 A-F). The examined species is amphianomocytic (Fig. 1 A-F). The length of stomata ranges from 15 to 30 µm and the width range from 10 to 20 µm (Fig. 1E). Both glandular and non-glandular trichomes were observed on the surface of the leaf but some trichomes are deciduous in nature, mostly non-glandular ones (Fig. 1F). The length of trichomes ranges from 40 to 200 µm (Fig. 1D). The glandular head has a size of 30 to 40 µm (Fig. 1C). Capitate mushroom-like multicellular type of glandular trichomes noted in this species (Fig. 1E). The Glandular hairs are stalked or sessile and one-to-many-celled. The body and head of the trichome are variable in structure as observed in c. purpurea.

***Cyathocline lutea* Law ex Wight:**

The epidermal cuticular membrane has a smooth ornamentation layer (Fig. 2 A-F). The examined species is amphianomocytic (Fig. 2 A-F). The length of stomata ranges from 20 to 30 µm and the width range from 15 to 30 µm (Fig. 2 D). Both glandular and non-glandular trichomes were observed on the surface of the leaf. The length of trichomes ranges from 10 to 300 µm (Fig. 2 A-B). The glandular head has a size of 10 to 15 µm (Fig. 2 B). Non-glandular trichomes were uniseriate and they are one-celled, two-celled, and three celled. The frequency of non-glandular trichomes is more as compared to the glandular ones. Sessile club-shaped types of glandular trichomes are noted in this species (Fig. 2 B). The Glandular hairs are small stalked or sessile. The body or head of the trichome is variable in structure as observed in c. purpurea. Sessile secretary heads occur

in this species. Some epicuticular wax depositions may be present on this species' cuticular membrane. The wax crystals deposits are threadlike, long, and flat (Fig. 2E).

Solereder (1908) recorded glandular as well as non-glandular trichomes from *Baccharis, Artemisia, Helianthus, Vernonia, Haplopappus,* etc. Metcalf and Chalk (1950) recorded diverse kinds of trichomes in Asteraceae. Manfron *et al.* (2018) recorded glandular as well as non-glandular trichomes from many species of *Baccharis.* As per observed micromorphological data, The *Cyathocline purpurea* (Buch.-Ham. ex D.Don) has a high frequency of trichomes. *Cyathocline lutea* Law ex Wight has very less frequency as compared to *Cyathocline purpurea*. The present investigation is another supportive evidence of their work and for the family.

IV. CONCLUSION

It is found after SEM screening that the genus is homogenous with respect to foliar micromorphology and also shows somewhat similar micromorphological characteristics to a related genus of the family Asteraceae.

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Impact of Aroclor on Sodium, Potassium Content in Fresh Water Crab Barytelphusa Guerini

Paikrao S. M.

ABSTRACT

Exposure of fresh water crab Barytelphusa guerini to aroclor. Resulted change in sodium & Potassium content of hepadopancreas, muscles & gills. Sodium, Potassium content declined after subletbal stress of Aroclor is observed. Thus Pollutant Aroclor in aquatic ecosystem affects Physiosogy of Aquatic animals.

Keywords – Barytelphusa guerini, Sodium, Potassium.

I. INTRODUCTION

Ions such as sodium, potassium, calcium and magnesium are considered to be the major ions in addition to the organic constituents such as proteins, carbohydrates & fats. These ions serve for 1) activation of enzyme systems 2) The stabilization of proteins in solution 3) the development of electrical excitability 4) the regulation of the permeability of the membranes and 5) the maintenance of a dynamic state of isotonicity between cells and the extracellular fluid. The regulation of the ionic composition of the body fluids in animals is presumed to have adaptive significance (Burton, 1973).

The animal body regains mineral elements which serve structural & physiological functions such as calcium, phosphorus, sodium, potassium, magnesium, sulphur chloride, which are required for the animals and conduct certain essential functions in the animal body (Rastogi, 1984.)

Renfro et. al., (1974) found decreased ability of tissue cells to ionic regulation when Anguilla rostrata was exposed to Mercury.

Studies have shown that DDT and related pesticides and the Polychorinated Biphenyls (PCB s) inhibit the activity of Na, K, Mg- ATPase (Koch, 1969 / 70; Grant & Mehrle, 1970; Cutkamp et. al., 1971; Yap et. al., 1971; Davis et. al., 1972 Desaiah (et. al., 1972). It has been postulated that ATPase inhibition by these compounds may impir the osmoregulatory ability of eels (Anguilla rostrata) & Killfish (Fundulus heteroclitus) (Janicki and Kinter 1971, Kinter et al, 1972) In earlier studies, Eisler and Edmunds (1966) showed that alterations of blood and tissue ions occur in putters (Sphaeronectes maculatus) exposed to organochlorine pesticide, Endrin

Nimmo and Blackmann(1972) observed a decrease in sodium, potassium & magnesium in hepatopancreas of shrimps, when exposed to DDT. The puffers (Sphaeronectes maculates) also showed a decrease in sodium and potassium content of liver and increase in serum levels of these ions after exposure to endrin which is also an organochlorine insecticide.

Campbell et. al. (1974) and Leadem et. al., (1974) also found such disturbances in ionic regulation in rainbow trout, Salmo gairdneri exposed to DDT.

The process of ionic regulation in Decapod Crustaceans are studied by some workers (Grass, 1975; Nagal, 1934 and Ruddy, 1967), active ion uptake or excretion in the gills (Shaw, 1961) and occasionally the gut (Green et. al., 1959), and ion transport in the excretory organ (Dehnel and Carefoot, 1965). It is widely believed that active transport in the biological membranes are driven by the energy stored in ATP and released by the activity of ATPases. The Na+, K+ activated, Mg++ dependent ATPases (Na K Mg ATPases) are central to most mechanisms of active membrane transport and is believed to be involved not only in Na+ and K+ transport but also in the transport of other chemical or ionic species (Whittam and Wheeler, 1970).

Indiscriminate discharge of pesticide in fresh water causes several imbalances in the animals of aquatic media. Hence the present work expatiates the ions like sodium, potassium, content in the tissues & blood of Barytelphusa guerini.

Aroclor is one of the pesticide of organochlorine group. It is particularly used in paddy field is It is most hazardous pesticide. Even at low concentraton Aroclor cause potential hazard due to bioaccumulation in food chain. It is in this perspective, the Present workwas undertaken to evaluate the sub lethal concentrations of Aroclor on sodium & potassium, content of hepatopancreas, gills muscles & blood of fresh water crab, Barytelphusa guerini.

II. MATERIAL & METHOD

The crabs were collected from the nearest area (Paddy field) and brought to the lab Barytelphusa guerini ranging between 50 to 60 grams were selected for investigation of in organic constituents.

They are acclimatized for 4 days in this period They were fed with frog muscles. They were fasted for 24 hrs, before exposure to sublethal concentrations of Aroclor. The Animals were exposed for 1 day, 2 days, 3days, 4days After desired period of exposure the animals were dissected & sample of hepatopancreas, gills, muscles were collected.

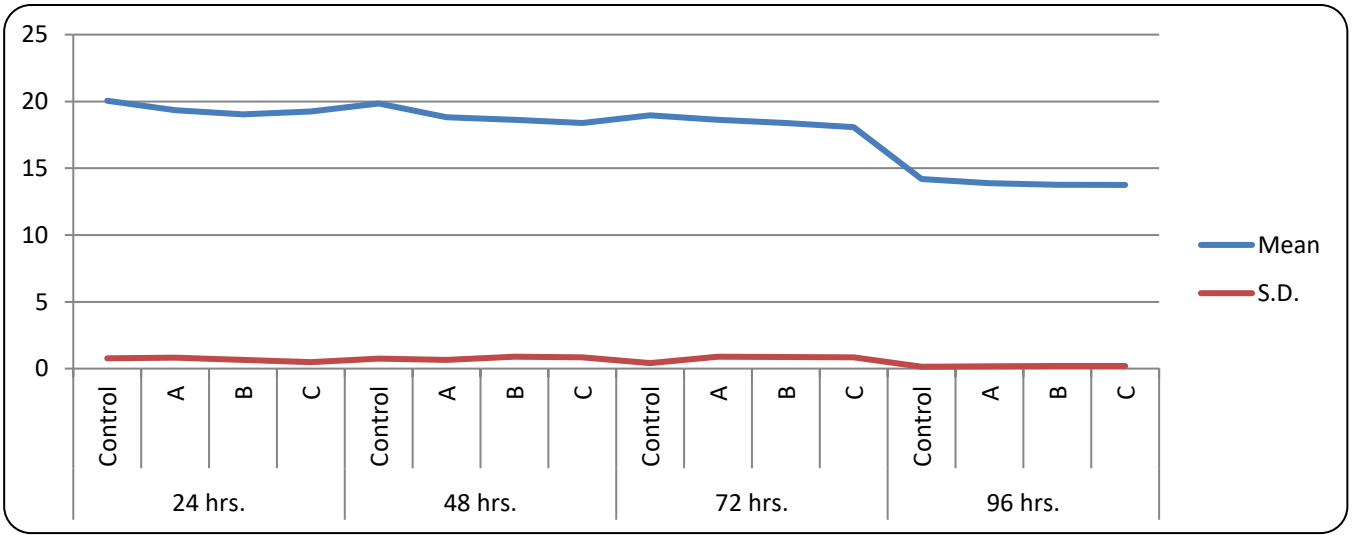
Total sodium content of muscles, gills, hepatopancreas & blood was estimated by method of wein bach (oser, 1965) Potasium content of hepatopancreas, gills, muscle and blood was estimated by Loney & Dyer Method Oser, (1965)

III. RESULT & DISCUSSION

In the present investigation the sodium & Potassium content of hepatopancreas, gill muscles & blood of the freshwater crab Barytelphusa guerini decresed after sublethal exposure of Aroclor. Potassium content of hepatopancreas decrese significantly at 24 & 48 hrs but at 72 hrs it decreses insignificantly & at 96 hrs it also decreses significantly at different sub lethal concentrations of Aroclor. (Table-1).

Table: 51: Effect of various concentrations of Aroclor---- a Polychlorinated Biphenyl (PCB) on hepatopancreas of freshwater crab, Barytelphusa guerini. The potassium content expressed in terms of mg/gm wet weight of tissue, is an average of 6 values ± S.D.

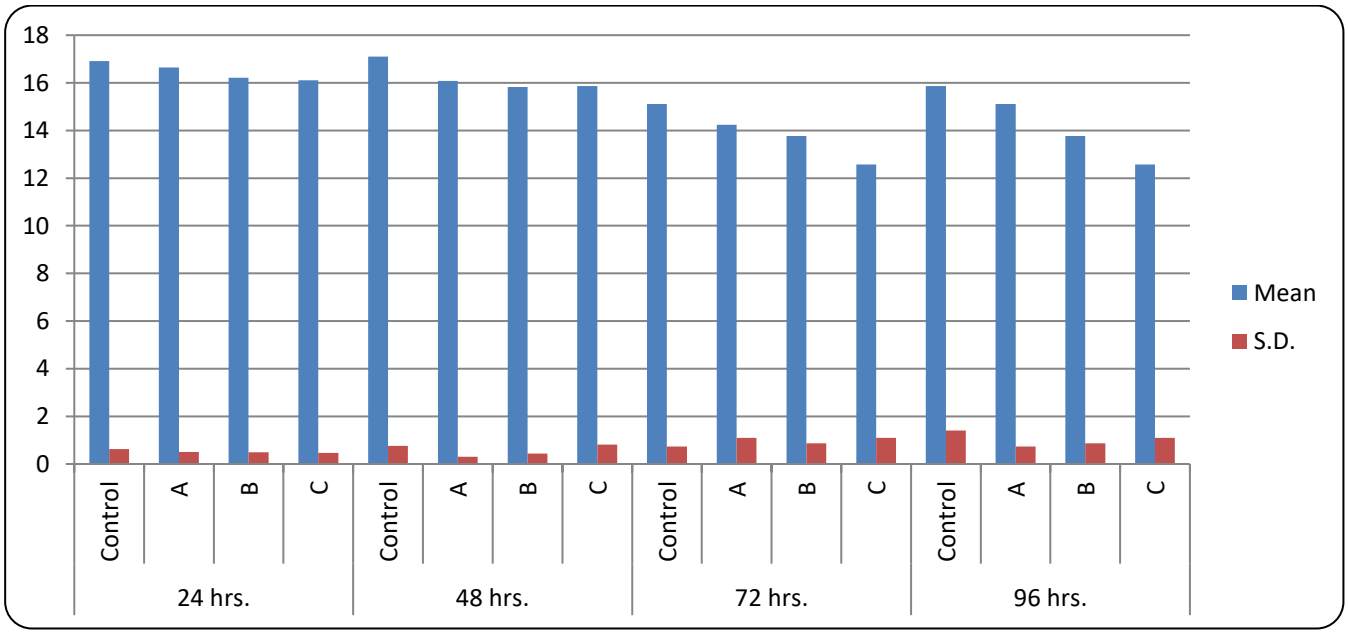
Period	Name of sample	Mean ± S.D.	% Change	Student "t" Test	Level of significance
24 hrs.	Control	20.05 ± 0.77			--
	A	19.34 ± 0.82	3.54	6.46	P > 0.01 (S)
	B	19.04 ± 0.64	5.04	5.83	P > 0.01 (S)
	C	19.25 ± 0.49	3.99	3.29	P > 0.05 (S)
48 hrs.	Control	19.84 ± 0.74			--
	A	18.82 ± 0.65	5.14	7.066	P > 0.01 (S)
	B	18.62 ± 0.89	6.15	6.21	P > 0.01 (S)
	C	18.38 ± 0.85	7.36	8.71	P > 0.01 (S)
72 hrs	Control	18.95 ± 0.42			--
	A	18.62 ± 0.89	1.74	1.39	P < 0.05 (IS)
	B	18.38 ± 0.87	3.01	1.86	P < 0.05 (IS)
	C	18.08 ± 0.85	4.59	2.89	P > 0.05 (S)
96 hrs	Control	14.18 ± 0.14			--
	A	13.88 ± 0.16	2.12	10.39	P > 0.01 (S)
	B	13.77 ± 0.19	2.89	7.89	P > 0.01 (S)
	C	13.75 ± 0.20	3.03	7.44	P > 0.01 (S)



Result: There was significant decrease in potassium content of hepatopancreas at 24 & 48 hrs but at 72 hrs it decreases insignificant and at 96 hrs it also decreases significantly at different sublethal concentrations of Aroclor.

Table: 52: Effect of various concentrations of Aroclor---- a Polychlorinated Biphenyl (PCB) on gills of freshwater crab, Barytelphusa guerini. The potassium content expressed in terms of mg/gm wet weight of tissue, is an average of 6 values ± S.D.

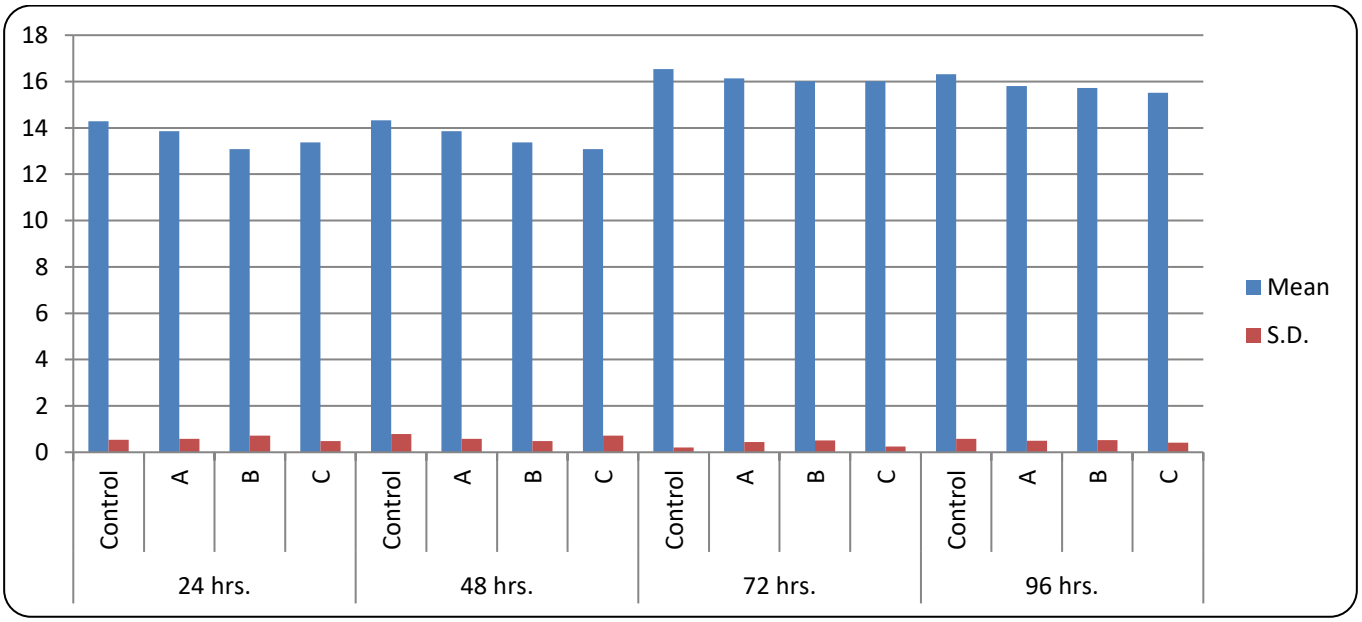
Period	Name of sample	Mean ± S.D.	% Change	Student "t" Test	Level of significance
24 hrs	Control	16.91 ± 0.62			--
	A	16.65 ± 0.51	1.54	1.87	P < 0.05
	B	16.21 ± 0.49	4.14	4.66	P > 0.01
	C	16.11 ± 0.46	4.73	4.77	P > 0.01
48 hrs.	Control	17.10 ± 0.76			--
	A	16.08 ± 0.31	5.96	3.60	P > 0.05
	B	15.82 ± 0.44	7.49	5.15	P > 0.01
	C	15.87 ± 0.82	7.19	10.14	P > 0.01
72 hrs	Control	15.11 ± 0.74			--
	A	14.24 ± 1.1	5.76	2.64	P > 0.05
	B	13.77 ± 0.87	8.87	7.25	P > 0.01
	C	12.57 ± 1.1	16.81	7.71	P > 0.01
96 hrs	Control	15.87 ± 1.4			--
	A	15.11 ± 0.74	4.79	1.56	P < 0.05
	B	13.77 ± 0.87	13.23	4.72	P > 0.05
	C	12.57 ± 1.1	20.79	9.36	P > 0.01



Result: There was significant decrease in potassium content of gills at 24 & 48 hrs but at 72 hrs it decreases insignificant and at 96 hrs it also decreases significantly at different sublethal concentrations of Aroclor.

Table: 53: Effect of various concentrations of Aroclor---- a Polychlorinated Biphenyl (PCB) on muscles of freshwater crab, Barytelphusa guerini. The potassium content expressed in terms of mg/gm wet weight of tissue, is an average of 6 values ± S.D.

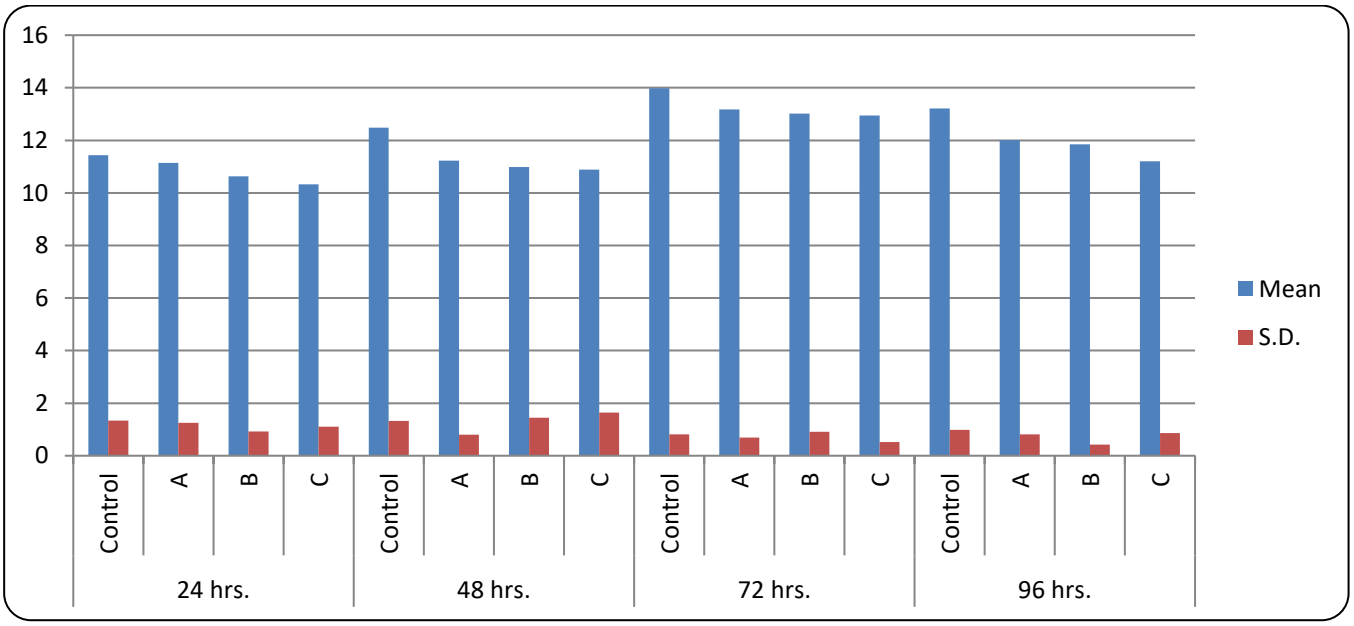
Period	Name of sample	Mean ± S.D.	% Change	Student "t" Test	Level of significance
24 hrs	Control	14.28 ± 0.54			--
	A	13.85 ± 0.58	3.01	5.31	P > 0.01 (S)
	B	13.08 ± 0.72	8.40	6.29	P > 0.01 (S)
	C	13.38 ± 0.48	6.30	9.16	P > 0.01 (S)
48 hrs.	Control	14.32 ± 0.78			--
	A	13.85 ± 0.58	3.28	2.26	P < 0.05 (IS)
	B	13.38 ± 0.48	6.56	3.78	P > 0.05 (S)
	C	13.08 ± 0.72	8.66	10.22	P > 0.01 (S)
72 hrs	Control	16.54 ± 0.21			--
	A	16.14 ± 0.44	2.42	2.56	P < 0.05 (IS)
	B	16.01 ± 0.51	3.20	2.89	P > 0.05 (S)
	C	16.01 ± 0.25	3.20	10.19	P > 0.05 (S)
96 hrs	Control	16.32 ± 0.58			--
	A	15.81 ± 0.49	3.13	4.20	P > 0.01 (S)
	B	15.72 ± 0.52	3.68	5.77	P > 0.01 (S)
	C	15.52 ± 0.42	4.90	4.94	P > 0.01 (S)



Result: The potassium content in muscle of exposed animals to different sublethal concentration of Aroclor exhibited significant decrease at 24 hrs to 96 hrs.

Table: 54: Effect of various concentrations of Aroclor---- a Polychlorinated Biphenyl (PCB) on blood of freshwater crab, Barytelphusa guerini. The potassium content expressed in terms of mg/gm, is an average of 6 values ± S.D.

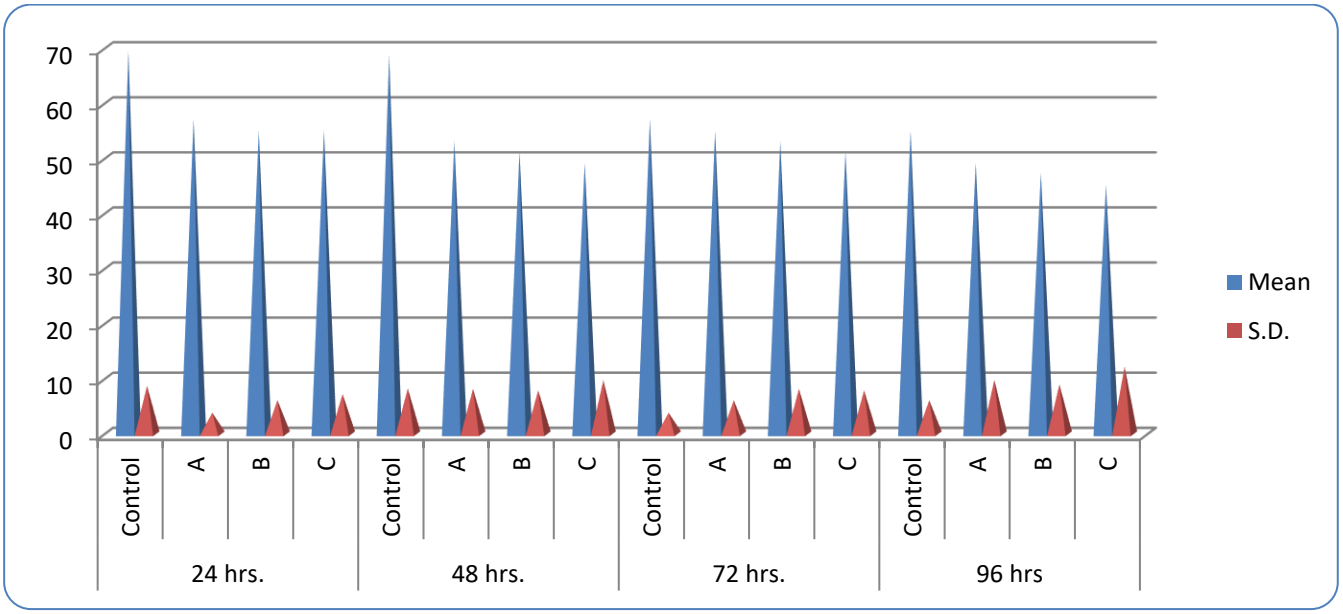
Period	Name of sample	Mean ± S.D.	% Change	Student "t" Test	Level of significance
24 hrs.	Control	11.44 ± 1.34			--
	A	11.14 ± 1.25	2.62	1.52	P < 0.05 (IS)
	B	10.63 ± 0.92	7.08	2.06	P < 0.05 (IS)
	C	10.33 ± 1.1	9.70	3.56	P > 0.01
48 hrs.	Control	12.48 ± 1.32			--
	A	11.23 ± 0.8	10.02	5.06	P > 0.01 (S)
	B	10.98 ± 1.45	12.02	6.18	P > 0.01 (S)
	C	10.88 ± 1.64	12.82	7.05	P > 0.01 (S)
72 hrs	Control	13.98 ± 0.81			--
	A	13.17 ± 0.69	5.79	4.67	P > 0.01 (S)
	B	13.02 ± 0.91	6.87	5.73	P > 0.01 (S)
	C	12.94 ± 0.52	7.44	4.27	P > 0.01 (S)
96 hrs	Control	13.21 ± 0.98			--
	A	12.01 ± 0.81	9.08	3.07	P > 0.05 (S)
	B	11.85 ± 0.42	10.30	2.35	P < 0.05 (IS)
	C	11.2 ± 0.86	15.22	10.54	P > 0.01 (S)



Result: The blood potassium level depleted insignificantly at 24 hrs later it significantly decrease from 48 hrs to 96 hrs.

Table :55: Showing effects of various sublethal concentrations of Aroclor----, a Polychlorinated Biphenyl on hepatopancreas of fresh water crab, Barytelphusa guerini. The sodium content exposed in terms of mg/gm is an average of values ± S.D.

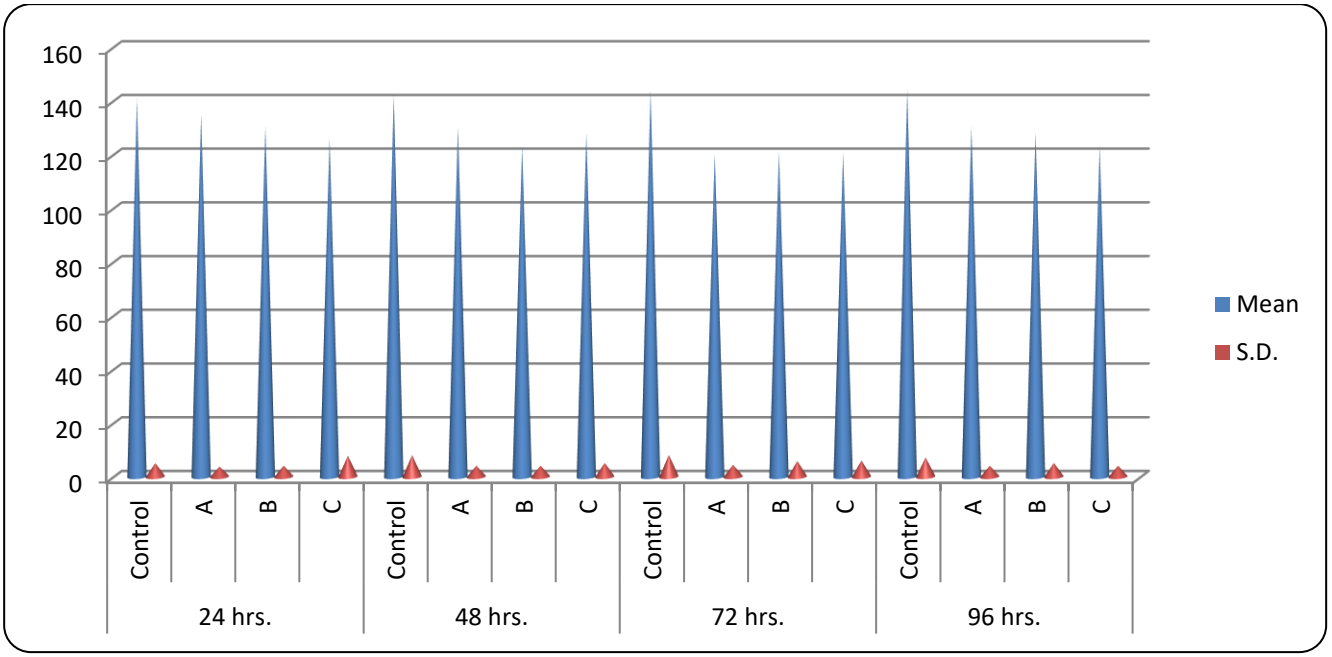
Period	Name of sample	Mean ± S.D.	% change	Student "t" test	Level of significance
24 hrs	Control	69.55 ± 8.71			
	A	57.14 ± 3.84	17.84	3.69	P > 0.05 (S)
	B	55.04 ± 6.11	20.86	5.71	P > 0.01(S)
	C	55.11 ± 7.26	3.55	7.35	P > 0.01(S)
48 hrs	Control	68.86 ± 8.25			
	A	53.16 ± 8.16	22.80	6.12	P > 0.01(S)
	B	51.24 ± 7.89	25.59	8.59	P > 0.01(S)
	C	49.20 ± 9.77	7.45	9.20	P > 0.01(S)
72 hrs	Control	57.14 ± 3.84			
	A	55.04 ± 6.11	3.68	1.08	P < 0.05(IS)
	B	53.16 ± 8.16	6.97	1.35	P < 0.05(IS)
	C	51.24 ± 7.89	6.90	2.09	P < 0.05(IS)
96 hrs	Control	55.04 ± 6.11			
	A	49.20 ± 9.77	10.61	1.87	P < 0.05(IS)
	B	47.39 ± 8.94	13.90	2.87	P > 0.05(S)
	C	45.25 ± 12.21	8.03	2.26	P < 0.05(IS)



Result: Sodium content of hepatopancreas depleted significantly at 24 hrs, 48 hrs & 96 hrs but at 72 hrs it decrease insignificantly at different sublethal concentrations of Aroclor.

Table: 56: Effect of various concentrations of Aroclor---- a Polychlorinated Biphenyl (PCB) on gills of freshwater crab, Barytelphusa guerini. The sodium content expressed in terms of mg/gm wet weight of tissue, is an average of 6 values ± S.D.

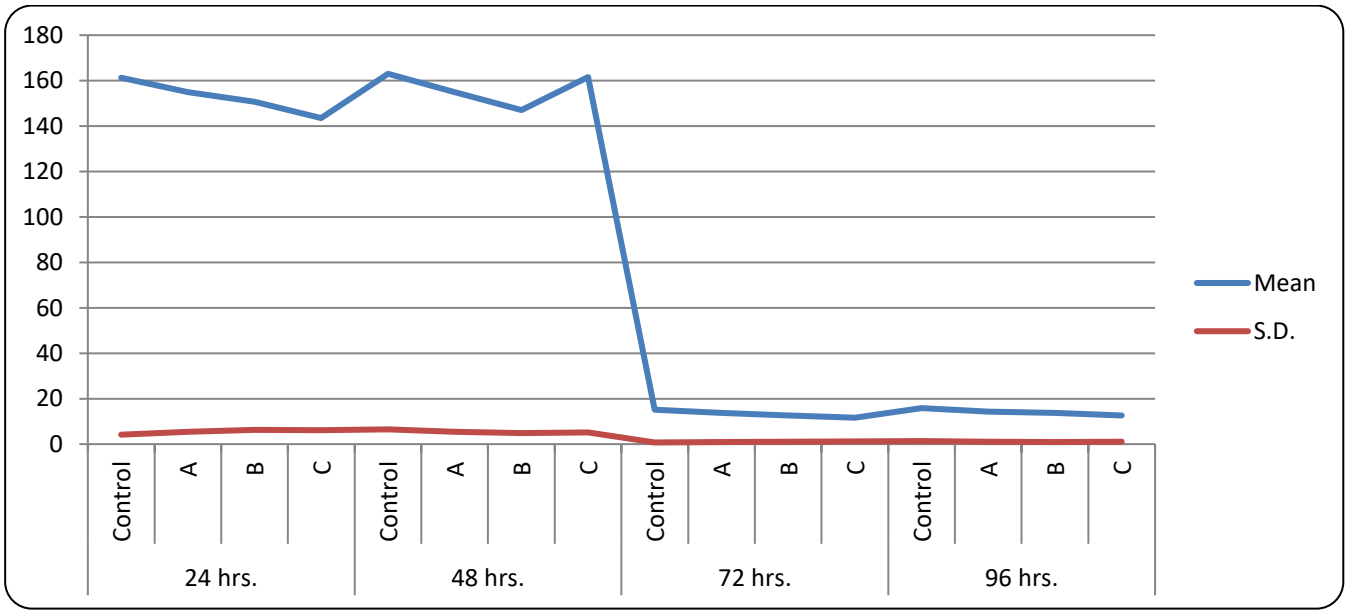
Period	Name of sample	Mean ± S.D.	% Change	Student "t" Test	Level of significance
24 hrs	Control	140.95 ± 5.13			--
	A	135.08 ± 3.84	4.16	7.30	P > 0.01 (S)
	B	130.42 ± 4.16	7.47	8.60	P > 0.01 (S)
	C	126.01 ± 7.89	10.60	6.11	P > 0.01 (S)
48 hrs.	Control	142.06 ± 8.12			--
	A	130.42 ± 4.16	8.19	4.08	P > 0.01 (S)
	B	123.22 ± 4.18	13.26	8.52	P > 0.01 (S)
	C	128.12 ± 5.21	9.81	5.48	P > 0.01 (S)
72 hrs	Control	143.84 ± 8.19			--
	A	120.32 ± 4.48	16.35	8.11	P > 0.01 (S)
	B	121.16 ± 5.91	15.77	9.82	P > 0.01 (S)
	C	120.78 ± 6.1	16.03	10.34	P > 0.01 (S)
96 hrs	Control	144.28 ± 7.28			--
	A	130.42 ± 4.16	9.61	5.68	P > 0.01 (S)
	B	128.12 ± 5.21	11.20	7.085	P > 0.01 (S)
	C	123.22 ± 4.18	14.60	7.30	P > 0.01 (S)



Result: There was decrease in sodium level of gill significantly from 24 hrs to 96 hrs at different sublethal concentrations of Aroclor.

Table: 57: Effect of various concentrations of Aroclor---- a Polychlorinated Biphenyl (PCB) on muscles of freshwater crab, Barytelphusa guerini. The sodium content expressed in terms of mg/gm wet weight of tissue, is an average of 6 values ± S.D.

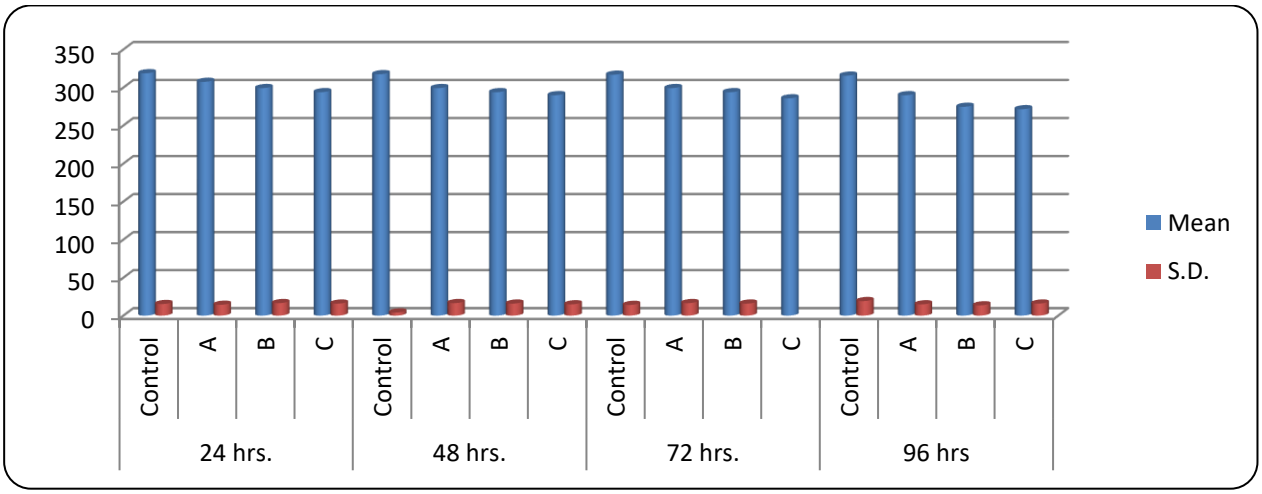
Period	Name of sample	Mean ± S.D.	% Change	Student "t" Test	Level of significance
24 hrs	Control	161.32 ± 4.21			--
	A	154.95 ± 5.42	3.95	4.57	P > 0.01 (S)
	B	150.7 ± 6.26	6.58	5.62	P > 0.01 (S)
	C	143.45 ± 6.19	11.08	9.67	P > 0.01 (S)
48 hrs.	Control	163.01 ± 6.49			--
	A	154.95 ± 5.42	4.94	5.53	P > 0.01 (S)
	B	154.95 ± 5.42	4.94	5.53	P > 0.01 (S)
	C	147.07 ± 4.86	9.78	9.07	P > 0.01 (S)
72 hrs	Control	15.11 ± 0.74			--
	A	13.77 ± 0.87	8.87	7.25	P > 0.01 (S)
	B	12.57 ± 1.1	16.81	7.71	P > 0.01 (S)
	C	11.64 ± 1.2	22.96	9.10	P > 0.01 (S)
96 hrs	Control	15.87 ± 1.4			--
	A	14.24 ± 1.1	10.27	4.62	P > 0.01 (S)
	B	13.77 ± 0.87	13.23	4.72	P > 0.01 (S)
	C	12.57 ± 1.1	20.79	9.35	P > 0.01 (S)



Result: Sodium content of muscles depleted significantly from 24 hrs to 96 hrs at different sublethal concentrations of Aroclor.

Table:58: showing effect of various sublethal concentrations of Aroclora Polychlorinated Biphenyl (PCB) on blood of fresh water crab Barytepphusa gurerini. The sodium content of blood expressed as mg /ml is an average of six values S. D.

Period in hrs	Name of Sample	Mean ± S. D.	% Change	Student Test	Level of Significance
24 hrs	Control	318.7 ± 15.23			
	A	307.4 ± 14.25	3.55	5.14	P > 0.01(S)
	B	299.2 ± 16.45	6.12	7.69	P > 0.01(S)
	C	293.8 ± 15.81	4.42	5.19	P > 0.01(S)
48 hrs	Control	317.45 ± 4.13			
	A	299.2 ± 16.45	5.75	2.80	P > 0.05 (S)
	B	293.8 ± 15.81	7.45	3.79	P >0.05 (S)
	C	289.8 ± 14.84	3.14	4.47	P > 0.01 (S)
72 hrs	Control	316.8 ± 14.06			
	A	299.2 ± 16.45	5.56	5.10	P > 0.01 (S)
	B	293.8 ± 15.81	7.26	7.29	P > 0.01 (S)
	C	285.7 ± 16.85	4.51	8.21	P > 0.01 (S)
96 hrs	Control	315.55 ± 19.10			
	A	289.8 ± 14.84	8.16	5.24	P > 0.01(S)
	B	274.57 ± 13.49	12.99	5.24	P > 0.01 (S)
	C	271.42 ± 15.84	6.34	10.13	P > 0.01 (S)



Result: Significant decrease in sodium content of blood was observed from 24 hrs to 96 hrs at different sublethal concentrations of Aroclor.

There was significant decrease in potassium content of gills at 24 & 48 hrs it decreses insignificantly at 72 hrs. And at 96hrs it also decreses significantly at different sublethal concentrations of Aroclor. (Table-2)

Potassium content in muscle of exposed animals to different sub lethal concentration of aroclor exhibited significant decres at 24 hrs to 96 hrs (Table 3). The blood Potassium level depleted insignifieantly at 24 hrs later it signifieantly decrese from 48 hrs to 96 hrs. (Table 4).

Sodium content of hepatopanereas depleted signifieantly at 24 hrs 48 hrs & 96 hrs but at 72 hrs it decreses insignificantly at different sublethal concentrations at Aroclor. (Tables 5) There was significant decrese in sodium level of gill from 24 hrs to 96 hrs at different sublethal concentrations (Table 6) sodium content of muscle depleted signifeantly from 24 hrs to 96 hrs at different sub lethal concentrations. (Table 7). Significant decrese in sodium content of blood was observed from 24 hrs to 96 hrs at different sublethal concentrations of Aroclor. (Table 8) In present study it is found that sodium, potassium, ions in tissues and blood decrease. When Barytelphusa guerini is exposed to Aroclor. Simillar results were obtained by various workers. Jeney and Jeney (1987) observed that different stressors decrease Ca values in fish.

Jeney et. al., (1996) noted that chronic exposure to toxicants ofpulp and paper mill effluent decreases Ca in the roach (Rutilus rutilus). Nimmo and Blackmann (1972) reported a decrease in sodium, potassium and magnesium ions in hepatopancreas of shrimps when exposed to DDT.

Charjan and Raja (2008) found that a low dose of Fenvalerate cayses decrease but at medium and high dose, blood Na levels increased. Depending on the doses Na value, first decreased a little then increased.

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Effect of Aroclor on Alkaline Phosphatase Enzyme

Paikrao S. M.

ABSTRACT

Exposure of fresh water crab. Barytelphusa guerini to Aroclor, Resulted Change in alkaline Phosphatase content of hepatopancreas, muscles & gills. Alkaline phosphatase content increased significantly in hepatopancreas of crab while Alkaline phasphatase content of gills, muscles & blood decreses affer sublethal stress of Aroclor is abserved.

Keywords – Barytelphusa guerini, Aroclor, Alkaline Phosphatase.

I. INTRODUCTION

Enzymes play an important role in metabolism. The synthesis and final concentration of enzymes is under genetic control and is greatly influenced by small molecules like toxicants. Hence change in enzyme levels is one of the fundamental steps to assess the effect of toxicants (Rana et al., 2002).

Enzymes are exceedingly efficient and very specific in terms of nature of reactions catalyzed and substrates utilized.

Enzyme system plays a significant role in food utilization and metabolism. But this system may get altered under toxicity. The most important mechanism of toxic action of toxicants is through poisoning of enzymes (Bowen, 1966) since toxic chemicals often affect the activity of enzymes at least to some degree. Enzymes are logical candidates to be used as biomonitors (Christener et al., 1982).

Pesticides not only affect biochemical constitution (Muley et al., 1996), but also adversely affect enzyme activities in fishes and other animals. Enzymes are proteins which function as catalysts in the chemical reactions occurring in the cell.

The changes in the enzyme levels are one of the fundamental steps to assess the effects of toxicants.

Stress and pesticides generally cause rapid change in respiration and enzyme activities of fish (Asztolas et al., 1990; Borach and Yadav , 1996, Rajamaniar and Manohar, 2000; Tilak et al., 2005.)

II. MATERIAL AND METHOD

The crabs Barytelphusa guerini were collected and acclimatized to laboratory conditions for three to four days in plastic troughs containing tap water. Water changed daily and crabs were fed daily. One day fasting given before exposed to Aroclor. Healthy crabs were selected. Three sublethal concentrations of Aroclor were made

for studying the effects on activity levels of biomarker enzymes in crabs. Animals were divided in 3-groups, each of six crabs. They were exposed to sublethal concentrations of Aroclor for 24, 48, 72 and 96 hours. A control was also maintained after desired period of treatment blood also collected. The crabs were dissected and the tissues like hepatopancreas, muscles and gills were isolated.

An effect of sublethal concentrations of Aroclor was studied on the activity levels of Alkaline Phosphatase enzyme

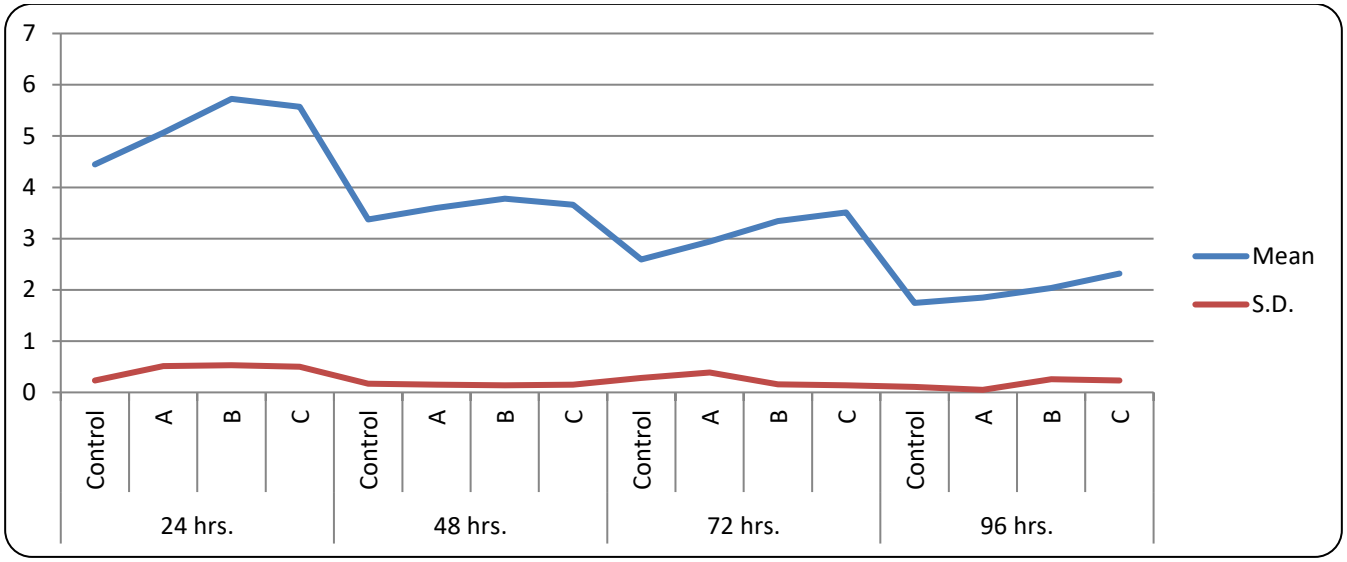
Alkaline Phosphate (ALP) (E.C. 3. 1. 3. 1) of muscles, hepatopancreas, gills and blood were estimated by method of Bodansky (Oser, 1965).

III. RESULT & DISCUSSION

In the present study alkaline phosphatase of hepatopancrease increased significantly at different sublethal concentration of Aroclor (Table 1). Alkaline Phosphatase content of gills decresed significantly at 24 hrs to 96 hrs. (Table 2). After exposure to Aroclor, Alkaline phosphatase content of muscles was reduced significantly from 24 hrs to 96 hrs. At different sublethal concentrations (Table 3).

Table: 17: Effect of various concentrations of Aroclor---- a Polychlorinated Biphenyl (PCB) on hepatopancreas of freshwater crab Barytelphusa guerini. The enzyme alkaline phosphatase activity expressed as Bondansky units/gm wet weight is an average of 6 values of ± S.D.

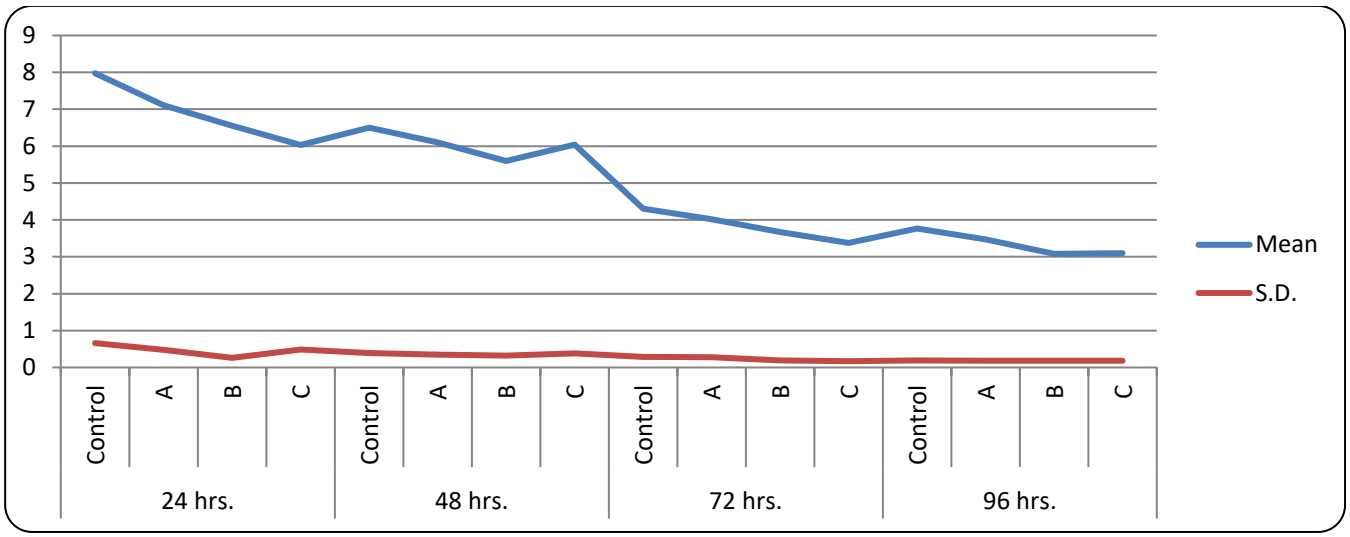
Period	Name of sample	Mean ± S.D.	% Change	Student "t" Test	Level of significance
24 hrs.	Control	4.445 ± 0.23			--
	A	5.063 ± 0.51	-13.90	3.35	P > 0.05 (S)
	B	5.725 ± 0.53	-28.80	6.71	P > 0.01(S)
	C	5.57 ± 0.50	-25.31	6.28	P > 0.01 (S)
48 hrs.	Control	3.375 ± 0.17			--
	A	3.597 ± 0.15	-6.58	6.80	P > 0.01 (S)
	B	3.778 ± 0.14	-11.94	10.26	P > 0.01 (S)
	C	3.66 ± 0.15	-8.44	8.81	P > 0.01 (S)
72 hrs	Control	2.595 ± 0.28			--
	A	2.943 ± 0.39	-13.41	3.36	P > 0.05 (S)
	B	3.342 ± 0.16	-28.79	7.98	P > 0.01 (S)
	C	3.51 ± 0.14	-35.26	9.78	P > 0.01 (S)
96 hrs	Control	1.745 ± 0.11			--
	A	1.848 ± 0.05	-5.90	2.58	P > 0.05 (S)
	B	2.037 ± 0.26	-16.73	3.04	P > 0.05 (S)
	C	2.315 ± 0.23	-32.66	6.95	P > 0.01 (S)



Results: Alkaline phosphatase content hepatopancreas increased significantly from 24 hrs to 96 hrs at different sublethal concentrations of Aroclor.

Table: 18: Effect of various concentrations of Aroclor---- a Polychlorinated Biphenyl (PCB) on gills of freshwater crab Barytelphusa guerini. The enzyme alkaline phosphatase activity expressed as Bondansky units/gm wet weight is an average of 6 values ± S.D.

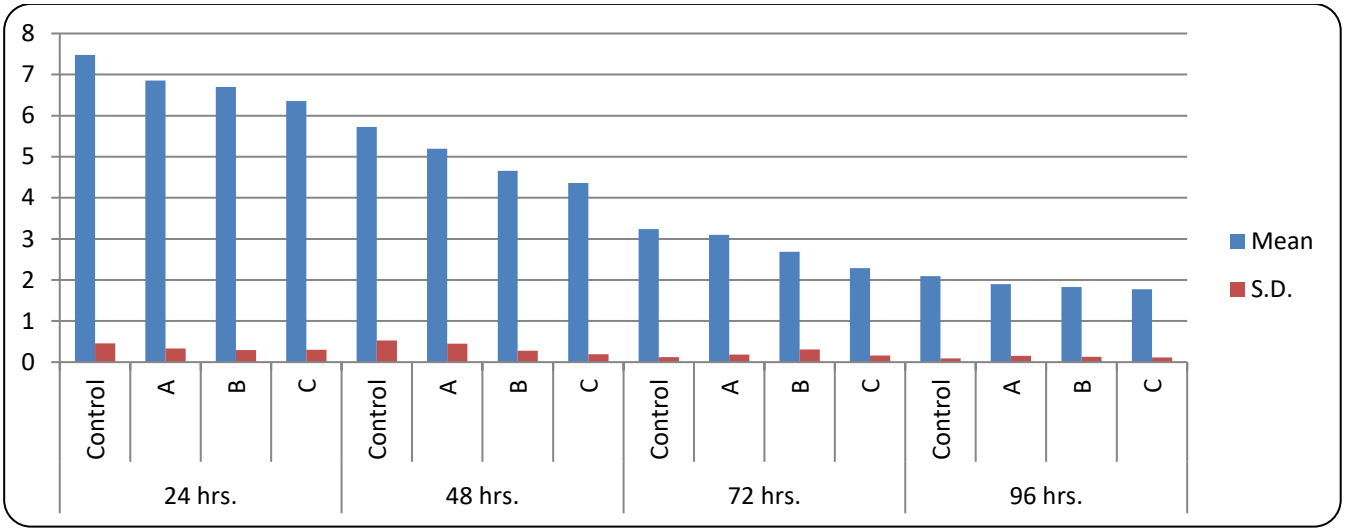
Period	Name of sample	Mean ± S.D.	% Change	Student "t" Test	Level of significance
24 hrs.	Control	7.977 ± 0.66			--
	A	7.107 ± 0.48	10.91	4.70	P > 0.01 (S)
	B	6.552 ± 0.26	17.86	5.87	P > 0.01(S)
	C	6.035 ± 0.49	24.34	10.85	P > 0.01 (S)
48 hrs.	Control	6.5 ± 0.39			--
	A	6.102 ± 0.35	6.12	5.69	P > 0.01 (S)
	B	5.598 ± 0.32	13.88	9.95	P > 0.01 (S)
	C	6.04 ± 0.38	7.08	1.28	P < 0.05 (IS)
72 hrs	Control	4.308 ± 0.29			--
	A	4.022 ± 0.28	6.64	9.29	P > 0.01 (S)
	B	3.667 ± 0.19	14.88	7.20	P > 0.01 (S)
	C	3.378 ± 0.17	21.59	9.70	P > 0.01 (S)
96 hrs	Control	3.768 ± 0.19			--
	A	3.472 ± 0.18	7.86	1.19	P < 0.05 (IS)
	B	3.08 ± 0.18	18.26	2.77	P > 0.05 (S)
	C	3.098 ± 0.18	17.78	4.02	P > 0.01 (S)



Results: The animals exposed to different sublethal concentrations of Aroclor showed significant decrease in alkaline phosphatase content of gill at 24 hrs to 96 hrs.

Table: 19: Effect of various concentrations of Aroclor---- a Polychlorinated Biphenyl (PCB) on muscles of freshwater crab Barytelphusa guerini. The enzyme alkaline phosphatase activity expressed as Bondansky units/gm wet weight is an average of 6 values ± S.D.

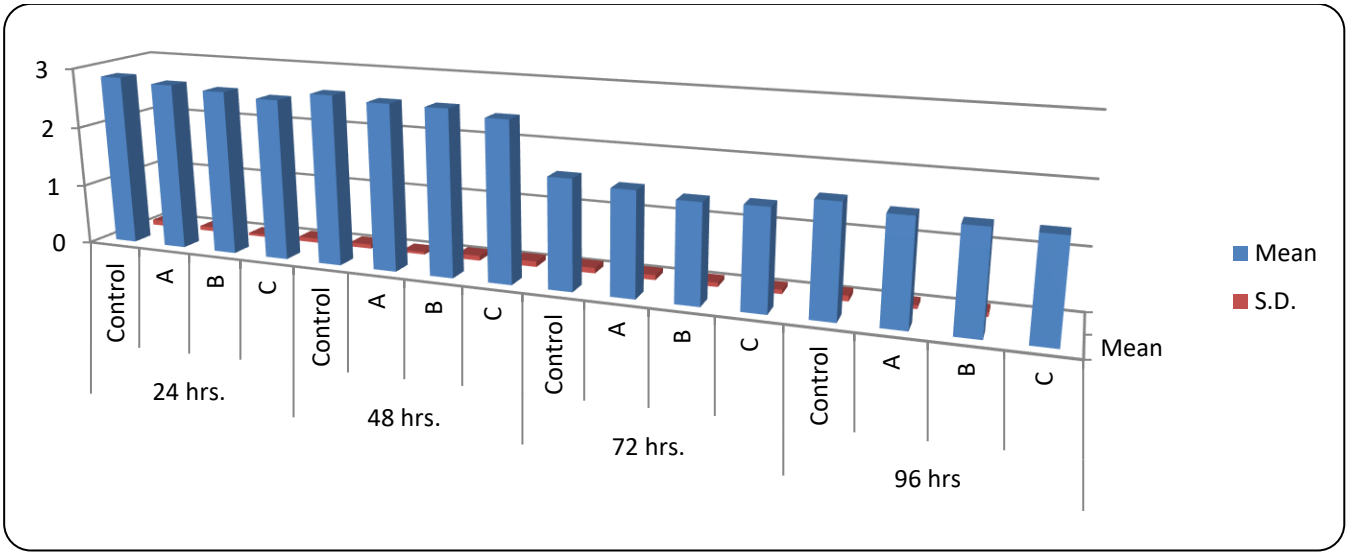
Period	Name of sample	Mean ± S.D.	% Change	Student "t" Test	Level of significance
24 hrs.	Control	7.478 ± 0.46			--
	A	6.852 ± 0.33	8.37	4.79	P > 0.01 (S)
	B	6.7 ± 0.29	10.40	5.34	P > 0.01(S)
	C	6.357 ± 0.30	14.99	7.89	P > 0.01 (S)
48 hrs.	Control	5.725 ± 0.53			--
	A	5.195 ± 0.45	9.26	4.65	P > 0.01 (S)
	B	4.655 ± 0.28	18.69	5.82	P > 0.01 (S)
	C	4.363 ± 0.19	23.79	6.75	P > 0.01 (S)
72 hrs	Control	3.242 ± 0.12			--
	A	3.098 ± 0.18	4.44	2.61	P > 0.05 (S)
	B	2.687 ± 0.31	17.12	4.75	P > 0.01 (S)
	C	2.287 ± 0.16	29.46	7.33	P > 0.01 (S)
96 hrs	Control	2.09 ± 0.09			--
	A	1.898 ± 0.15	9.19	1.010	P < 0.05 (IS)
	B	1.83 ± 0.13	12.44	6.82	P > 0.01 (S)
	C	1.77 ± 0.11	15.31	1.25	P < 0.05 (IS)



Results: During exposure to Aroclor, the alkaline phosphatase activity level was significantly reduced from 24 hrs to 96 hrs at different sublethal concentration

Table : 20: Eeffects of various sublethal concentrations of Aroclor a Polychlorinated Biphenyl (PCB) on blood of freshwater crab, Barytelphusa guerini. The values expressed as bondansky units /ml is an average of six values S. D.

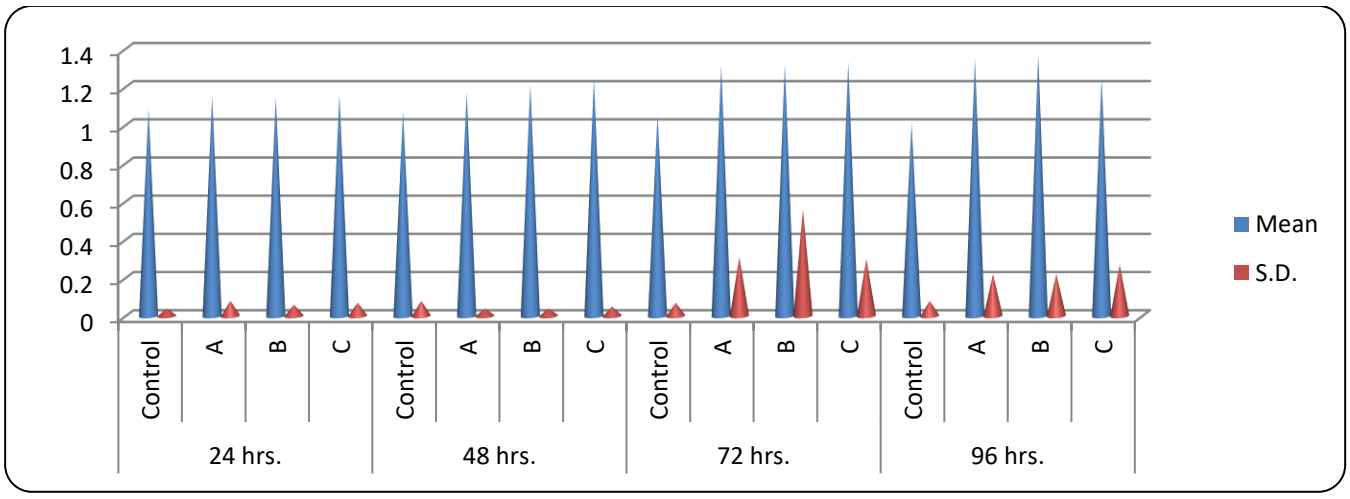
Period in hours	Name of Sample	Mean ± S. D.	% Change	Student Test	Level of Significance
24 hrs	Control	2.84 ± 0.09			
	A	2.77 ± 0.07	2.46	3.03	P > 0.05 (S)
	B	2.72 ± 0.04	4.23	3.64	P > 0.05 (S)
	C	2.65 ± 0.07	4.33	8..22	P > 0.01 (S)
48 hrs	Control	2.79 ± 0.07			
	A	2.72 ± 0.04	2.51	3.03	P > 0.05 (S)
	B	2.71 ± 0.08	2.87	5.13	P > 0.01 (S)
	C	2.61 ± 0.09	4.04	7.79	P > 0.01 (S)
72 hrs	Control	1.78 ± 0.09			
	A	1.69 ± 0.08	5.06	5.37	P > 0.01 (S)
	B	1.60 ± 0.07	10.11	6.92	P > 0.01 (S)
	C	1.62 ± 0.07	4.14	7.79	P > 0.01 (S)
96 hrs	Control	1.79 ± 0.09			
	A	1.68 ± 0.06	6.15	6.26	P > 0.01 (S)
	B	1.62 ± 0.07	9.50	7.36	P > 0.01 (S)
	C	1.60 ± 0.07	4.76	8.22	P > 0.01(IS)



Results: Significant decrease in alkaline phosphatase level of blood was observed from 24 hrs to 96 hrs at different sublethal concentrations of Aroclor.

Table: 21: Effect of various concentrations of Aroclor---- a Polychlorinated Biphenyl (PCB) on hepatopancreas of freshwater crab, Barytelphusa guerini. The enzyme acid phosphatase activity expressed as Bondansky units/gm wet weight is an average of 6 values ± S.D.

Period	Name of sample	Mean ± S.D.	% Change	Student "t" Test	Level of significance
24 hrs.	Control	1.087 ± 0.04			--
	A	1.15 ± 0.08	-5.80	2.23	P < 0.05 (IS)
	B	1.145 ± 0.06	-5.34	3.17	P > 0.05 (S)
	C	1.16 ± 0.07	-6.72	3.16	P > 0.05 (S)
48 hrs.	Control	1.068 ± 0.08			--
	A	1.17 ± 0.04	-9.55	3.60	P > 0.05 (S)
	B	1.213 ± 0.04	-13.58	5.029	P > 0.01 (S)
	C	1.243 ± 0.05	-16.39	6.87	P > 0.01 (S)
72 hrs	Control	1.053 ± 0.07			--
	A	1.315 ± 0.31	-24.88	2.13	P < 0.05 (IS)
	B	1.32 ± 0.56	-25.36	1.17	P < 0.05 (IS)
	C	1.33 ± 0.30	-26.31	2.32	P < 0.05 (IS)
96 hrs	Control	1.013 ± 0.08			--
	A	1.35 ± 0.22	-33.27	4.05	P > 0.01 (S)
	B	1.37 ± 0.22	-35.24	4.29	P > 0.01 (S)
	C	1.248 ± 0.27	-23.20	2.26	P < 0.05 (IS)



IV. RESULTS

Relative to controls a insignificant increase in acid phosphatase level of hepatopancreas was observed at 72 hrs only and significant increase at 24 hrs, 48 hrs & 96 hrs at different sublethal concentrations of Aroclor.

Significant decrese in Alkaline Phosphatase level of blood was observed from 24 hrs to 96 hrs at different sublethal concentrations of Aroclor.

Alkaline phosphatase is a key enzyme in the maintenance of the orthophosphate pool transports of phosphoryl groups and hydrolysis and esterification of metabolite through the membrane transport. Inhibition in alkaline phosphate has been reported by several workers.

Alam (1984) reported decline in alkaline phosphatase activity in the snail Bellama bengalensis. Bhatnagar et al. (1995) observed activity of alkaline phosphatase in liver and muscle of teleost Clarius batrachus exposed to synthetic pyrethroid name and pyrothroid for 30 days. Borah and Yadav (1996) reported that decrease in the activity of alkaline phosphatase in the muscle tissue of fresh water fish Heteropneustis fossilis.

Majumdar et al. (1997) reported changes in alkaline phosphatase levels in broiler chicks exposed to Fenvalerate. Rana et al., (2002) reported changes in alkaline phosphatase activity in mudskipper, Biliophthalmus dusumier. Inhibition of alkaline phosphatase is due to the damage of mitochondrial network and the action of enzymes involved in oxidative metabolism is blocked. The uncoupler promotes conductivity of protons within the mitochondrial membrane and subsequently prevents the formation of gradient across the membrane.

Rajkumar (2008) reported the alkaline phosphatase activity levels were significantly decreased both in muscle and liver tissues after exposure to Fenvalerate.

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Taxonomy and Diversity of Genus Xylaria from Aurangabad District, (Maharashtra) India

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ABSTRACT

The present investigation deals with the taxonomy and diversity of genus Xylaria, specimens collected from various regions of Aurangabad District (Maharashtra) India. Xylaria genus is described in the family Xylariaceae, order Xylariales, class Sordariomycetes, phylum Ascomycota. During the survey, it was observed that most of the Xylaria species were grown on decaying wood logs. Collected specimens were examined on the basis of morphological and microscopic features, and noted down the dimension of stromata, perithecia, and ascospore. Based on observations five species of Xylaria were identified according to macro-morphological and microscopic character, Xylaria multiplex and Xylaria polymorpha were dominating macrofungi while Xylaria feejeensis, Xylaria hypoxylon, and Xylaria symploci were rarely observed. The four species newly reported for Aurangabad district are Xylaria feejeensis, Xylaria hypoxylon, Xylaria multiplex, and Xylaria symploci.

KEYWORDS: Aurangabad, Macro-morphological, Specimens, Stromata.

I. INTRODUCTION

Randomly survey and collection of stromata of *Xylaria* species were done from various regions of forest area, grassland, crop field, roadside, riverside, and sawmills of Aurangabad district, which comprises nine taluka Aurangabad, Gangapur, Kannad, Khultabad, Paithan, Phulambri, Sillod, Soygaon and Vaijapur. Aurangabad district is located between 19˚–20˚ North Latitude and 74˚–76˚ East Longitude, the total geographic area of Aurangabad district is 10107 sq. kms, out of forest area is 770.93 sq. kms i.e. 7.61%, which is rich in plant biodiversity.

The saprobic lignin degraders belong to the ascomycetous genus *Xylaria* Hill ex Schrankis cosmopolitan in distribution, occurs on dead wood, barks, wood logs, plant litter, saprobic or parasites on woody trees, are characterized carbon and cussion, sessile or stipitate, upright, simple or branched stromata, cylindrical to clavate or globoid or irregular fertile parts (Roger 1979, Trierveiler-Pereira et al. 2009). *Xylaria* was classified on the basis of morphometrical character by giving priority to the length and position of germination of ascospores (Whalley 1996). *Xylaria* species grow on various substrates, but the major substrate is decaying

wood, and wood logs, therefore they are wood decaying fungi mostly saprobic or rarely parasitic in nature (Rogers 2000). The new species of *Xylaria* from western ghat of India *Xylaria symploci* was reported by (Pande et al. 2005). Six new record *Xylaria* species for India out of ten species were collected from Musashi forest, western ghat of Maharashtra India (Kshirsagar 2009). Family Xylariaceae large and diverse family of phylum Ascomycota and randomly distributed throughout the world as pieces of evidence reported from the region or ecological diversity (Lee et al. 2018). Five species of *Xylaria* were reported from the Jalgaon district from various regions of the forest area (Firdousi 2021).

II. MATERIALS AND METHODS

In the present investigation, the thirty-three specimens of *Xylaria* were collected from various regions of Aurangabad district, 20 to 25 days after heavy rainfall during the year July (2016) to November (2019) after several intervals. The specimen of Stromata were collected in brown paper bags, noting the host name, locality, date of collection, color of the specimen, and type of attachment suggested by (Gilbertson and Ryvarden 1986), Dimension or range of measurement of stromata were done as started by (Ryvarden and Johanson 1980). The morphological and microscopic character was recorded, fresh material from the field and dried material in the laboratory. The freehand thin section cutting stromata is done with a sharp blade, stained, and studied in 5 % KOH, Lactophenol, Cotton Blue, and Melzer's reagent and microscopic observations were made under 40X and 100X Magnification (Olympus CX 41) in the laboratory.

III. RESULT AND DISCUSSION

***Xylaria feejeensis* (BERK.) Fr.**

Stromata annual, upright, up to 14.9 cm in length, corky, flattened, simple, the lower part of stromata grayish brown to black, stromatal context white. Perithecia rounded, some are flattened, few in stroma, present at periphery of stroma, 245–340×190–260 µm. Asci cylindrical, 91–85 × 3.2– 6.5 µm, 8-spored. Ascospores smooth, non-septate, ellipsoid-inequilateral, black, uniseriate, 9.8–16.5 × 3.5–6.5 µm.

Specimen examined: INDIA; Maharashtra, Marathwada, Aurangabad district, Taluka Kannad, Barkatpur; 20°22′30″N 75°23′29″E; alt 640m; on the living tree at root of *Senna siamea* (Lam.) H.S.Irwin & Barneby; 08/09/2019; *Vijay Gore* (VUG/VPM–711).

***Xylaria hypoxylon* (L.) Grev.**

Stromata annual, erect, up to 3.9 cm in length, corky, flattened, simple or branched, the lower part of stromata grayish brown to black, stromatal context grayish white. Perithecia develop beneath the stromatal surface showing protruduing papillae of the perithecial necks. Perithecia with comspicuous ostioles. Asci cylindrical, 90–115 × 5–5.5 µm, 8-spored. Ascospores smooth, non-septate, ellipsoid-inequilateral, black, uniseriate, 10.5–14.5 × 5–6 µm.

Specimen examined: INDIA; Maharashtra, Marathwada, Aurangabad district, Taluka Sillod, Ajanta forest; 20˚33′01″N 75˚42′09″E; alt 418m; on the wood logs of *Pistacia integerrima* J. L. Stewart ex Brandis; 02/10/2019; *Vijay Gore* (VUG/VPM–726).

***Xylaria multiplex* (Kunze) Fr.**

Stromata annual, upright, up to 7.1 cm in length, corky, flattened, simple, clavate, cylindrical, stromata grayish brown to black, stromatal context white. Perithecia black, sub-globous, embedded in fertile head, arrange in single layer, 285–375 × 170–240 µm. Asci cylindrical, 90–125 × 5–6.5 µm, 8-spored. Ascospores smooth, non-septate, ellipsoid-inequilateral, black, uniseriate, 8–11 × 5.5–6 µm.

Specimen examined: INDIA; Maharashtra, Marathwada, Aurangabad district, Taluka Sillod, Loanwadi; 20˚17′19″N 75˚32′10″E; alt 653m; on the wood logs of *Mangifera indica* L.; 01/09/2016; *Vijay Gore* (VUG/VPM–308).

***Xylaria polymorpha* (Pers.) Grev.**

Stromata annual, 2.4–7.6 × 0.5 – 2.5 cm, extremely variable in shape and size, cylindric to cylindro-clavate, with rounded fertile apices, short or long stipe merging gradually into fertile parts or sessile with long rooting bases. Stromata grayish white to tan, at first bearing conidia over entire clavate, becoming dull blackish brown to black as conidial layer sloughs or flakes off. Stromatal context white to off white. Stromatal surface rugulose to strongly rugose, ostiolar papillae obscure to discoid to hemispheric. Perithecia 520–790 × 320–430 µm. Asci long-stipitate, 8-spored, 155–230 × 6 – 15 µm, spore bearing part 95–145 µm, with apical ring rectangular to urn-shaped, 4.5 – 6.5 × 3 – 4 µm. Ascospores smooth, brown to dark brown, ellipsoid-inequilateral to navicular, with rounded to acute ends 22–28×5.5–7 µm, with straight to slightly oblique germ slit.

Specimen examined: INDIA; Maharashtra, Marathwada, Aurangabad district, Taluka Soygaon, Nimbayati Phata; 20˚32′54″N 75˚31′025″E; alt 336m; on the living tree of main trunk of *Butea monosperma* (Lam.) Taub; 09/11/19; *Vijay Gore* (VUG/VPM–784).

***Xylaria symploci* A. Pande, Waing., Punekar & Ranadive.**

Sromata annual, erect, 13–19 × 2.5– 3.5 cm, mostly straight, solitary, smooth, cylindrical, apex rounded, or rarely notched in upper part, surface pale yellow to yellowish green, with black dots of spread over entire surface, interior white, Stipe concolourous, slightly narrow, cylindrical, 2–5 × 2–3 cm, Stromatal surface becomes black wrinkled on drying. Perithecia numerous, innate, in one layer below the surface of stromata, ostiole punctuate or slightly papillate. Perithecia 710–780 × 320–450 µm. Asci numerous, cylindrical, stipitate, 8-spored, paraphysate, 95–130 × 10–12 µm. Ascospores light brown to brown, one celled, navicular or fusoid, slightly pinched at both tips, 12–16 × 4.5–6 µm, with germ-slits straight. Specimen examined: INDIA; Maharashtra, Marathwada, Aurangabad district, Taluka Sillod, Palashi; 20˚16′59″N 75˚34′02″E; alt 618m; on the wood logs of *Acacia nilotica* (L.) Delile; 01/09/2016; *Vijay Gore* (VUG/VPM–298).

IV. CONCLUSION

Genus *Xylaria* belongs to family Xylariaceae, it was observed that *Xylaria polymorpha* species found that grow on living tree of two host *Butea monosperma* and *Senna siamea*. All specimens were collected during July

(2016) to November (2019) after the regular interval from different sites of Aurangabad district (M.S.) India. Thirty-three specimens of macrofungi were examined, and from that five different species, were studied (Photo Plate 1). From the above discussion, it is concluded that *Xylaria multiplex* and *Xylaria polymorpha* were dominating macrofungi while *Xylaria feejeensis, Xylaria hyooxylon*, and *Xylaria symploci* were rarely observed, four species are new reported for Aurangabad district, are *Xylaria feejeensis, Xylaria hyooxylon*, *Xylaria multiplex,* and *Xylaria symploci,* belongs to five hosts *Acacia nilotica, Butea monosperma*, *Mangifera indica*, *Pistacia integerrima* and *Senna siamea*.

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Photo Plate - 1

Xylaria feejeensis (BERK.) Fr. *Xylaria hypoxylon* (L.) Grev. *Xylaria multiplex* (Kunze) Fr.

Xylaria polymorpha (Pers.) Grev. *Xylaria symploci* A. Pande, Waing., Punekar & Ranadive.

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Territories of Heterometrus Xanthopus (Pocock) (Scorpionidae) around Hadapsar, Dist: Pune, M/S, India

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ABSTRACT

The members of scorpion species Heterometrus xanthopus (Pocock) (Scorpionidae) are most venomous and ancient arachnids. The members of this species are mostly found in drier areas of India. They prefer to stay in self-made burrows in semi-arid or drier areas. These burrows occur in open velds and soft substratum of loam. They are also abundant around dried portion of Hadapsar of District Pune (M/S, India). The present study focused on study of habit and habitats of H. xanthopus (Pocock) (Scorpionidae).

Key words: Heterometrus xanthopus (Pocock), Scorpions, Habits, Habitat, Hadapsar.

I. INTRODUCTION

Scorpion studies have received very little attention as compared to other animal groups. It may be due to venomous nature of scorpion and nocturnal habitat, unusual superstitions and difficulties in collections. The scorpion fauna present in India has more than 126 species under five families and 19 genera (Tikader and Bastawade; 1983).

Scorpions present in dry region are mostly burrowing and nocturnal. They possess wax layered cuticle with enlarged pedipalps for digging, low BMR, excretion of guanine and release of dry faecal pallet etc. are adaptations in scorpion to live in dry and desert area (Hadley N.F. 1974). Water loss was more critical to survival (Marples and Shorthouse, 1982).

Heterometrus fulvipes (Brunner) are advanced in sub social behaviour as they make burrows as a cause of sub social behaviour because burrows provide them protection against predators, increase availability of food, ideal microclimate. Burrow allows the mother and offspring to live together. The cohabitation of relative offspring transforms the burrow into nest (Shivashankar, 1994). Awati and Tembe (1952) made monogram of *Buthus tamulus* (Fabr.).

Members of *Heterometrus* are generally large-sized scorpions (80–120 mm total length). The taxonomic characters of *H. xanthopus* were described by Tikader and Bastawade; 1983. Males of *H. xanthopus* are smaller than females. Body is brownish with blackish tint, targites are I-IV provided with inconspicuous >> - << yellowish marks on lateral portion. Sternite is yellowish. Chelicerae are yellowish but brown on fingers. Pedipalps are yellowish brown and dark brown on fingers. Legs are dark yellowish with a brownish tint.

Metasoma is light brown but darker on carinae. Telson is yellowish but aculeus brownish on distal portion (Fig.1).

II. OBJECTIVES OF THE STUDY

The main objective of the present study was to observe animal diversity in the study area and to study microhabitats of scorpion species found in the study area.

III. HYPOTHESIS

The study area is located in eastern portion of Western Ghats with semi-arid, loamy soil with seasonal grasslands. Rich biodiversity was expected in the study area. No detailed survey record found. So, there is an urgent need to study.

IV. MATERIAL AND METHODS

The present study was carried out in December 2021 to March 2022. The study area was in the Southern portion of Hadapsar, Pune M/S, India (18°25'55.3"N 73°58'08.1"E). The random sampling was performed in a study area without disturbing natural habitats. The burrows of *H. xanthopus* was identified with the help of literature of More & Khatavkar (1990). Burrows of *H. xanthopus* were confirmed and photographed for further studies (Fig. 4). The seasonal variation in temperature and humidity in the burrow was measured by using (Hadley 1970) method.

V. RESULT AND DISCUSSION

Heterometrus xanthopus (Pocock) (Scorpionidae) species of scorpion was chosen for present study. The species were available locally in southern portion of district Pune (Maharashtra, India). The members of *H xanthopus* prefered a very dry, warm climate and lived in most dried area. The members were observed in self-made burrows in soft soil substratum. The open entrance burrows were observed (Fig: 2). Shape of the entrance observed was oblique with about 2-5 cm length and 1-5 cms breadth. The depth of burrows depends on type of soil and it ranged from 12 cms to 52 cms. Members of the species were observed at the base of the burrow. Humidity observed at the base of burrows was 70 % and with body remains of Coleopterans, Orthopterans and other insects. *H. xanthouus* might consider soil hardness and texture, the presence of shading etc. while making burrows. Adequate soil moisture, protection against sand and debris was observed in the burrows.

Few measurements such as actual temperatures and humidifies of burrows were measured. It is difficult to place thermocouples into the deeper burrow chambers without disrupting the burrow structure due to the spiral nature of burrows (Hadley 1970). To overcome this problem, a thermocouple with a sensor was attached to the leg of *H. xanthopus* and allowed them to carry down into burrows. The relative humidity inside the burrow

was determined by tethering individual scorpions with nylon thread to which thin strips of humidity-indicator paper were tied and after sufficient time for equilibration, quickly removing the scorpion for the reading. The results of this study indicated that due to diurnal fluctuations in temperature, species of scorpion made deep burrows and protected themselves within the burrows. It was observed that scorpions occupying shallow terminal burrows experienced temperatures approaching 33°C, whereas an individual inhabited in 40 cm experienced an almost-constant 24° C. Relative humidifies at depths of 22 to 40 cm ranged from 60 to 67 percent. It was also observed that all females of *H. xanthopus* undergo parturition in the first week of the month May. The early babies of *H. xanthopus* were observed to be very tiny and appeared to stay at the burrow with their mother (Giramkar S. V. 2013). The male and female specimens were observed in separate burrows, possibly due to the catabolistic nature of scorpion species.

Fig: 1

Fig: 2

Fig: 3

VI. CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest.

VII. ACKNOWLEDGMENT

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Comparative Analysis of Dielectric Constant and Loss Parameters of Ethanol and Methanol with Lorazepam

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ABSTRACT

In the dielectric relaxation study, the Debye relaxation equation and its derivatives used to analyze the experimental permittivity of Ethanol, Lorazepam binary mixture and Methanol, Lorazepam binary mixture over the frequency range of 10MHz to 50GHz. at temperature 283K, 288K, 293K and 298K and at the concentration of 0, 20, 40, 60, 80 and 100% of volume, to form the binary mixture. The plot of dielectric constant of Ethanol and Methanol against mole fraction of Lorazepam is useful to determine how well the experimental data fits the Debye equation.

KEYWORDS –Dielectric constant, Ethanol, Methanol, Lorazepam, Debye.

I. INTRODUCTION

To distinguish non-polar solvent and polar solvents, dielectric constant can be used. Generaly solvents with dielectric constant less than 15 are considered non-polar, while those with the value more than 15 as polar solvents. Technicaly dilectric constant measures the solvents ability to reduce the field strength of the electric field surrounding a charged particle immeresed in it. The dielectric relaxation can also used for study of H-bonded liquids [1]. Determination of complex permittivity spectra in the gigahertz range is now a days fairly straightforward for non-conducting liquids. Advanced microwave techniques have accelerated to remarkable development of measuring complex permittivity over wide frequency range by time domain reflectometry (TDR) technique [2].

The permittivity and dielectric loss are given by the Debye equation

$$\varepsilon^* = \varepsilon_\infty + \frac{(\varepsilon_0 - \varepsilon_\infty)}{(1 + i\omega\tau)}$$

where ε* = ε'- iε", ε' is known as dielectric dispersion and ε" is known as dielectric loss which are given by –

$$\varepsilon' = \varepsilon_\infty + \frac{(\varepsilon_0 - \varepsilon_\infty)}{(1+\omega^2\tau^2)} \quad (1)$$

$$\varepsilon'' = \frac{(\varepsilon_0 - \varepsilon_\infty)\omega\tau}{(1+\omega^2\tau^2)} \quad (2)$$

Equation (1) and (2) are known as Debye equations[3] which describes the behaviour of dielectric at various frequencis. These equations used to compute the values of dielectric constant, loss factor, and relaxation time.

Information regarding to solute solvent interaction may be obtained by excess properties[4]

The excess permittivity (ε_0^E) is defined as[5]

$$\varepsilon_0^E = (\varepsilon_0)_m - [(\varepsilon_0)_A X_A + (\varepsilon_0)_B X_B] \quad (3)$$

Where, X is the mole fraction and the subscript m, A and B represent mixture, solute and solvent respectively.

The excess permittivity provides qualitative information about multimer formation in the mixture as follows.

(i) ε^E=0: indicates that liquid A and liquid B do not interact and do not change their individual structural properties in the presence of other liquid.

(ii) ε^E<0: indicates that liquid A and liquid B interact in such a way that the effective dipole get aligned in antiparallel direction resulting in effective dipole moment gets reduced. The solute and solvent may form multimers leading to less effective diploes. In general the negative excess permittivity indicates the formation of multimers having small values of effective dipoles in the binary mixture.

(iii) ε^E>0:indicates liquid A and liquid B interact in such a way that the effective diploe moment increases. This may be due to breaking of multimer structure into monomer structure in the presence of other molecule.

II. RESULT AND DISCUSSION

Table 1.Physical constants of pure liquids.

Sr. No.	Name of Compound	Molecular Formula	Permittivity Literature value (εs)	M.W. g/Mole	Density g/cm3	Dipole Moment μ D	R. I.
1	Ethanol	C2H5OH	24.3	46.03	0.789	1.69	1.3617
2	Methanol	CH3OH	32.7	32.04	0.792	1.69	1.3314
3	Lorazepam	C15H10Cl2N2O2	N.A.	321.2	1.52	N.A.	1.60

Table 2.Temperature dependent dielectric parameters of Ethanol and Methanol with Lorazepam.

Mole Fraction of Lorazepam	283K		288K		293K		298K	
	Ethanol εs	Methanol εs	Ethanol εs	Methanol εs	Ethanol εs	Methanol εs	Ethanol εs	Methanol εs
0	39.71	33.27	38.49	32.03	35.96	31.69	34.48	31.42
0.046	40.03	34.46	38.72	33.85	37.25	33.58	36.62	33.52
0.113	40.63	38.14	39.49	36.14	39.46	34.32	38.16	34.14
0.223	41.28	40.58	41.01	38.96	40.45	38.45	39.6	37.35
0.434	54.31	45.87	53.08	43.76	48.4	41.98	47.71	41.42
1	58.96	58.96	54.47	53.47	52.58	52.58	48.43	48.43

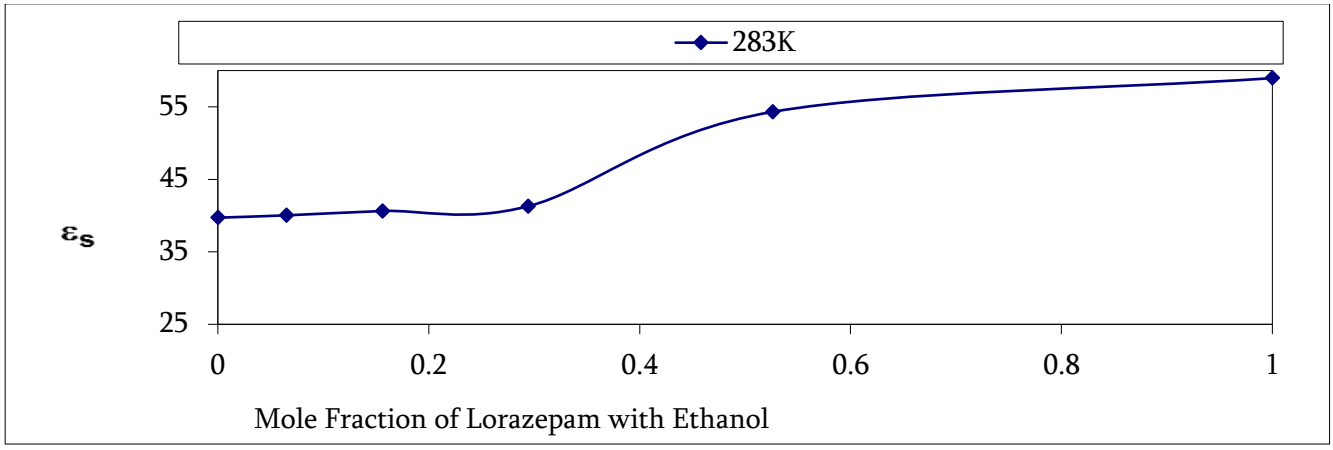

Fig. 1.a Dielectric constant of Ethanol at 283K.

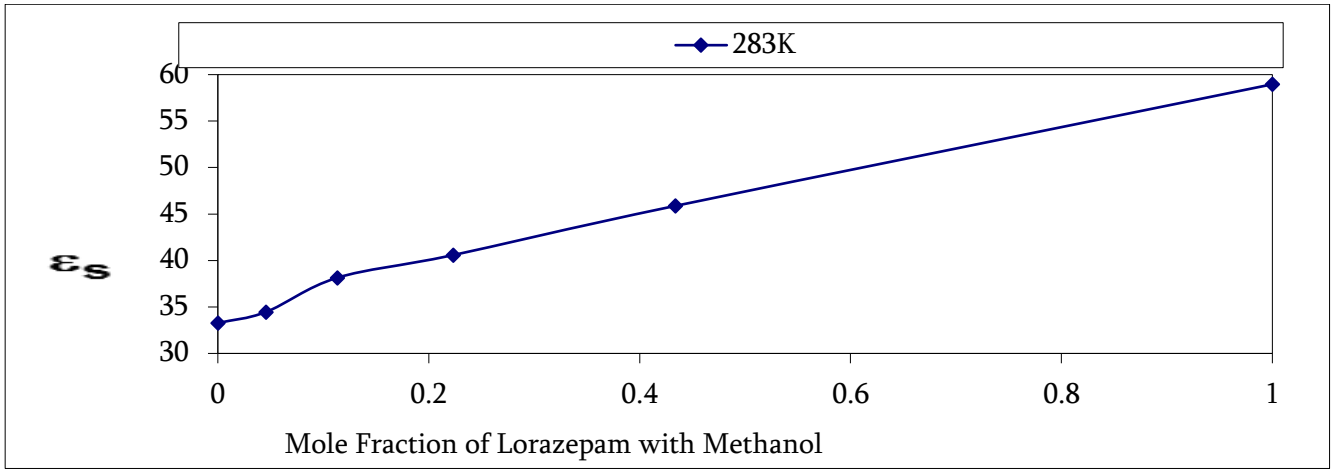

Fig. 1.b Dielectric constant of Methanol at 283K.

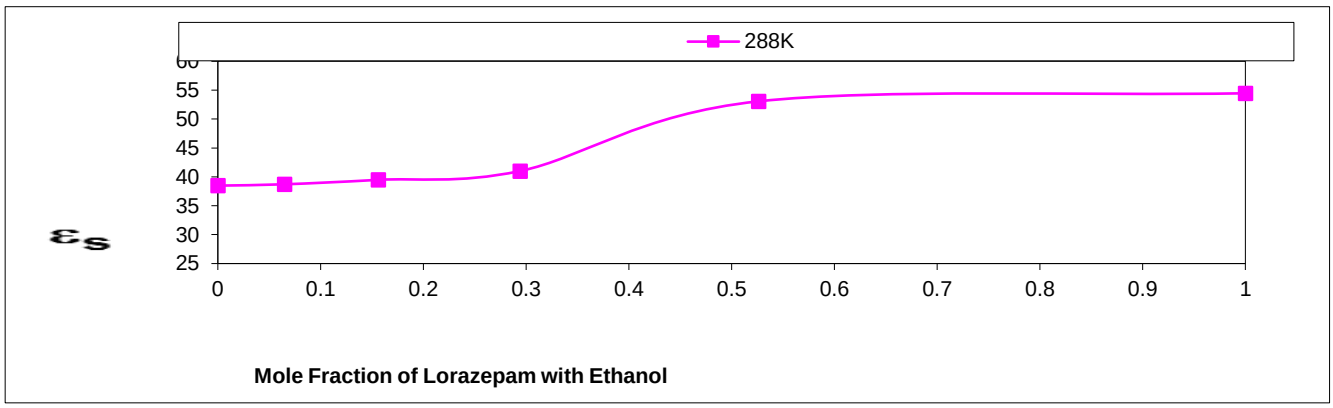

Fig. 2.a Dielectric constant of Ethanol at 288K.

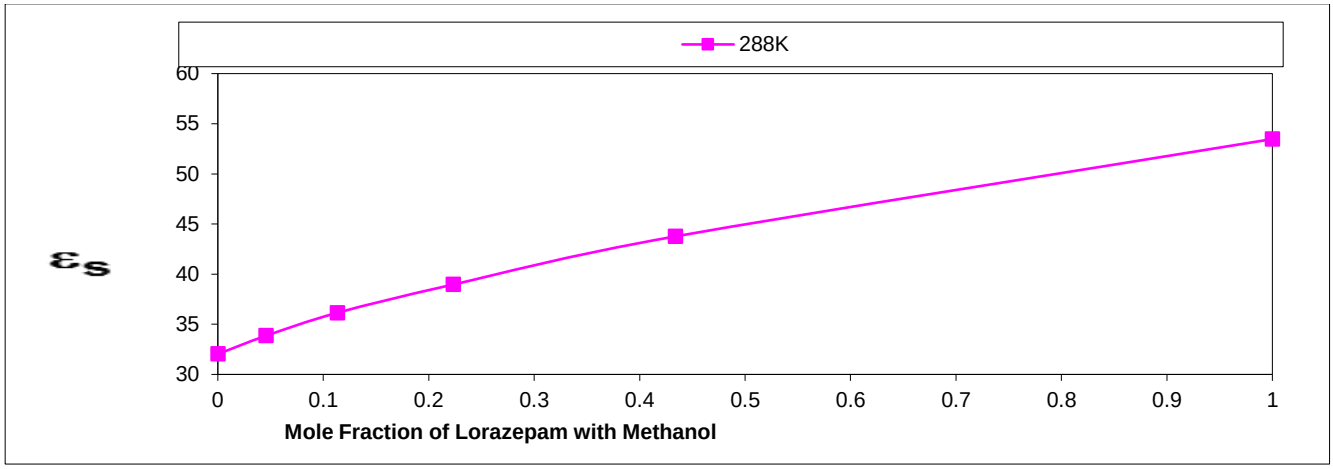

Fig. 2.b Dielectric constant of Methanol at 288K.

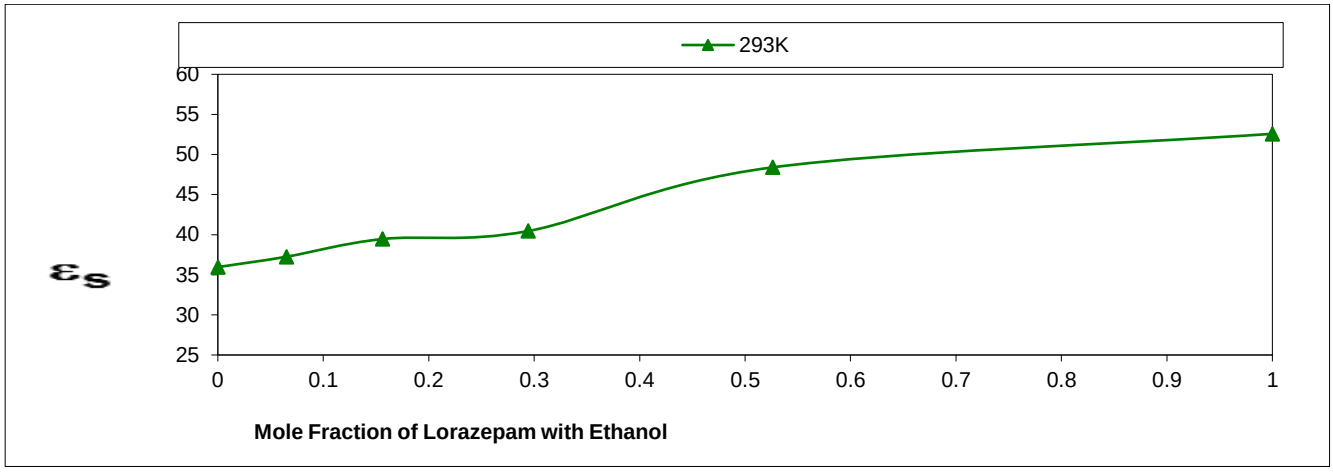

Fig. 3.a Dielectric constant of Ethanol at 293K.

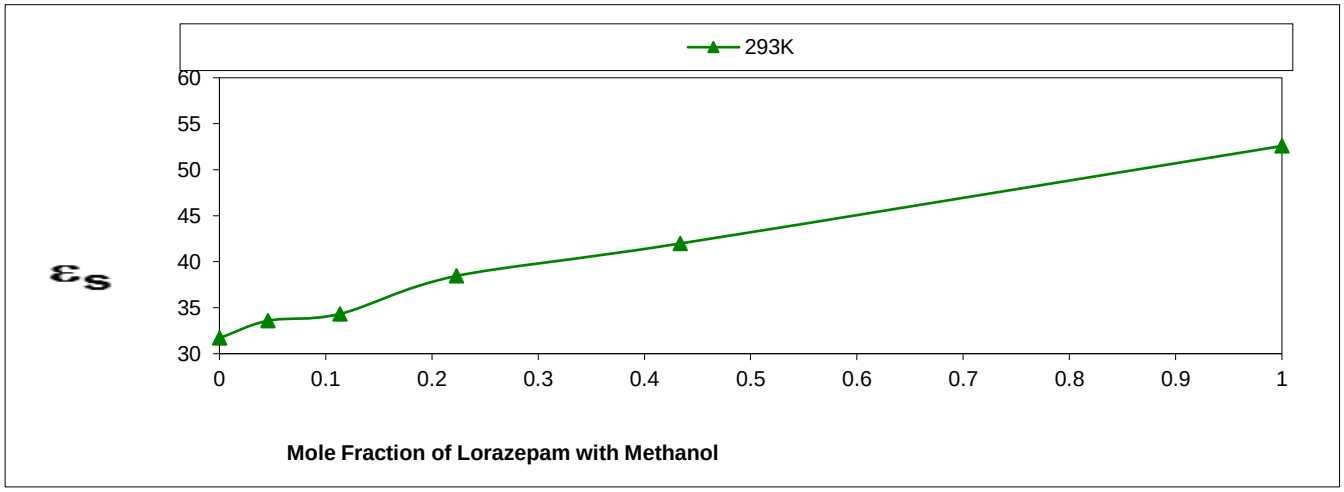

Fig. 3.b Dielectric constant of Methanol at 293K.

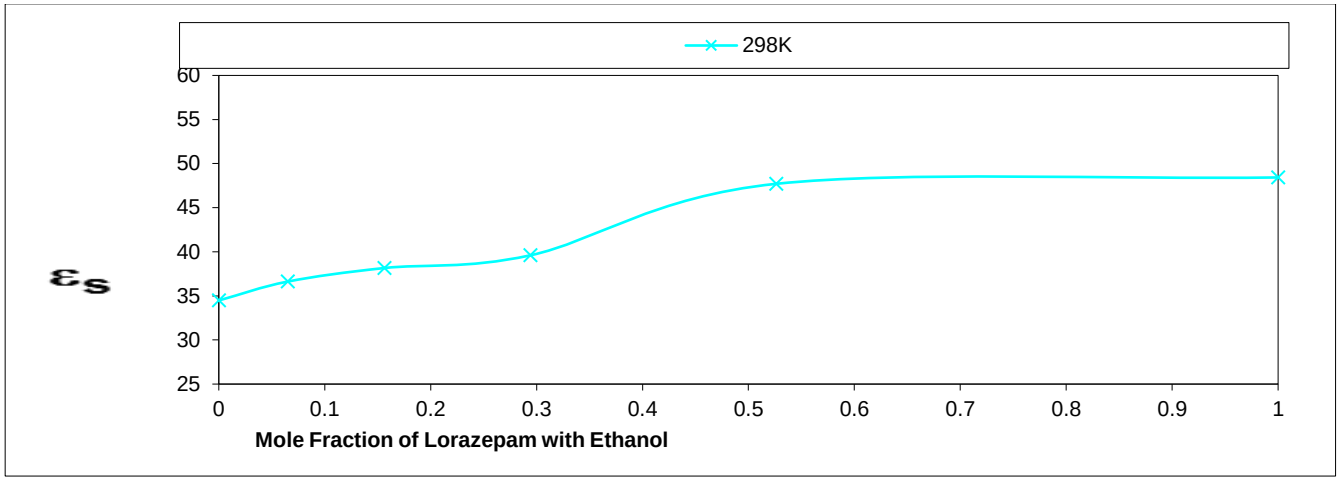

Fig. 4.a Dielectric constant of Ethanol at 298K.

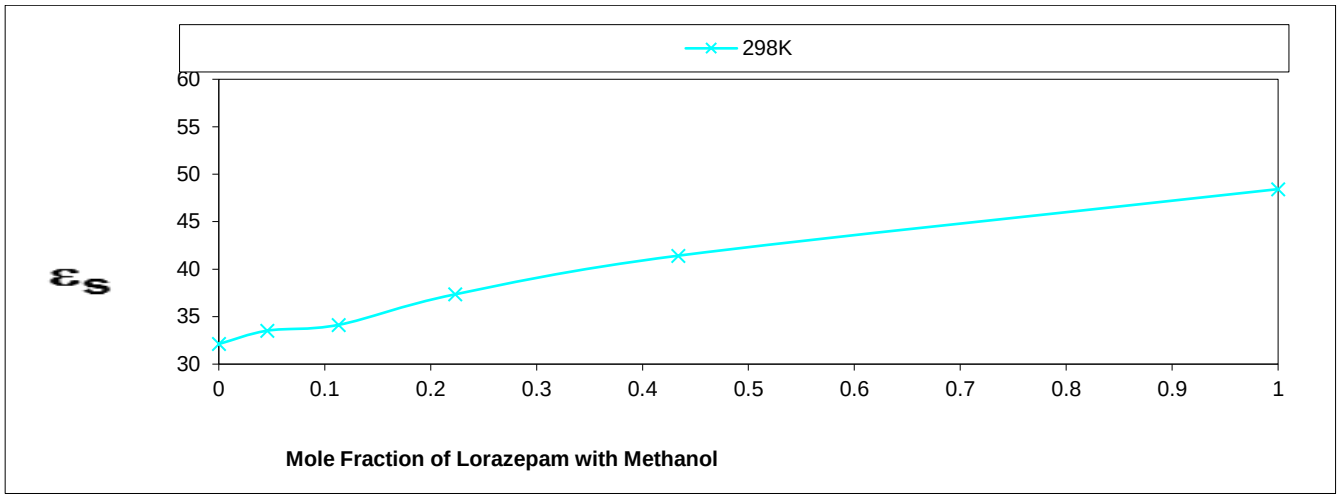

Fig. 4.b Dielectric constant of Methanol at 298K.

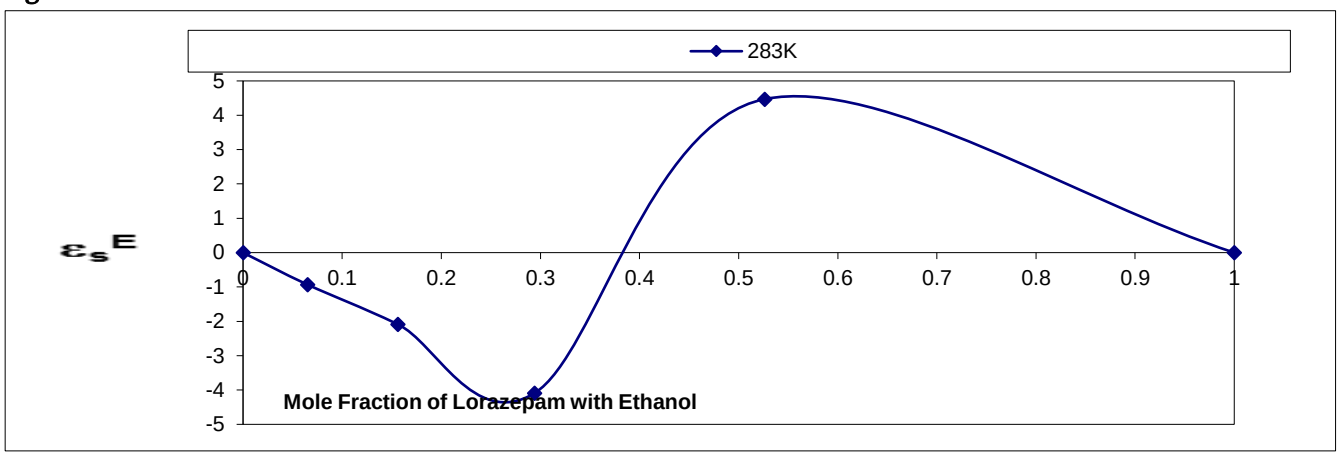

Fig. 5.a Dielectric loss of Ethanol at 283K.

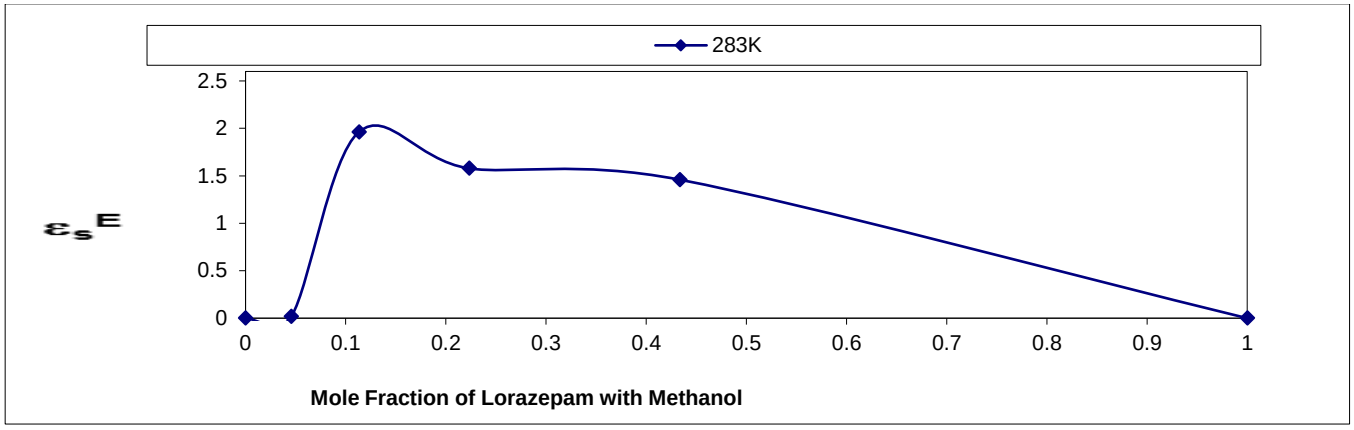

Fig. 5.b Dielectric loss of Methanol at 283K.

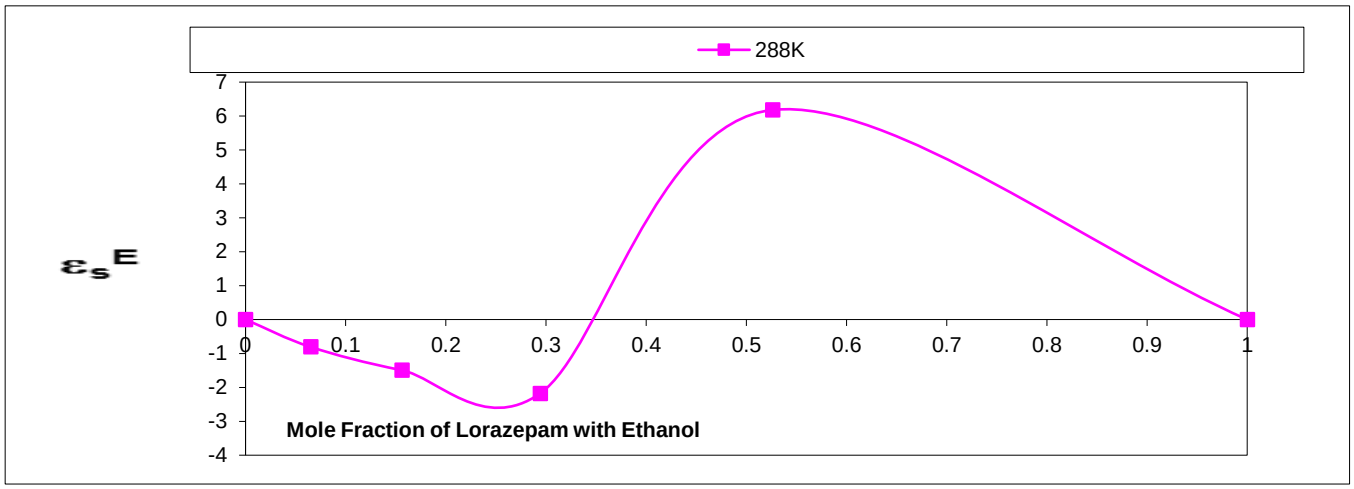

Fig. 6.a Dielectric loss of Ethanol at 288K.

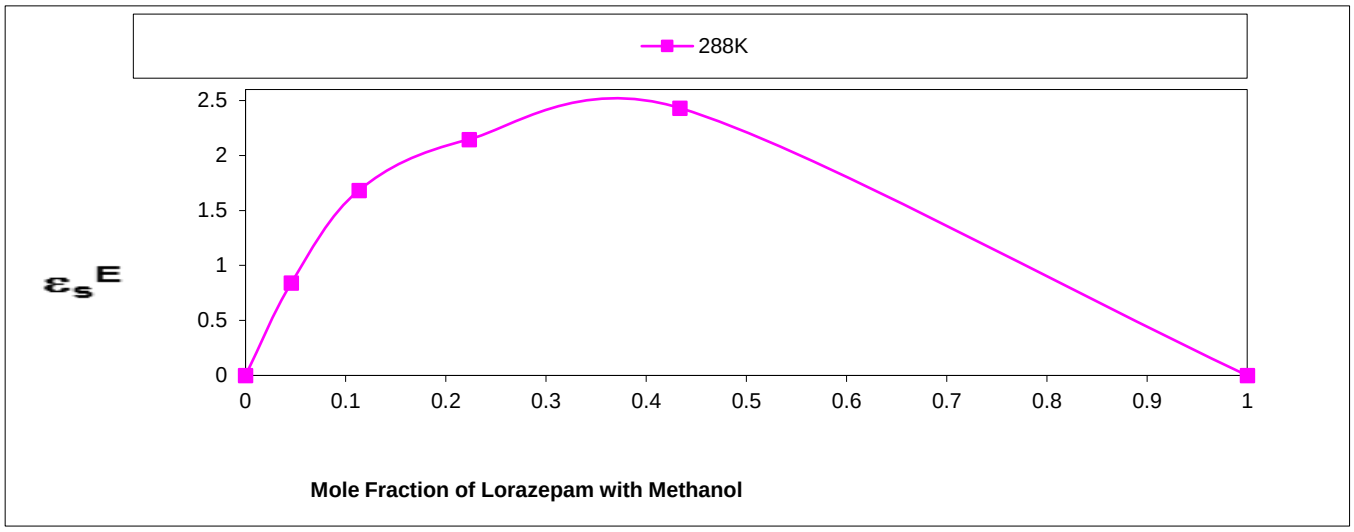

Fig. 6.b Dielectric loss of Methanol at 288K.

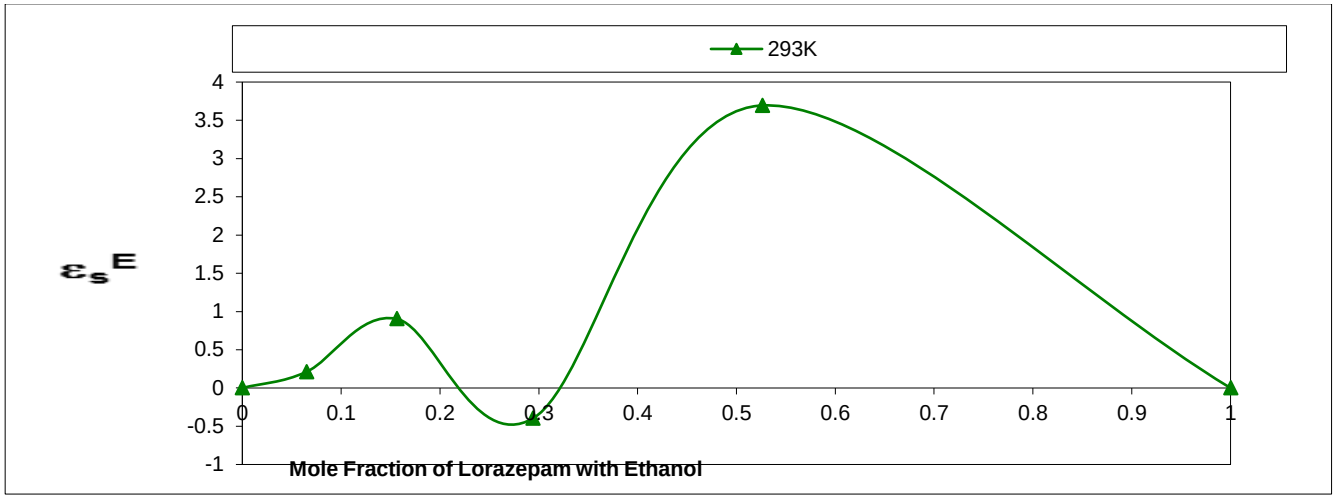

Fig. 7.a Dielectric loss of Ethanol at 293K.

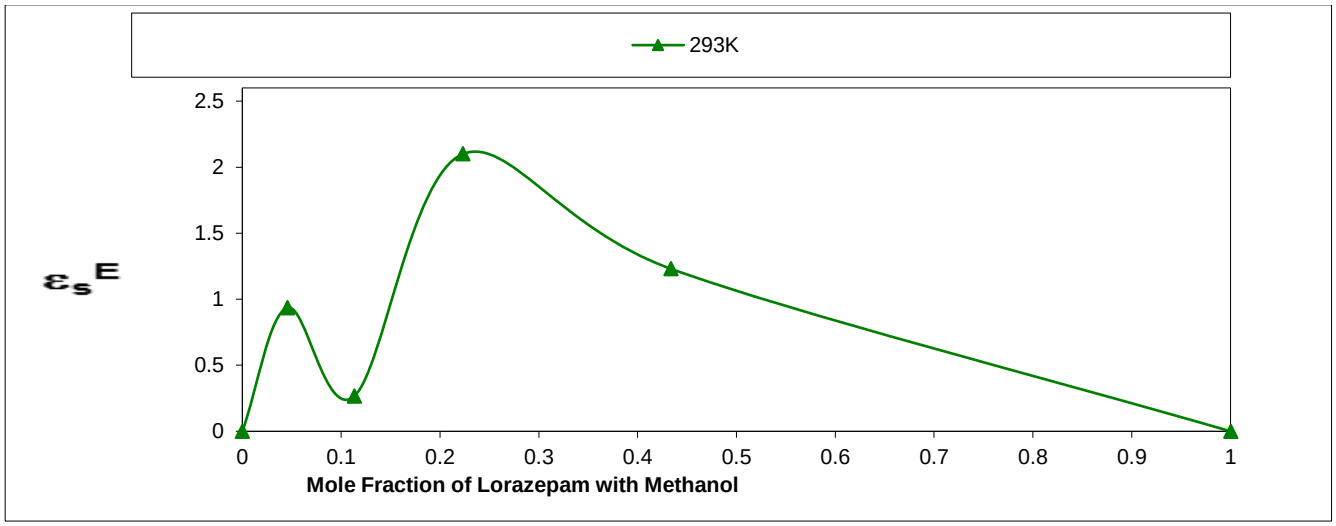

Fig. 7.b Dielectric loss of Methanol at 293K.

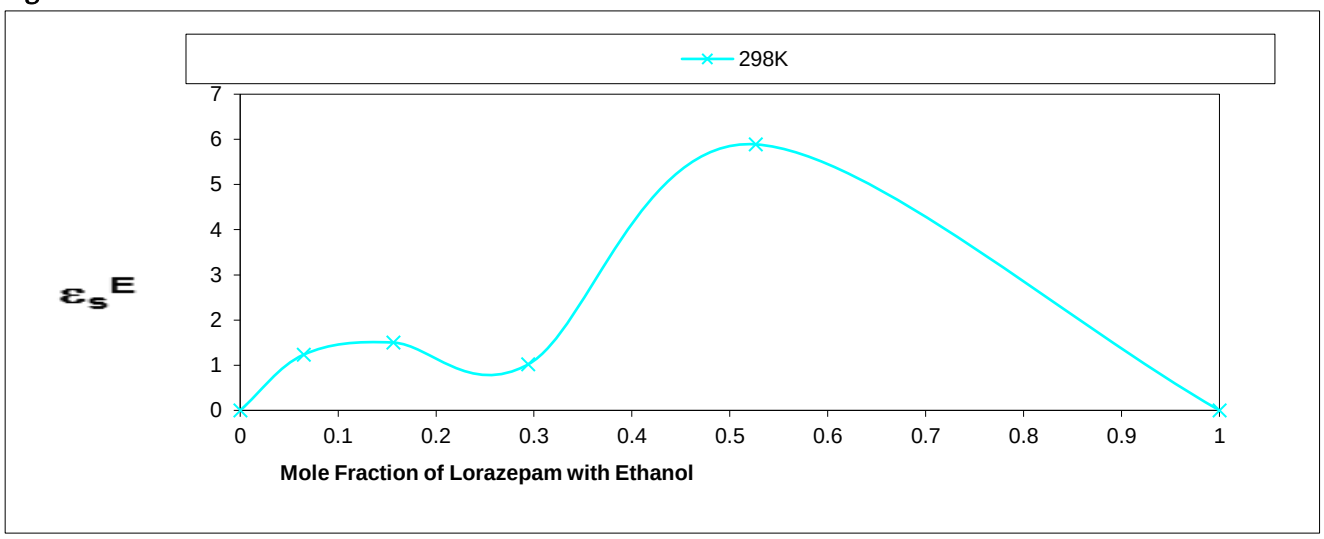

Fig. 8.a Dielectric loss of Ethanol at 298K.

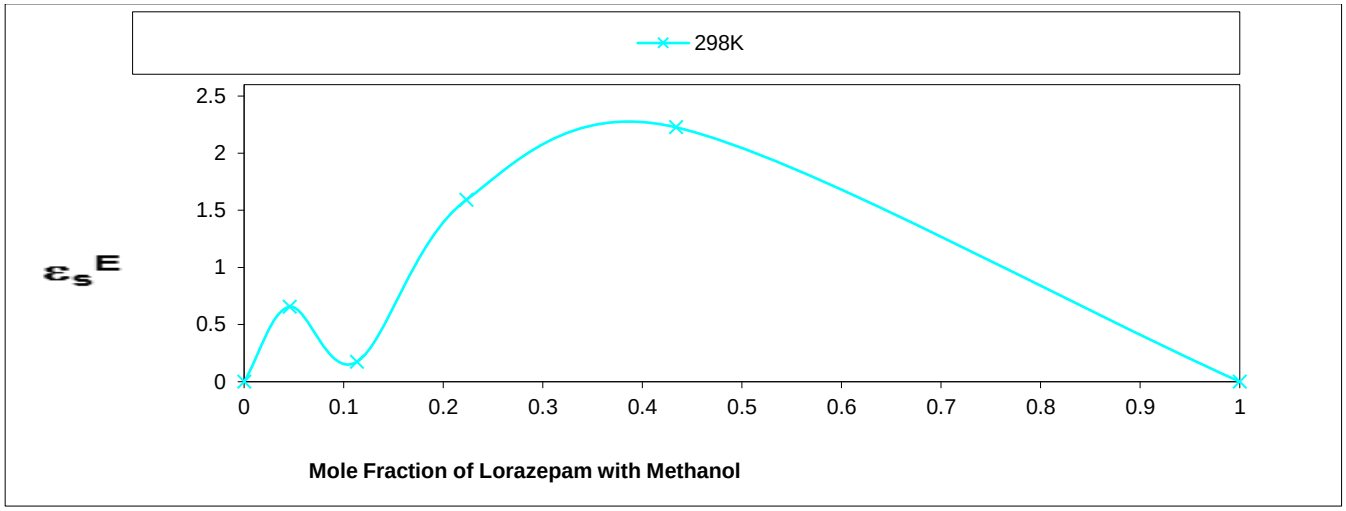

Fig. 8.b Dielectric loss of Methanol at 298K.

Every Fig. a is related to Ethanol and every Fig. b is related to Methanol, with Lorazepam, and are used for comparative study. The dielectric constant and loss factor of Ethanol with Lorazepam and Methanol with Lorazepam both binary mixture were computed using Debye relaxation method. The result revealed that the dielectric constant is low and increases with increase in the mole fraction of Lorazepam for both Ethanol and Methanol. At lower temperature the dielectric constant of Ethanol is higher, and hence it is observe that as the temperature increases the dielectric constant of both Ethanol and Methanol was found decreaseing. The decrease in the dielctric constant as a result of increase in temperature may be due to relaxation time. The highest value observed at 80% of Lorazepam and 20% of Ethanol, the dielectric constant is 54.31 and for 20% of Methanol it is 45.87, at 283K temperature.

III. CONCLUSION

The Debye equation and its derivatives have been used to compute the dielectric constant and loss factor of both Ethanol and Methanol with Lorazepam. The result revealed within frequency rang of 10MHz to 50GHz, at temperature 283K, 288K, 293K and 298K. The dielectric constant is low and increases with increase in the mole fraction of Lorazepam. The dielectric constant decreases as the temperature increase in the binary mixture.

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Soybean Response to Biological and Chemical Fertilizers

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ABSTRACT

The field trial was conducted to investigate the effect of organic and inorganic Fertilizers on the growth of leguminous crop viz., soybean. The experiment was carried out in a Randomized complete Block Design (RCBD) and field trials were carried out in triplicates. The variety Mahabeej was used for trial. The fertilizers treatments comprised of five type's viz., Urea, 18-18, 12-32-16, FYM, poultry manures, Compost manures and control crop was not provided any fertilizer treatment. The result showed that poultry manures+18-18 and FYM +18-18 fertilizers had significant effect on Biochemical analysis (Crude Protein, Crude Fat, Crude Fiber, Nitrogen free extract, Acid Insoluble Ash and Total Carbohydrates,) at 30, 60, and 90 days after sowing. FYM+18-18 fertilizers had significant effect on Biochemical Analysis in comparison with untreated crop.

Keywords: Poultry Manures, Compost Manures, Yield Production, Inorganic Fertilizers, Control crop.

I. INTRODUCTION

Soybean (Glycine max L.) is considered as a wonder crop of 21st century which is the top oil seed in the world production. It is an important oil seed crop in addition to source of food, feed and nutrition (Imkongtoshi and Gohain, 2009). Organic fertilizers not only improve the soil physical and biological properties, also improved the efficacy of chemical fertilizers (Alam et al., 2010). Application of organic manure not only produced the highest and sustainable crop yield, but also improves the soil fertility and productivity (Sanwal et al., 2007). FYM provides essential macro and micro-nutrients, improves soil physical, chemical and biological environment by which it increases crop yield (Sangashetty, 2006). Nitrogen should be applied to a crop at times that avoids periods of significant loss and provide adequate N when needed. Soybean nitrogen (N) requirements are met in a complex manner, as this crop is capable of utilizing both soil N (mostly in the form of nitrate) and atmospheric N (Through symbiotic nitrogen fixation) (Vera et al., 2002). Manure is a readily available organic source of essential plant nutrients. It is used primarily as a source of plant nutrients (Mullins et al., 2002). Soybean being a highly nutrient-exhaustive legume requires higher amounts of nutrients, particularly P and K for its optimum production (Hasan, 1994). While application of

nitrogen fertilizer is not common for soybean crop, it is believed that the ability of soybean plant for fixing air N2 to meet nitrogen requirements and maximum yield production is not enough (Wesley et al., 1998).

II. MATERIAL AND METHODS

The present work entitled "Effect of Various Fertilizers on the Growth and Yield of Soybean and Jowar" was carried out, during three consecutive Rabi seasons in the year 2016 to 2018 at the Department of Botany Sawarkar Mahavidyalaya, Beed. The experimental plots were laid out in a Randomized Complete Block Design (RCBD). Two plants were selected one from leguminous (Soybean) and other from non-Leguminous (Jowar). The Square plots were allocated with three organic and other inorganic Fertilizers viz., Application of farmyard manure (FYM= 10t/ha) Application of Poultry manure (PM), Application of Compost manure (CM= 2.5ton/ha) and Applications of recommended doses of chemical fertilizers i.e. Urea: 46% N (N= 180kg/ha), phosphorus and potassium. The experimental crop seeds were sown using single row hand drill on well prepared seeds bedthe quantity of FYM and PM to be added was calculated according to Rashid and Memo (2001). Dose of phosphate (P), nitrogen and Urea in the respective plots before sowing and remaining at the time sowing was applied. All other agronomic practices were kept normal and uniform. These fertilizers treatments were designated as F1 to F14 respectively.

The *Soybean* variety (**Mahabeej DS 228**) was cultivated for three seasons to observe the effects of different organic and inorganic fertilizers. The effects of FYM, poultry manure, chicken manure, compost manure and inorganic fertilizers viz., nitrogen (N), phosphorus (P) and potassium (K) on the treated and control plants were studied. The chemical composition of *soybean* calculated for three seasons has been given in the (Table No.20, 21and22). In the year (2016) application of organic and inorganic fertilizers significantly showed an increase in the dry matter content, crude protein and crude fibers, total ash and acid insoluble ash over the untreated crop.

III. RESULT AND DISCUSSION

Table No. 20: Effect of organic and inorganic fertilizers on Control and Treated *Soybean* crop (2016)

Sr. No.	Parameter	Treatments		Difference
		Control	Treated	
1	DM	16.15	17.30	1.15%
2	CP	29.60	31.85	2.25%
3	Cfat	3.50	3.90	0.40%
4	CF	28.50	30.30	1.8%
5	Total Ash	15.10	15.20	0.10%
6	AIA	6.30	6.80	0.50%
7	NFE	23.30	18.75	4.55%
8	TC	51.80	49.05	2.72%

In the first year (2016), the dry matter (DM) in treated *soybean* was 17.30% while in control it was 16.15%. The crude protein content of control and treated was 29.60 and 31.85 respectively. Crude fat (Cfat) concentration in control and treated was 3.50and 3.90. The crude fibre (CF) from treated and control 30.30 and 28.50.The total ash was 15.20 and 15.10 respectively. Acid insoluble ash was calculated and was 6.80 and 6.30 from treated and control. Nitrogen free extract was calculated and that was 18.75 from treated and 23.30 from control. The total carbohydrate measured and was 49.05 and 51.80 from treated and control plant respectively.

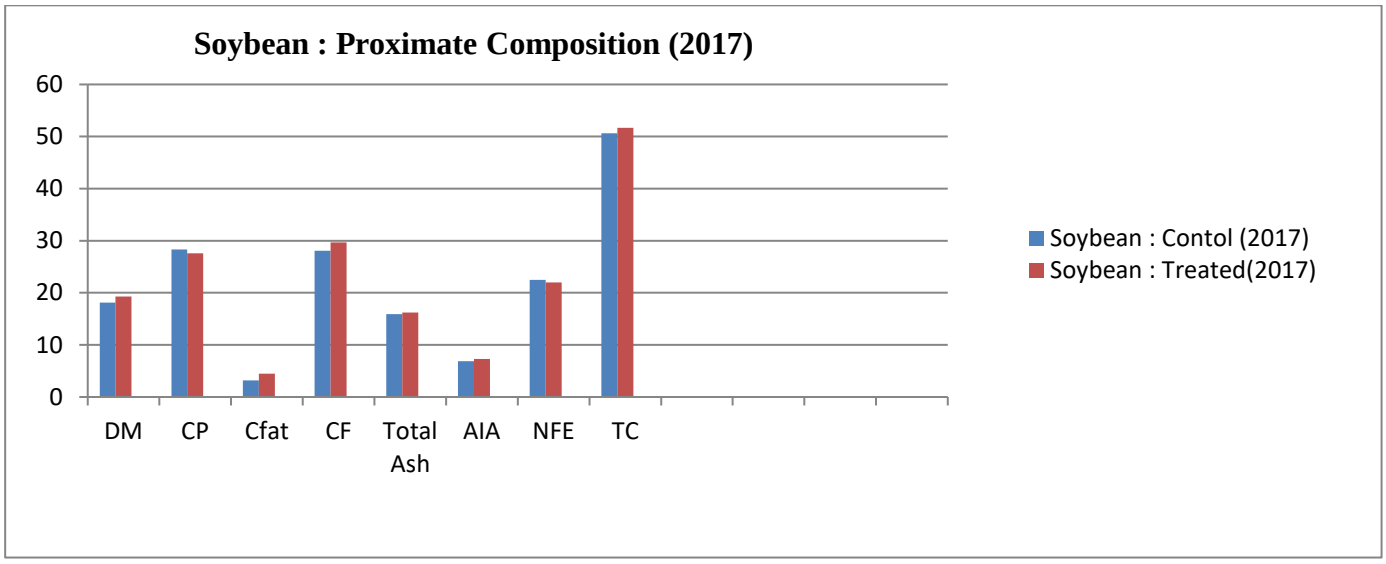
Table No. 21: Effect of organic and inorganic fertilizers on Control and Treated *Soybean* crop (2017)

Sr. No.	Parameter	Treatments		Difference
		Control	Treated	
1	DM	18.10	19.30	1.2%
2	CP	28.30	27.60	0.7%
3	Cfat	3.20	4.50	1.3%
4	CF	28.10	29.70	1.6%
5	Total Ash	15.90	16.20	0.3%
6	AIA	6.90	7.30	0.4%
7	NFE	22.50	22.00	0.50%
8	TC	50.60	51.70	1.1%

During the second year i.e.2017 the contents of dry matter, crude protein, crude fat, crude fibre, total ash, acid insoluble ash, nitrogen free extract, total carbohydrate from treated crops were 19.30, 27.60, 4.50, 29.70, 16.20, 7.30, 22.00 and 51.70 respectively whereas from the control that were 18.10, 28.30, 5.20, 28.10, 15.90, 6.90, 22.50 and 50.60 respectively. In the last year (2018) the dry matter, crude protein, crude fat, crude fibre, total ash, acid insoluble ash, nitrogen free extract and total carbohydrate from treated *soybean* were 22.50, 29.30, 6.40, 30.90, 15.40, 7.20, 18.00 and 30.90 respectively. On the other hand from control *soybean* were 20.60, 27.80, 5.80, 28.70, 14.70, 5.80, 23.00 and 51.70 respectively.

The results obtained by Rajput *et al.,* (2018) on proximate composition from legume and non-legume fodder crops were however higher than the results obtained during present work. The results recorded from present work for the yields are in agreement with the results obtained by Patil and Mungikar (1991). The variations seen in the values of control crops were due to the seasonal changes. The results obtained indicated that the dry matter yield and nutrient elements showed an increase owing to utilization of poultry manure, chicken manure, compost manure

Graph:



IV. CONCLUSION

The response of soybean crop to various treatments was evaluated with growth attributes and yield attributes nutrient contents of soil before sowing and after harvest. The salient findings of this investigation are enumerated as under. The Biochemical composition of soybean concluded for three years, the dry matter yield of soybean crop was comparatively high (22.50%) in 2018 as compared to the dry matter production in the years 2016, 2017 which was (17.30%) (19.30%) respectively. 13. The crude protein was recorded maximum in the year 2018 i.e. (29.30%) whereas it was (27.60%) and (31.85%) during the 2017 and 2016 respectively in soybean crop. 14. Total carbohydrates was recorded maximum in the year 2017 i.e. (51.70%) whereas it was (30.90%) (49.05%) during the 2018 and 2016 respectively. 15. From the present work it may be concluded that the legume and non-legume fodder plants with more nutritive significance and increased productivity can be practiced in this Marathwada region.

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Evaluation of Medicinal Plant Extracts (Spray) As Disease Resistance in Selective Plant Pathogens

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ABSTRACT

In recent era we have seen that there is increase in fungal infections rate in plants and crops as well as further to animals and humans so all over the globe excessive chemical controls been used as fungicides, the excessive use of these chemicals having adverse effect on nature, so need is to use plant extract by using most effective extraction methods. So it had become the demand to develop most effectual methods for the extraction and segregation bioactive contents from antifungal medicinal plants. Present review focused upon the methods used in the extraction and separation of natural content. In this research the results obtained by preparing mix medicinal plant extract as a spray made by using Allium cepa, , Calotropisprocera, Tageteserecta, Daturastramonium, Ocimum sanctum (O. tenuiflorum in same quantity serve as best examples of traditional and latest techniques concerned in extraction of effective contents from medicinal plants.

Key words: Anti fungal, Medicinal Plant Extraction,

I. INTRODUCTION

In recent era we have seen that there is increase in fungal infections rate diagonally the world due to the manifestation of antifungal efficacy to diverse fungicidal used in medicinal practice. It is usually documented that several types of fungal pathogens can be a reason for loss in cereal yield. Furthermore fungal pathogens can have an effect on cereal grains during the storage period, which is out of st&ard for human use by, worsen the safety & quality of food product. Mycotoxins present in that fungi cause serias loss as well as unfit for taking it as food [1].

Further it cause rancid flavor in the grains [2,3] the fungal species like Aspergillus, Penicillium&Fusarium distressing the production of grain, cereal further it leads in degradation of food . The variety of strategies used for the check out for fungal infection, like acceptance of specific agronomic application for the expansion of anti fungal varieties [4].

Most of the plant diseases controlled by using various chemical additives available in market. Viz. Imazalil-SulphateBenzimidazoles ($C_7H_6N_2$), Organic, & Inorganic Sulfur Contents & oxidizing stuffs have been pioneered to managing various plant disease. The recent focus point is that the widespread use of such chemical components which are responsible for the serious environmental problems, toxic effects upon animals & humans, organization of fungal resistant races, is having elevated costs. So now a days to protect environment & to reduce coast of fungicides more than two hundred species work as plant pathogens become defiant to chemical pesticides further, various side effects cause by pesticides have been noted .

II. MATERIALS AND METHODS

1) II-1: Plant collection

Leaf materials of the selected 05 plant species viz., Allium cepa, ,Calotropisprocera, Tageteserecta, Daturastramonium, Ocimum sanctum (O. tenuiflorum),plant species were collected from the various regions of latur district.

2) II-2: Extraction procedure

Each finely ground plant material (4 g) were extracted with 40 ml of solvents of increasing polarities: hexane, dichloromethane, acetone and methanol (technical grade-Merck) in polyester plastic tubes, while shaking vigorously for 3-5 min on a shaking matchine at high speed. After centrifuging at 3500 rpm for 5 min, the supernatants were decanted into labelled, weighed glass vials. The process was repeated three times on the marc and the extracts were combined. The solvent was removed under a stream of cold air at room temperature. Plant extracts were re-dissolved in acetone for further microbiological assays and phytochemical analysis.
After that all plant extract mix in container in total amount divided by 5

III. RESULTS

The experiments carried out on extracts of 05 plant species viz., Allium cepa, , Calotropisprocera, Tageteserecta, Daturastramonium, Ocimum sanctum (O. tenuiflorum),All solutions were mix together and solution were used as spray which showed antifungal properties against five pathogenic fungi under laboratory condition by using different concentrations (400. 600, 800 , 900 micro g/ml.). Leaf extracts of Allium cepa, , Calotropisprocera, Tageteserecta, Daturastramonium, Ocimum sanctum (O. tenuiflorum), were the most antifungal against all the test fungi, their potential was more pronounced at 900 micro g/ml.

Table 1: antifungal activity of the medicinal plant extract against plant pathogens isolated from various diseased plants (900 micro g/ml.)

Sr. no	Isolated pathogens	Zone of Inhibition			
		Day -7	Day-14	Day-21	Day-28
1.	*Aspergillusparasiticus,*	8.02±0.1	9.03±1.2	12.98±.0.4	10.01±0.2
2.	*Fusariumoxysporum.*	5.8 ±1.34	6.3 ±1.51	16.1 ±1.33	10.2± 1.60
3.	Rhizotoniasolani	5.1 ±1,23	7.02 ±1.51	17.1 ±1.12	11.2± 1.60

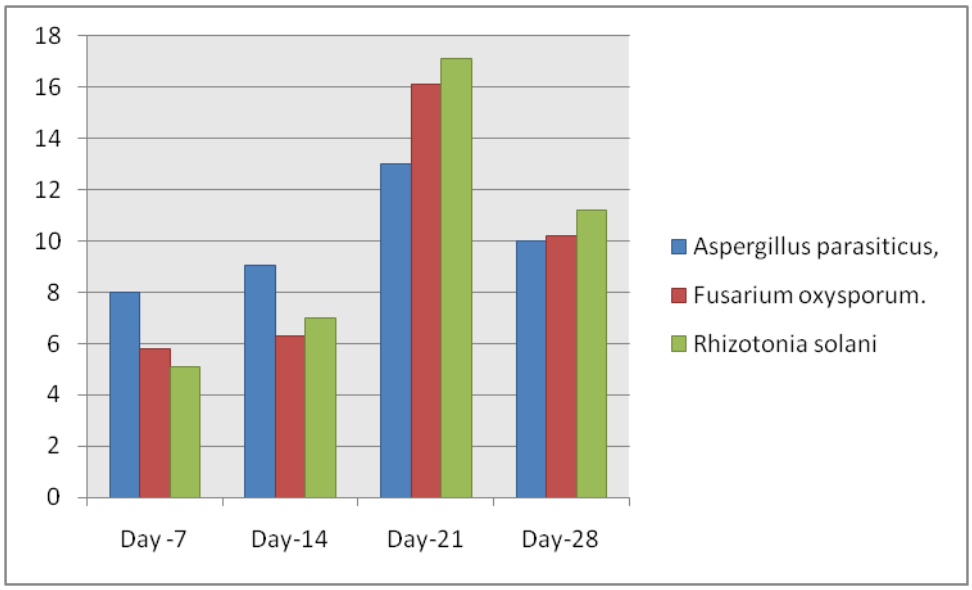

Fig: antifungal activity of the medicinal plant extract against plant pathogens isolated

Antagonistic effect:

To evaluates the antagonistic effect of mix medicinal plant spray against the fungal plant pathogens. The antagonistic activity of mix medicinal plant spray.Isolate was done against fish pathogens by *Cross streak method*.

The zone of inhibition showed against, plant pathogens at day 21 ,the good result were obtain at concentration (900 micro g/ml.)(table1). Other concentrations shows less inhibition (viz. 400. 600, 800 micro g/ml). In the current study, negative controls showed that acetone alone was not harmful to the plant pathogens at the highest percentage tested, confirming previous results However, plant extracts are traditionally prepared with water as infusions, decoctions and macerations. Therefore, it would be difficult for the traditional healer to be able to extract those compounds which are responsible for activity in the acetone and methanol extracts. Many traditional healers use water to extract plant material, since water is not toxic, not expensive and is the only extractant available. In some cases animal fat is mixed with plant material and under these conditions the non-polar compounds could become available.(6)

IV. CONCLUSION

Acetone was the best extract and it is also low in toxicity to the test organisms. In bioautography, several active compounds were visible in acetone, hexane, dichloromethane and methanol extracts

Benefit of Present Research Work to Society

1. **Lab to land practice:** From present investigation we can provide low coast formulated antifungal spray.
2. **Immune modulation:** Antagonistic effect against some fungal plant pathogens shows its antagonistic effect too.
3. **Eco-friendly Research:** Now a days the research spotlight upon to do ecofriendly research. By using natural contents only.

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Study of Algebra of Linear Transformations

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ABSTRACT

The is two vector spaces V and W over the same field, the set hom (V,W) of all vector space homomorphism's of V into W In fact we introduced into hom (V,W) the operations way that hom (V,W)itself became a vector space over.
Special case V= W, for here, in addition to the vector space operations, we can introduce a multiplication for any two elements under which hom (V, V) becomes a ring. Blessed with this twin nature that of a vector space and of a structure and its consequences that impart so much life and sparkle to the subject and which justify most fully the creation of the abstract concept of a vector space. Our main concern shall be concentrated on hom (V, V) where V will not be an arbitrary vector space but rather will be restricted to be a finite –dimensional vector space over a field. The facet, perhaps each of its elements satisfies a polynomial over F. Popular myth is that mathematicians revel in the inapplicability of their discipline and are disappointed when one of their results is soiled magician does not depend for his value judgments on the applicability of an intrinsic, at times intangible mathematical criteria.

Keywords: Linear algebra, theory of matrices, application in, mathematics economics in fact in almost science pseudoscience.

I. INTRODUCTION

A linear transformation is a function from one vector space to another that respects the underlying (linear) structure of each vector space. A linear transformation is also known as a linear operator or map.
The of the transformation may be the same as the domain, and when that happens, transformation is known as an endomorphism or, if invertible, an auto Orphism. The two vector spaces must have the same underlying field.
The defining characteristic of a linear transformation T: V \to W $T\colon V \to W$ is that, for any vectors v-1 $v1$ and v-2 $v2$ in V V and scalars a s and b b of the underlying field,
T(av-1+ bv-2) = aT(v-1) + bT(v-2). $T(av1+bv2)=aT(v1)+bT(v2)$.
Linear transformations are useful because they preserve the structure of a vector space. So, many qualitative assessments of a vector space that is the domain of a linear transformation may, under certain conditions,

automatically hold in the image of the linear transformation. For instance, the structure immediately gives that and image are both subspaces of the range of the linear transformation .Most linear functions can probably be seen as linear transformations in the proper setting. Transformations in the formulas are linear, and most geometric operations, including rotations, reflections, and contractions/dilations, are linear transformations. Even more powerfully, linear algebra techniques could apply certain very non-linear functions through either approximation by linear functions or reinterpretation as linear functions in unusual vector spaces. A comprehensive, grounded understanding of linear transformations reveals many connections between areas and objects of mathematics.

The is two vector spaces V and W over the same field, the set hom (V,W) of all vector space homomorphism's of V into W In fact we introduced into hom (V,W) the operations way that hom (V,W) itself became a vector space over F.

Linear algebra, theory of matrices, application in physics, chemistry, mathematics economics in fact in almost science pseudoscience.

II. LINEAR TRANSFORMATIONS: DEFINITION

In this section, we introduce the class of transformations that come from matrices.

A linear transformation is a transformation T: Rn→Rm satisfying

T (u+v) =T (u) +T (v) T (cu) =cT (u)

For all vectors u, v in R n and all scalars c.

Let T: R n →R m be a matrix transformation: T(x) =A. X for an m ×n matrix A.

We have,

T(u+v)=A(u+v)=A u+ Av=T(u)+T(v)T(cu)=A(cu)=c Au=cT(u)

For all vectors u, v in R n and all scalars c. Since a matrix transformation satisfies the two defining properties, it is a linear transformation

We will see in the next that the opposite is true:

Every linear transformation is a matrix transformation;

We just haven't computed its matrix yet.

Let T: R n→Rm be a linear transformation. Then:

T(0) =0.

We have, For T. The columns of A are the vectors obtained by evaluating T on the n standard coordinatVector spaces are one of the two main ingredients of linear algebra, the other being linear transformations .

Linear transformations are that send, or "map," one vector to another vector. The simplest example of a linear sends each vector to *c* times itself, where *c* is some constant. Thus, every vector remains in the same direction, but all lengths are multiplied by *c*. Another example is a, which leaves all lengths the same but alters the directions of the vectors. *Linear* refers to the fact that preserves vector addition and scalar multiplication. This means that if T is a linear transformation sending a vector v to T(v), then for any vectors v and w, and any

scalar *c*, the transformation must satisfy the properties T(v + w) = T(v) + T(w) and T(*c*v) = *c*T(v).e vector resin Rn.

The application of matrix plays a major role in Mathematics, as well as in other fields. It helps in solving linear equations. Matrices are extremely valuable objects that can be found in a wide range of applications. The application of matrices in mathematics is used in a wide range of scientific fields as well as mathematical areas.

Engineering mathematics is used in almost every aspect of our lives. In this article, we are going to learn what a matrix is, different matrix operations at the matrix in mathematics is a rectangular or square array of numbers or variables, arranged in the form of rows and columns. Individual items in a matrix are known as elements or entries.

The size of the matrix is determined by some its rows and columns. Matrix with 'm' rows and 'n' columns is read as 'm*n' matrix where m and n are its dimensions.

For example, the matrix A mentioned above is a 3*4 matrix, where 1, 5, 9, 2, 6etc. are its elements.

Let A be any square matrix of order n x n and I be a unit matrix of same order. Then $|A-\lambda I|$ is called characteristic polynomial of matrix. Then the equation $|A-\lambda I| = 0$ is called characteristic roots of matrix. The roots of this equation is called characteristic roots of matrix.

Eigenvalues are also called characteristic roots or latent roots. Eigenvectors and eigenvalues arise in many areas of mathematics, physics, chemistry and engineering.

The characteristic equation, also known as the determinant equation, is the equation obtained by equating the characteristic polynomial to zero. In spectral graph theory, the characteristic polynomial of a graph is the characteristic polynomial of its adjacency matrix.

A nonzero vector x is an eigenvector (or characteristic vector) of a square matrix A if there exists a scalar λ such that $Ax = \lambda x$.

Then, λ is an eigenvalue (or characteristic value) of A.

How do you find the characteristic equation of a 2x2 matrix?

Recipe: The characteristic polynomial of a 2×2 matrix

$f(\lambda) = \lambda 2 - Tr(A)\lambda + det(A)$.

In this page characteristic roots questions 4 we are going to see how to find characteristic roots of any given matrix.

Definition: Let A be any square matrix of order n x n and I be a unit matrix of same order. T

Then the equation is called characteristic roots of matrix. The roots of this equation is called characteristic roots of matrix.

Characteristic roots are also known as latent roots or eigenvalues of a matrix.

❖ Determine the characteristic roots of the matrix

$$\begin{bmatrix} 4 & -20 & -10 \end{bmatrix}$$

$$\begin{bmatrix} -2 & 10 & 4 \\ 6 & -30 & -13 \end{bmatrix}$$

Solution:

Let A = $\begin{bmatrix} 4 & -20 & -10 \\ -2 & 10 & 4 \\ 6 & -30 & -13 \end{bmatrix}$

The order of A is 3 x 3. So the unit matrix I = $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

Now we have to multiply λ with unit matrix I.

$\lambda I = \begin{bmatrix} \lambda & 0 & 0 \\ 0 & \lambda & 0 \\ 0 & 0 & \lambda \end{bmatrix}$

$$A-\lambda I= \begin{bmatrix} 4 & -20 & -10 \\ -2 & 10 & 4 \\ 6 & -30 & -13 \end{bmatrix} - \begin{bmatrix} \lambda & 0 & 0 \\ 0 & \lambda & 0 \\ 0 & 0 & \lambda \end{bmatrix}$$

$$= \begin{bmatrix} (-4-\lambda) & (-20-0) & (-10-0) \\ (-2-0) & (10-\lambda) & (4-0) \\ (6-0) & (-30-0) & (-13-\lambda) \end{bmatrix}$$

$$= \begin{bmatrix} (-4-\lambda) & -20 & -10 \\ -2 & (10-\lambda) & 4 \\ 6 & -30 & (-13- \end{bmatrix}$$

$$\begin{bmatrix} & & \lambda) \end{bmatrix}$$

$= (4-\lambda)\,[(10-\lambda)(-13-\lambda)+120]+$
$20[-2(-13-\lambda)-24]-10[60-6(10-\lambda)]$
$= (4-\lambda)[-130-10\lambda+13\lambda+\lambda^2+120]+20[26+2\lambda-24]-10[60-60+6\lambda]$
$= (4-\lambda)[-10+3\lambda+\lambda^2]+20[2+2\lambda]-10[6\lambda]$
$= (4-\lambda)[\lambda^2+3\lambda-10]+20[2+2\lambda]-10[6\lambda]$
$= 4\lambda^2+12\lambda-40-\lambda^3-3\lambda^2+10\lambda+40\lambda+40-60\lambda$
$= -\lambda^3 + 1\lambda^2 + 2\lambda$
To find roots let $|A-\lambda I| = 0$
$-\lambda^3 + 1\lambda^2 + 2\lambda = 0$
For solving this equation $-\lambda$ from all the terms
$-\lambda\,(\lambda^2 - 1\lambda - 2) = 0$
$-\lambda = 0$ (or) $\lambda^2 - 1\,\lambda - 2 = 0$
$\lambda = 0$ $\quad(\lambda+1)\,(\lambda-2) = 0$
$\boldsymbol{\lambda + 1 = 0}$ $\quad\boldsymbol{\lambda - 2 = 0}$
$\boldsymbol{\lambda = -1}$ $\quad\boldsymbol{\lambda = 2}$
Therefore the characteristic roots (or) Eigen values are $\mathbf{x = 0,-1,2}$

❖ Find determinant of the following matrix.

$$\begin{bmatrix} 3 & 4 & 1 \\ 0 & -1 & 2 \\ 5 & -2 & 6 \end{bmatrix}$$

Solution:

$$A= \begin{bmatrix} 3 & 4 & 1 \\ 0 & -1 & 2 \\ 5 & -2 & 6 \end{bmatrix}$$

$= 3[-6-(-4)] -4\,[0-10] +1\,[0-(-5)]$
$= 3\,[-6+4] -4\,[-10] +1\,[5]$
$= 3\,[-2] -4\,[-10] + 1\,[5]$
$= -6 + 40 + 5$
$= -6 + 45$
$= \mathbf{39}$

❖ Find determinant of the following matrix.

$$\begin{bmatrix} 1 & 1 & -1 \\ 2 & 1 & -2 \\ 1 & -1 & 1 \end{bmatrix}$$

Solution:

= 1 [1-2] -1 [2-(-2)] - 1 [-2-1]

= 1 [-1] -1 [2+2] - 1 [-3]

= -1 -1 (4) + 3

= -1 -4 + 3

= -5 + 3

= **-2**

❖ Find determinant of the following matrix.

$$\begin{bmatrix} 1 & 2 & 3 \\ -1 & 3 & 4 \\ 2 & 0 & -1 \end{bmatrix}$$

Solution:

= 1[-3 - 0] -2 [1 - 8] + 3 [0 - 6]

= 1[-3] -2 [-7] + 3 [- 6]

= -3 + 14 - 18

= -21 + 14

= -7

Given a matrix A, we can "find the trace of A," which is not a matrix but rather a number. We formally define it here.

Let A be ann×n matrix. The trace of A, denoted TR (A), is the sum of the diagonal elements of A.

TR (A+B) =TR (A) +TR (B)

TR (A–B) =TR (A) –tr (B)

TR (kA) =k·tr (A)

TR (AB) =TR (BA)

TR (AT) =TR (A)

"Flipping" a matrix over its diagonal. The rows and columns get swapped. Example: thevalue in the 1st row and 3rd column ends up in the 3rd row and 1st column.

The transpose of a transpose gets us back to where we started.

Definition: The transpose of a matrix.

The ***transpose*** of AA is the matrix ATAT derived by making the first row of AA the first column of AT, AT, the second row of AA the second column of AT, AT, etc. In other words, when taking a transpose, the rows and columns are interchanged. Another way of saying this is that the subscripts have been interchanged, that is, if AT=B= [bi,j].AT=B=[bi,j]. Then bi, j=aj, i

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1) **Review: scalar multiplication:**

One of the most attractive features of scalar multiplication is that it may be interpreted geometrically in R2.R2. Take the vector v= (1, 2), v= (1, 2), and consider the following points in R2:R2:

v= (1, 2) v= (1, 2)

2v= (2, 4)2v= (2, 4)

3v= (3, 6)3v= (3, 6)

2v= (12, 1)12v= (12, 1)

–1v= (–1, –2) –1v= (–1, –2)

–2v= (–2, –4) –2v= (–2, –4)

–3v= (–3, –6) –3v= (–3, –6)

These are all scalar multiples of v, v that is, each one is of the form tvtv for some number t.t. Here is an accurate plot of these points in R2:R2:

Notice that all of the points lie on a straight line that passes through 0= (0, 0).0= (0, 0).

In addition, if we start from (0, 0) (0, 0) and follow the line through the first quadrant, we pass through 0, 0, 12v, 12v, v, v, 2v2v and 3v3v in that order. It would seem that as tt starts at 00 and increases through positive values, the point's tvtv starts at 00 and moves along the line in the first quadrant. Similarly, as tt starts at 00 and decreases through negative values, the point's tvtv starts at 00 and moves along the line in the third quadrant.

A linearity test.

Suppose we wish to determine whether or not two vectors vv and ww are collinear with 0.0. There are two cases, depending on whether or not 00 lies between vv and w: w.

Directed vectors in R2R2 and RnRn:

We have looked at vectors as nn-tuples, that is, x=(x1, x2,…,xn).x=(x1,x2…xn). There is another way to look at vectors, namely, as objects having both length and direction. We visualize this as an arrow joining two points with the length being the length of the arrow and the direction that where the arrow points. Here are two such vectors in R2.R2.

2) **Addition of directed vectors:**

We next give a geometric interpretation for the addition of directed vectors. We wish to use the same pattern as we did with scalar multiplication: be consistent with the geometric interpretation of the parallelogram rule for nn-tuples.

We start with two vectors −→PQPQ→ and −→RS.RS→. Using the tail minus head rule, these are the same as the vectors x=−−→0 (Q–P) x=0(Q–P) → and y=−−→0 (S–R).y=0(S–R)→. Now xx and yy can be viewed as nn-tuples, and so the sum gives x+y=Q–P+S–R.

Definition. Lines in RnRn.

If xx and yy are two vectors in Rn,Rn, then the line LL containing xx and yy consists of all vectors zz such that

z= (1–t) x+tyz= (1–t) x+ty

For some real number t.t.

The following figure gives the geometric interpretation on the number t.t. obviously t=0t=0 gives xx and t=1t=1 gives y.y.

As tt goes from 00 to 1, 1, the vector zz moves from xx to y.y.

In fact, when t=12, t=12, the point zz is halfway between xx and y.y.

As tt becomes larger than 1, 1,

The vector zz passes yy and moves further down the line.

Determining if a point is on a line.

The equation z= (1–t) x+tyz= (1–t) x+ty gives us nn linear equations in the single variable t.t. If this system of linear equations is consistent, then the point is on the line.

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Study of Astable Multivibrator Using Pspice Spice and Top Spice Software's

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ABSTRACT

This paper addresses the performance of AstableMultivibrator using PSpice Spice& Top Spiceelectronic circuit simulation software's. Traditionally electronic circuit design was verified by building prototypes, subjecting the circuit to the various stimuli and then measuring its response using appropriate laboratory equipment's. Prototype building is somewhat time consuming. But produces practical experience from which we judge the manufacturability of the design. Computer programs that simulate the performance of an electronic circuit provide a simple cost-effective means of confirming the intended operation prior to circuit construction and verifying new ideas that could led to improve the circuit performance.

Keywords: - AstableMultivibrator, Amplification, Transient Analysis Simulation.

I. INTRODUCTION

The evolution of electronics technology almost in to every facet because of low cost, reliability and ease of interface [1]. The electronic industry is getting progressively more and more efficiently more at new products in wide range and verity of circuits in service of human being. We also saw the more and more products coming in to the market in shorter time [2]. Hence low-cost circuit design, with an accurate, linear and faster testing techniques are addressed. A verity of electronic components PSpice commercially available which plays an important role in design development of accurate circuit design performance and optimum reliability [3].

II. SIMULATION

Electronic simulation of circuit function is now a common practice in the design of individual circuit and the complete systems. The most of the circuit designer can simulate, and design the circuit and develop it as early as they can and hence in market [4]. Spice software models for common circuit elements, active as well as passive, and it is capable of simulating most electronic circuits. It is versatile programmed and is widely used both in Industries and Universities. [5]. The circuit performance and its reliability in any circuits for to minimize the failure can be tested. To meet the required standard of the circuits and hence quality

instruments, the circuit analysis is performed. In case of any failure or problem on can easily redesign it by modifying the very same circuit in a few minutes using highly sophisticated simulation tools [6].

The role of spice software's is very vital in all fields of engineering and industries for the design and built the electronic circuits. Today many groups around the world are investigating advanced software capable of responding a wide verity of components. Recent years have witnessed the excellent progress in the field of spice software. These improve the ability of users to integrate different types of electronic circuits in to their systems or applications. The spice software would have more capability to design and built electronic circuits in wider range of applications.

In case of classroom / laboratories study teaching the spice, experiments will be tried for example in the design of AstableMultivibrator. Here various software's can be come to our reuse and the effect can be easily demonstrated by changing various capacitors so also can be done in case of other circuits of amplifiers and oscillators even for modulation studies.

III. ASTABLE MULTIVIBRATOR

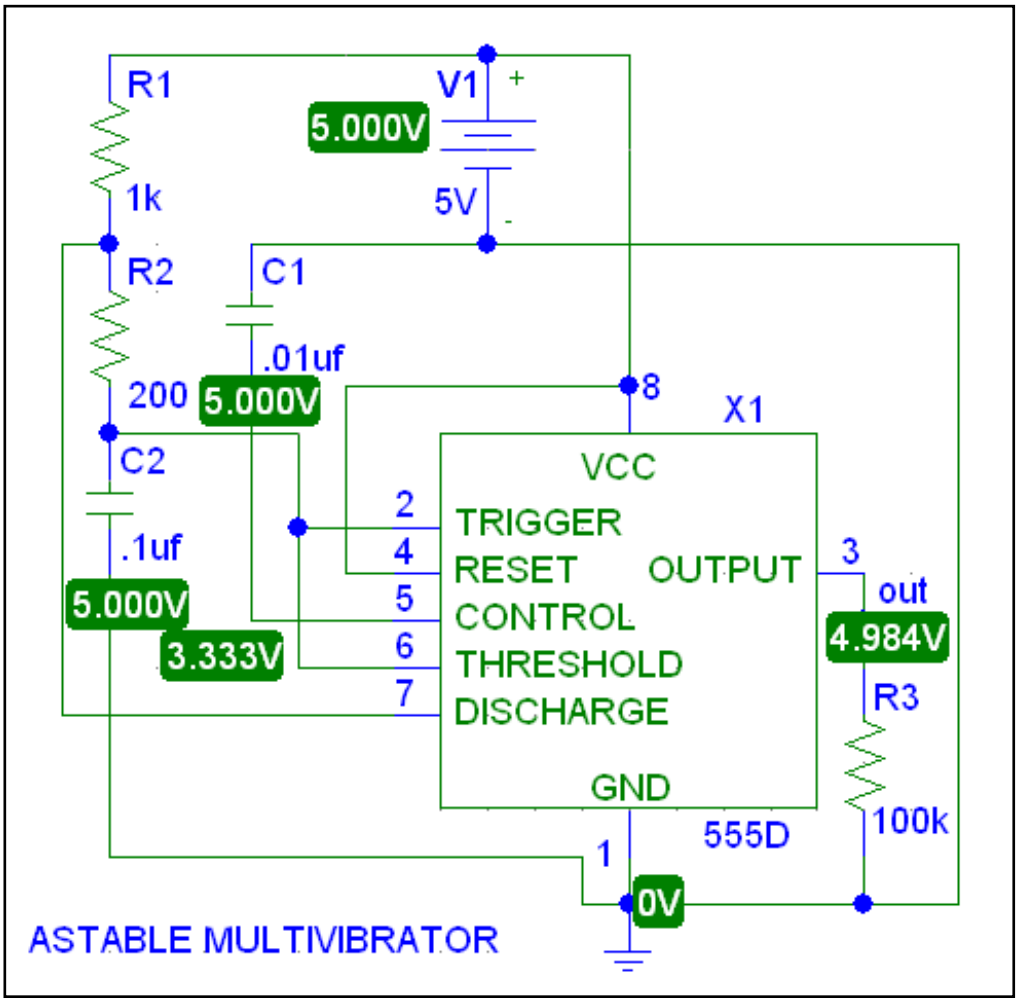

Fig 1 Circuit diagram for AstableMultivibrator

The 555 connection as an astable multivibrator is shown in figure 1. Assume that the capacitor is initially discharged and Q is high. The capacitor C will charge through R1 and R2 and the voltage Vc across it will rise exponentially towards Vcc. However as soon as this voltage reaches V_{UT} = (2/3)Vcc, the comparator output goes HIGH, reseating the flip flop. Q' becomes HIGH and the transistor conducts and the capacitor discharges through R2 lowering the voltage Vc. When the capacitor voltage becomes V_{LT} = (1/3)Vcc, the output of the comparator C2 becomes HIGH and the flip flop is again SET making the transistor OFF and again charging the capacitor through R1 and R2. The cycle repeats continuously and the pulse waveform is obtained at the output.

Assuming that t = o is the instant when charging of C begins, we can write the voltage across the capacitor during charging as

$Vc(t) = Vcc - (Vcc - V_{LT})e^{-t/(R1 + R2)C}$

And at $t = T_H$

$Vc(t) = (2/3)Vcc = V_{UT}$ and $V_{LT} = (1/3)Vcc$

Therefore

$\frac{2}{3} Vcc = Vcc - (Vcc - \frac{1}{3}Vcc)\, e^{T_H / (R1 + R2)C}$

$T_H = (R1 + R2)C \ln 2 = 0.69(R1 + R2)C$

We see from the figure that Vo is low during T_L therefore, the discharge voltages across the capacitor can be written as

$Vc(t) = V_{UT}\, e^{-t / R2C}$

(t = o is beginning of discharging of C)

At $t = T_L$

$Vc(t) = \frac{1}{3}Vcc = V_{LT}$

Hence

$\frac{1}{3}Vcc = \frac{2}{3} Vcc\, e^{-TL/R2C}$

Or

$T_L = R2C \ln 2\ 0.69R2C$

The total time period,

$T = T_H + T_L$

$T = 0.69(R1 + 2R2)C$

$f = \frac{1}{T} = \frac{1.443}{(R1+2R2)C}$

The duty cycle is

% duty cycle = $\frac{TH}{T}$ x 100

In this circuit the duty cycle is always be greater than 50%. If R1 << R2, it approaches 50%.

The Following Graphs Shows the Output of AstableMultivibrator in Different Software:

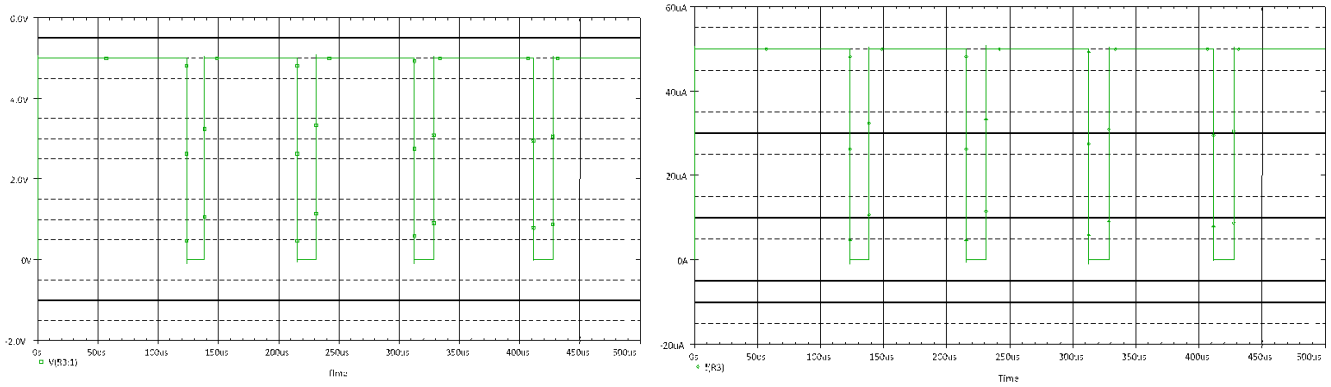

Fig 2 graph of square wave generator by PSPICE SPICE

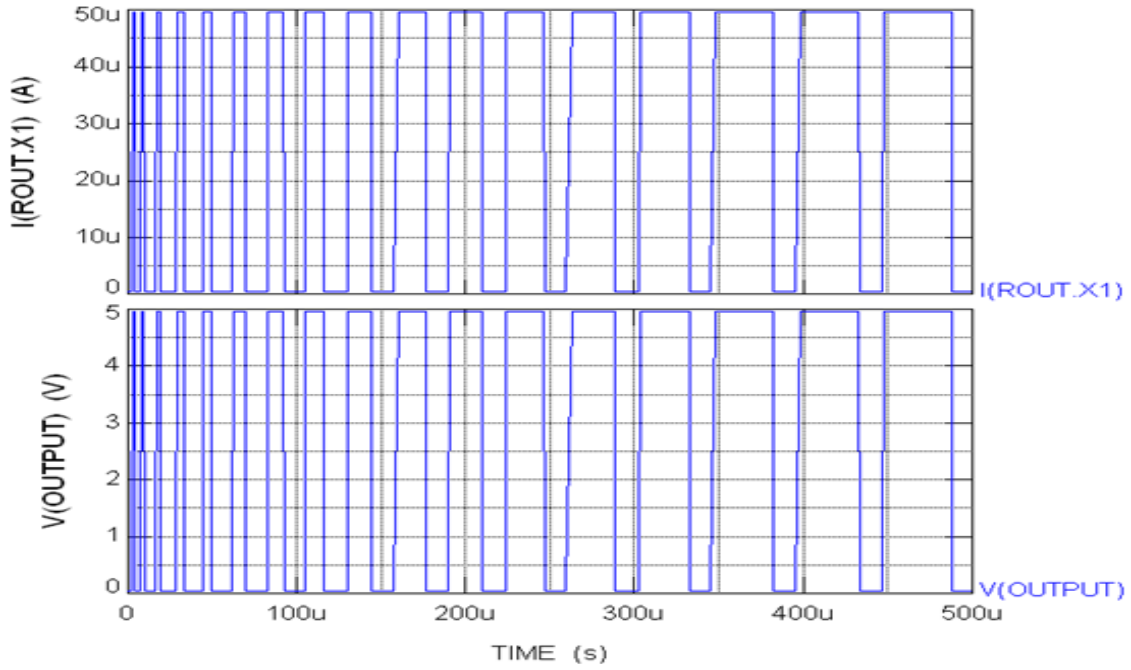

Fig 3 graph of square wave generator by TOP SPICE

IV. OBSERVATIONS

A. In Pspice Software: - 1. Output starts 3.8364μV to 4.9836 V. **2.** Rise time and fall time in this software is exactly equal to 598μS. **3.** The pulse width depends upon the values of R1 and R2. Except first all the pulses are equally spaced. **4.** Current and potential are in phase. **5.** We get the maximum current up to 49.936μA.

B. In Top Spice Software: - 1. Output starts -38.976μV to 4.962 V. **2.** We observe rise time and the fall time are exactly equal to zero second.**3.**We cannot get the perfect pulse; pulse width goes on increasing as the

time increases.**4.** Current and potential are in phase.**5.**We get the maximum current up to 49.62μA.**6.** Rise time and fall time, initially it is less but as the time increases it also increases.

V. CONCLUSION

In both software's we observed simultaneously the potential & current curves. In Pspice we observe up to 500 μs the output frequency is stable but in case of Top spice to 500 μs it decreases.

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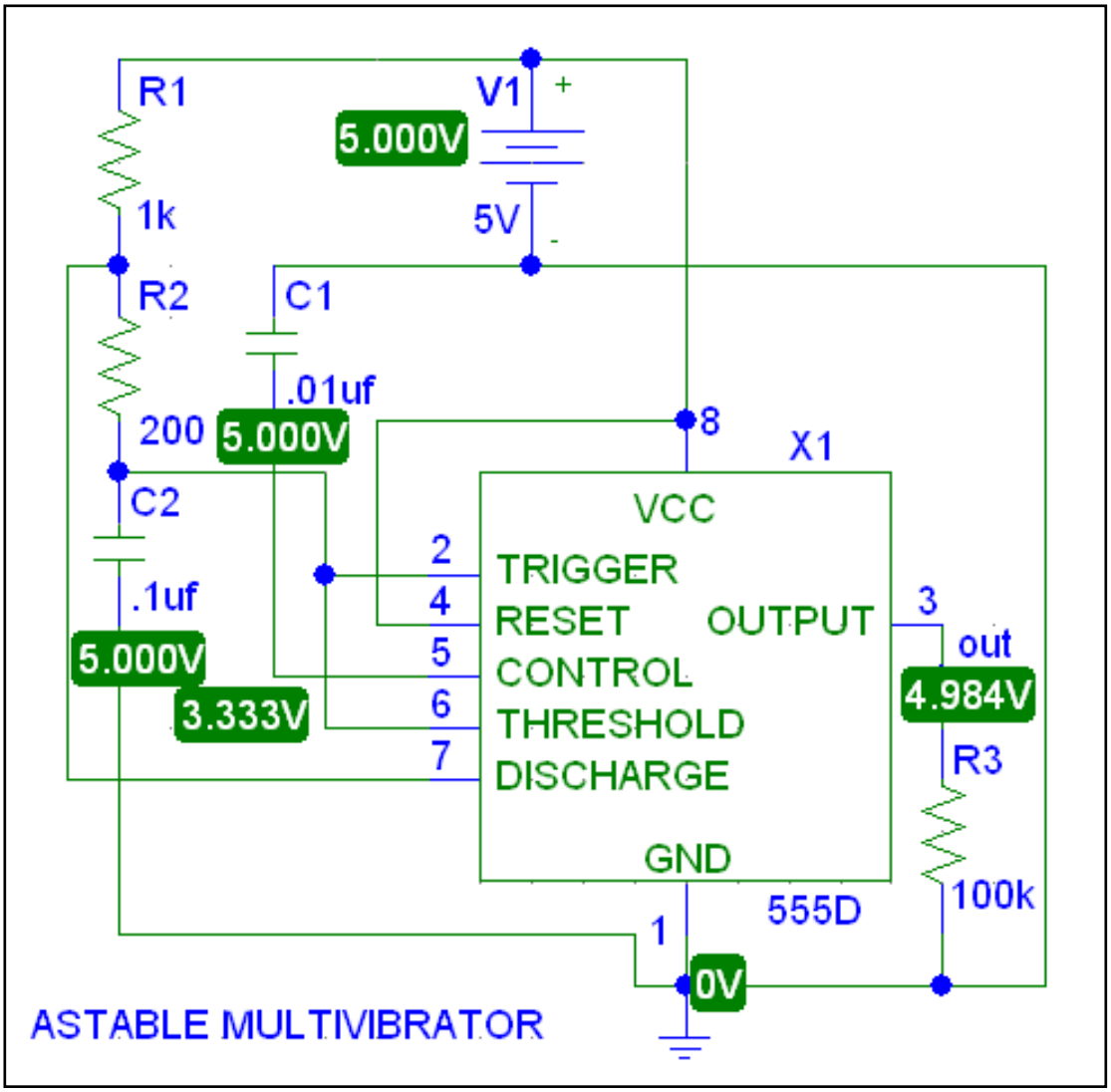

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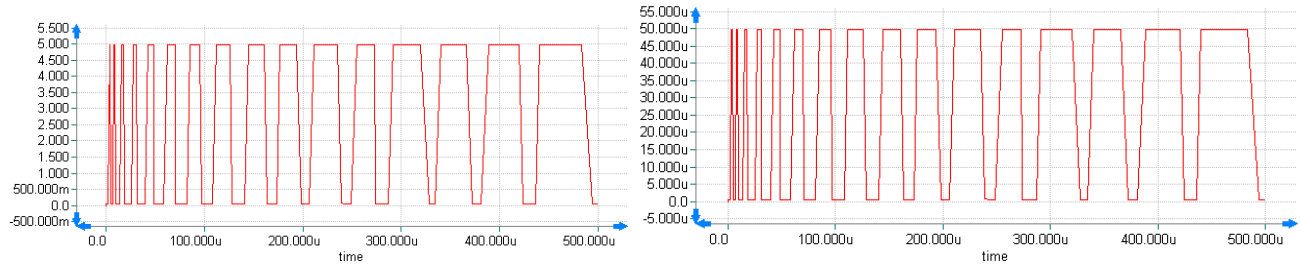

Fig 2 graph of square wave generator by B2 SPICE

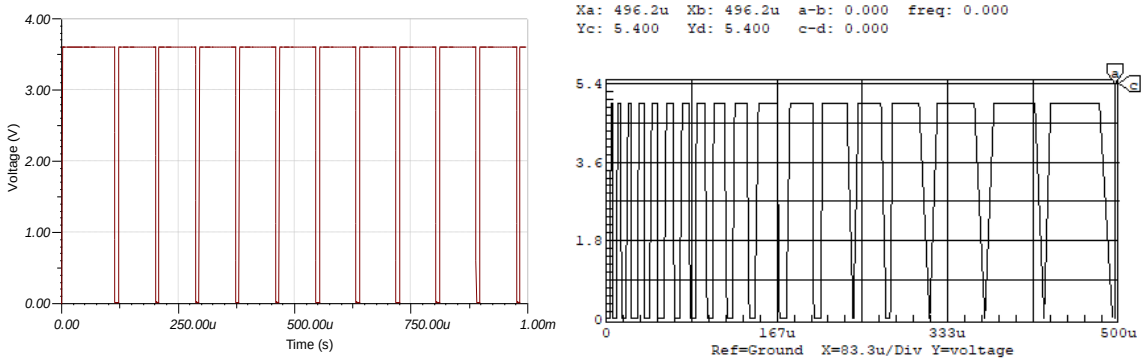

Fig 3 graph of square wave generator by TINA& Circuit Maker

IV. OBSERVATIONS

A. **In B2spice Software: - 1.** Lower level of the output is 0.045V to 0.049V.**2**. Higher level of the output is 4.962 V.**3**. Rise time and fall time initially it is less but as the time increases it also increases.**4.**Initially the output frequency is maximum and decreases as the time increases. **5.**We cannot get the perfect pulse; pulse width goes on increasing as the time increases.**6.**Current and potential are in phase.**7.**We get the maximum current up to 50μA.**8.**We get the minimum current up to .05μA.

B. **In TINAspice Software: - 1.** Output voltage is 0 V to 3.6 V. **2.**In this software rise tie and the fall time are exactly equal to zero second.**3.**We get expected output but output that changes with the change as the values of resistor R1 and R2 changes. **4.**First maxima take more time**. 5.** In this software, we cannot get the current response simultaneously in the graph window in transient analysis but in AC table analysis, we get the current the current as well as the potential value of any point of the circuit.

C. **In Circuit Maker Software: - 1.**The maximum output voltage at the peak is 4.950V.**2.**In this software rise time and the fall time are increases as the time increase.**3.**Initially the output frequency is maximum and decreases as the time increases. **4.**We cannot get expected output. However, output which changes with the change with the values of resistor R1 and R2. **5.**First peak take less time.**6.**In this software, we cannot get the current response simultaneously in the graph window in transient analysis. However, in multimeter we get the current as well as the potential value of any point of the circuit. **7.**The pulse starts from 0 V.

V. CONCLUSION

In above software's only in B2 Spice we observed simultaneously the potential & current curves. In Top spice we observe up to 500 μs the output frequency is stable from start to end but in case of B2 spice& Circuit Maker it decreases 500 μs.

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Insecticidal Property of Argemonemexicana L. Seed Extracts Against Callosobruchus Maculates F. (Coleoptera: Chrysomelidae : Bruchidae) in Stored Grains

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ABSTRACT

The insecticidal property of *Argenomemexicana*seed extracts against the pulse beetle, *Callosobruchusmaculatus*was tested in the laboratory. The experiments were conducted at (28±3) 0C and (78±3) % relativehumidity. It was observed that Soxhlet's extracted extracts of *A. mexicana*seed in acetone, chloroformand ethanol were very effective to control the pest while extracts in methanol gave poorresults. The probit analysis of data demonstrated that LD10, LD50 and LD90 and LD99 values for 96 hours foracetone, chloroformand ethanol extracts was LD10 = 0.5703, 0.8243, 1.242 ml/Kg, LD50 = 1.246, 3.324, 2.810 ml/Kg, LD90= 2.854, 13.40, 6.353 ml/Kg and LD99 = 5.500, 41.76, 9.072 ml/kg respectively. These results suggest that the mortality increasedwith increase in concentration as well as exposure time and the extracts of *A. mexicana*seed may be ofhigh value in grain storage against *C. maculatus*, especially in subsistence agriculture where the plants arelocally available to farmers with little resources. It can be recommended as cheap, easily available and eco-friendly insecticide in management of *Callosobruchusmaculatus* and thus, is efficacious in protecting mung bean at storage level, if timely applications are made and correct dosage is applied.

Key words: Insecticidal, extract, *Argemonemexicana*, *Callosobruchus maculates*.

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Antibiotic Resistance of Coliforms Isolated From Fresh Drinking Water of Nanded District (MS), India

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ABSTRACT

Water-borne disease outbreaks associated with the drinking of unsafe water, containing pathogenic bacteria, are common in densely populated countries like India. The present study was attempted to detect indicator bacteria from drinking water samples for the presumptive occurrence of contaminations that are responsible for health-associated problems. Therefore, a laboratory-scale qualitative analysis through the most probable number (MPN) method was employed.A total of six coliform bacteria isolated from fresh drinking water samples were tested against four antibiotics to determine the prevalence of antibiotic resistance and also to find out the high-risk source of contamination. Almost all of the identified coliform bacteria showed resistance against commonly used antibiotics which is of significant health concern.

Keywords: Drinking water, Most probable number (MPN), Coliform, Contamination.

I. INTRODUCTION

Coliforms are a group of indicator bacteria in water, soil, and other environments, often considered as a measure of water quality. They represent major contaminants in surface and groundwater in developing countries. Recently, the widespread use of antibiotics in agriculture and medicine is accepted as a major selective force in the increasingly high incidence of antibiotic resistance among bacteria [1,2]. High antibiotics resistant bacteria are found in environments such as hospital effluents, sewage, and wastewater [3].Coliforms, generally regarded as non-pathogenic indicators ofpollution [4]but eventually used to study the bacteriological quality of water and foods. It hasbeen demonstrated that antibiotic-resistant coliform bacteria from effluents and land runoffeventually may enter into waters[5]. River water is the main reservoir of antibiotics and antibiotic-resistant bacteria in the environment. They are directly introduced into surface water through fisheries, animal farms, and agricultural practices [6]. A large number of sewage and effluent containing antibiotic-resistant bacteria arereleased into rivers, streams, lakes, and seawater [7]. The antibiotic resistance bacteria in drinking water are a prime concern to public health [8].

The present study was designed to investigate multiple antibiotic resistance of coliform bacteria isolated from the fresh drinking water of the Nanded district.

II. MATERIALS AND METHODS

2.1 Study area and sampling

The drinking water samples used by the residents of Umri and Nanded (Vishnupuri and University campus) were tested in the current study. Three watersamples were collected from separate household and commercial points which were used to consume after pre-treatments during Feb. 2018. Samples were collected aseptically in sterile screw-capped bottles and transported to the laboratory under cold storage within 24 hours for microbiological analysis [9].

2.2 MPN (Most Probable Number)

The most probable number (MPN) techniquewas used[10] for the enumeration of total coliform. The evaluation procedure included three tests namely presumptive, confirmative, and completed test.

2.2.1 Presumptive Test

For each water sample; 5 tubes of each 10, 1, and 0.1 ml were used. 10 ml sample was inoculated in double strength of MacConkey broth media and rest 1 and 0.1 ml was inoculated in single strength MacConkey broth media. All the inoculated tubes were incubated at 37°C for 24–48 hrs. Tubes which showing the presence of growth (turbidity) with or without gas were submitted to the confirmatory phase.

2.2.2 Confirmative Test

All tubes which show positive results from presumptivetest were lightly shaken and using a micropipette and sterile tips culture were added to BGBL (Brilliant Green Bile Lactose Broth) and incubated at 37°C for 48 hrs. The gas formation within 48 hrs was taken for the completed test. Then the Numbers of positive tubes were recorded.

2.2.3 Completed Test

The cultures from the positive tubes were streaked on EMB (Eosin Methylene Blue) agar and these plates were placed at 37°Cfor 24 hrs in an inverted position. The presence of green metallic sheen colony confirms the presence of coliforms. Some of these isolated colonies from plates were transferred on the non-selective media such as nutrient agar slants for further biochemical testing of coliforms. These isolates were also confirmed by Gram's staining and biochemical tests [11].

2.3 IMViC Test

Allthe selected isolates were subjected to the IMVIC Test (Indole, Methyl red, Voges-Proskauer and Citrate) for the identification ofselected Isolates[14].

2.3.1 Indole Test

The bacterial cultures inoculated into a test tube of 5ml peptone water and then incubated at 37^0C for 24 hours and after that 5 drops of Kovac's indole reagent was added and shaken gently. A positive reaction was indicated by the development of a red color formation on the top layer.

2.3.2 Methyl Red

Isolate were inoculate in 5mlof MR-VP broth and incubated for 48hrs at 35^{0}C and after incubation1ml of the broth was transferred into a test tube and 2-3 drops of methyl red was added. Formation of red color indicates positive methyl red test, a yellow color indicates negative test.

2.3.3 Voges-Proskauer

The culture inoculate in MR-VP broth and incubated for 48 hrs, after incubation 15 drops of 15% alpha–napthal in alcohol was added and 5 drops of 40% KOH was also added then shake gently red color formation within 1hr indicates a positive test

2.3.4 Citrate Test

The isolates were inoculated into Simmon's citrate agar and incubated for 24-48 hrs. Development of a deep blue colour indicates a positive reaction.

2.4 Antibiotic susceptibility test of the identified bacteria

The pathogenic isolates were examined for antibiotic susceptibility traits (either drug-resistant or sensitivity) by well diffusion method on Mueller-Hinton agar against commonly used antibiotics following the standard protocol [13]. Antibiotics used in the study included cefotaxime, ceftriaxone, ciprofloxacin,and Metronidazole.

III. RESULTS AND DISCUSSION

3.1 Bacteriological quality of the drinking water samples tested

All of the water samples used in the present study were highly contaminated with lactose fermentation positive bacteria which determined by the formation of gas in the Derhum tube after 48 hrs of incubation period at 37°C.Sample number 1and 2 showed maximum counts of positive results for each of the three test tubes by looking at the formation of gas resulting in MPN index 920 MPN/100 ml and >1800/100ml of the sample. Sample no. 3 showed the lowest count as 8 MPN/100 ml of sample (Table-3.1).

Table-3.1: MPN index and Confirmed test results of drinking water samples.

Sample No.	Sample collection area	Water samples			MPN INDEX (MPN/100 ml)	Growth on EMB agar	Production of green metallic sheen	Result
		10ml	1ml	0.1ml				
1	Umri	5+	5+	3+	920	+	+	Nonpotable
2	Vishnupuri	5+	5+	5+	>1800	+	+	Nonpotable
3	S. R. T. M. University campus	3+	0+	0+	8	-	-	Potable

Confirmed results showing that samples no. 1 and 2 exhibited green metallic sheen on EMBagar plates (Fig.3.1)showing the presence of fecal coliform i.e., *E. coli*that makes a water sample non-potable (Table 3.1).

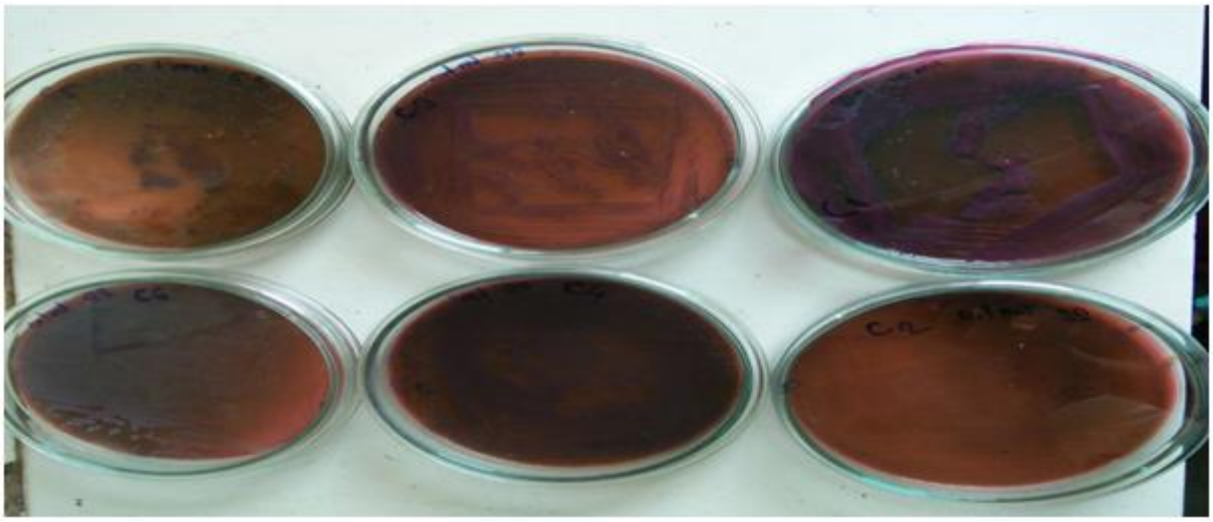


Fig. 3.1: Results of confirmed tests.

In the completed test, water sampleswere tested (1 and 2), bacterial sp. (Fig.3.1) isolates were further confirmed by their Gram reaction as Gram-negative. The presence of the indicator bacteria indicated the possible occurrence of fecal contamination.IMViC test results are shown in table-3.2.

Table-3.2: IMViC Test Results.

Test isolates	Indole	Methyl Red	VP	Citrate	Isolates Result
C1	Negative	Positive	Negative	Negative	*Shigella*
C2	Negative	Positive	Negative	Positive	*Salmonella*
C3	Positive	Positive	Negative	Negative	*E. coli*
C4	Negative	Negative	Positive	Positive	*Klebsiella*
C5	Negative	Positive	Negative	Positive	*Citrobacter*
C6	Negative	Positive	Negative	Positive	*Proteus*

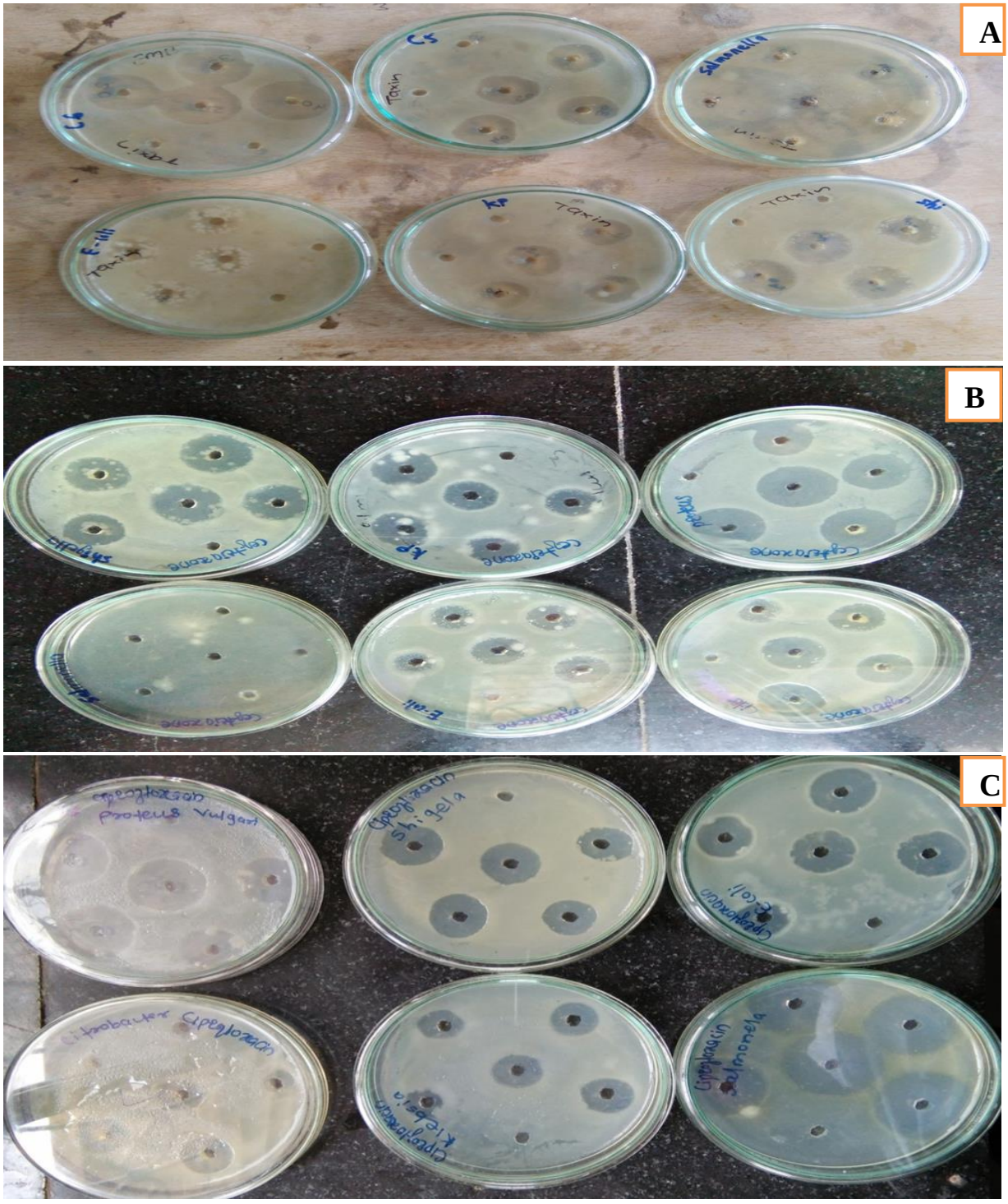
Antibiotic resistance in isolates from fresh drinking water samples

The incidence of antibiotic resistance among the coliform bacteria from the fresh drinking water samples is presented in Tables-3.3 against selected antibiotics. All isolated coliforms from fresh drinking water were resistant to one or more of the antibiotics (Fig.3.2).

The frequency of antibiotic resistanceamong coliform bacteria from fresh drinking water sampleswas found to be highest againstmetronidazole(Fig. 3.2-D). Of the isolated coliforms,*Salmonella* showed resistance againstceftriaxone antibiotics (Fig. 3.2-B). Similarly, at 10 µl concentration coliforms shows resistance but on subsequent increasing the concentration, coliforms show a significant decrease in resistance against cefotaxime(Fig. 3.2-A).The incidence of metronidazole-resistant coliforms was in general higher (Fig. 3.2-D) than thatfound as compared to other antibiotics.Among obtained coliforms, a higher frequencyof multiple resistance was found highest against metronidazole, ceftriaxone, cefotaxime, and ciprofloxacin antibiotics.

Table-3.3: Antibiotic resistance among coliform bacteria from fresh drinking water.

Sr. No.	**Antibiotic resistanceresults**(mm)						
A.	**Cefotaxime (Taxim)**						
	Concentration	*Shigella*	*Salmonella*	*E. coli*	*Klebsia*	*Citrobacter*	*Proteus*
	50µl	22	13	20	21	22	25
	40µl	20	11	18	19	21	22
	30µl	19	11	17	17	18	21
	20µl	17	10	15	16	16	20
	10µl	-	-	-	-	-	-
B.	**Ceftriaxone (Troxane)**						
	Concentration	*Shigella*	*Salmonella*	*E. coli*	*Klebsia*	*Citrobacter*	*Proteus*
	50µl	23	10	18	20	21	23
	40µl	22	-	17	19	21	21
	30µl	21	-	17	17	19	21
	20µl	21	-	15	16	18	20
	10µl	18	-	14	14	16	19
C.	**Ciprofloxacin**						
	Concentration	*Shigella*	*Salmonella*	*E. coli*	*Klebsia*	*Citrobacter*	*Proteus*
	50µl	19	25	20	16	17	24
	40µl	19	24	19	16	15	23
	30µl	18	24	18	15	15	22
	20µl	16	23	16	14	10	19
	10µl	15	21	15	12	06	18
D.	**Metronidazole**						
	Concentration	*Shigella*	*Salmonella*	*E. coli*	*Klebsia*	*Citrobacter*	*Proteus*
	50µl	14	22	16	12	10	20
	40µl	10	20	10	-	-	10
	30µl	-	13	-	-	-	-
	20µl	-	-	-	-	-	-
	10µl	-	-	-	-	-	-


A
B
C

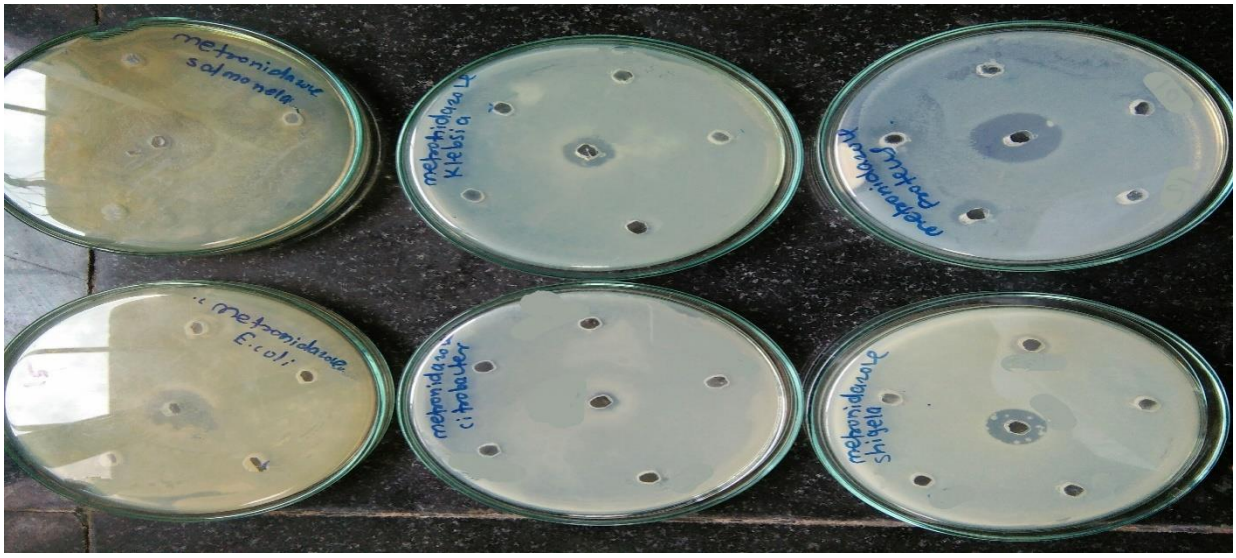


Fig. 3.2: Antibiotic resistance among coliform bacteria from fresh drinking water selected against antibiotics (A) Cefotaxime, (B) Ceftriaxone, (C) Ciprofloxacin, and (D) Metronidazole.

IV. CONCLUSION

The increasing pollution of drinking water sources and the presence ofantibiotic-resistant bacteriaincrease the risk to human health. Therefore, it is important to have detailed knowledge regarding suchissues.The present research shown that a sample of drinking water sources in Vishnupuri&Umrifrom Nanded district regionwere generallylow-qualitydrinking water andantibiotic resistance pools.Therefore,we advisethat this watershould not be consumed without further adequate treatment. Isolated coliformsare resistantto at least one antibiotictested and show multiple resistances.It indicates, the issueof antibiotic resistance is also critical in the water sources.Antibiotic-resistant isolatedcoliforms were still heavily seen in two studied source drinks of water. Asantibiotic resistance is difficult to eradicate, the prevalence of antibiotic resistanceof coliforms in source water it emergesindicates a potential public health hazard

.

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Antibacterial screening of *Euphorbia sp*. against Xanthomonas sp.

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ABSTRACT

Plant extracts contains not only minerals and primary metabolites but also a diverse array of secondary metabolites with antimicrobial potential. Euphorbia has been used for its antioxidant, antiviral, bactericidal, antileishmanial, and haemostatic effects. Efficacy of antimicrobial substances of Euphorbia sp. can be used as an alternative strategy for the production of effective and eco-friendly of a phytomedicines. Euphorbia prostrata, Euphorbia parviflora, Euphorbia cotinifolia, Euphorbia milli, Euphorbia nerifolia were used for antibacterial screening against various Xanthomonas sp. strains viz. X. axonopodis pv. citri, X. campestris pv. vasicatoria and X. axonopodis pv. punicae. Aqueous extracts of all screened Euphorbia sp. were showed inhibition against selected Xanthomonas sp. strains, and chloroform extract of Euphorbia milli exhibited antibacterial activity against selected Xanthomonas sp. The results in the study suggest that those extracts may possess the compounds with antibacterial properties that can be used as antibacterial agents in the development of new drugs formation. The potential for developing antibacterial from higher plants appears rewarding as it will lead to the development of a phytomedicines to act against microbes.

Keywords : Antibacterial, Xanthomonas, Euphorbia sp.

I. INTRODUCTION

The medicinal values of plants has assumed a more important dimensions in the past few decades. Crude extracts of plants containing variety of metabolites such as alkaloids, Tannis, Phenols, Terpenoids, Flavanoids. Potency of these secondary metabolites as antibacterial compound is proved by many researchers. Excess use of antibiotics against plant pathogenic bacteria increases antibiotic resistance among pathogens, which is quite alarming. Accumulation of these substances in food chain and their slow degradation leads to search of alternative natural substances. Active plant substances can be rich source of eco-friendly antibiotics or pesticides for controlling plant diseases caused by bacteria.

Many researchers contributed to find out plant by-products having antibacterial activity against plant pathogenic bacteria. (Deans & Svoboda 1990;Diker et.al. 1991 ; Heisey & Gorham 1992; De Pooter al et. 1995). Different plant extracts exhibited antibacterial activity against plant pathogenic bacteria. Many Euphorbia species are used as medicine. Some Euphorbia species are used against asthma, leprosy, jaundice and tumors. Studies indicate that phytochemical as a source of antimicrobial production serve as for the treatment of several bacterial infections. Phytochemical study of *Euphorbia* genus indicates cytotoxicity and

antimicrobial activity of many flavonoids (Okoli, 2009). Phytomedicine having secondary metabolites as a plant defense mechanism are very effective against microbes in treating skin diseases (Parekh and Chanda, 2007). In folk medicine, Euphorbia has been used for its antioxidant, antiviral, bactericidal, antileishmanial, and hemostatic effects (Ali-Shtayeh et. al. 2011).

The plants are characterized by the presence of milky latex which is more or less toxic. E. *milli* is used for ornamental purpose and have not been reported in folk therapy in India, however in Nepal the latex is used to treat sprains (Mananhdir *et al.*, 2011).

E. neriifolia leaves are used as aphrodisiac, diuretic and also used in the treatment of bronchitis, bleeding piles and in ano-rectal fistula (Kirtikar and Basu, 1996). Phytochemical screening of *E. neriifolia* leaf extracts has revealed the presence of secondary metabolites of therapeutical importance (Swamy *et al.*, 2011).

In the present study Euphorbia prostrata, *Euphorbia parviflora, Euphorbia cotinifolia, Euphorbia milli, Euphorbia nerifolia* were used for antibacterial screening against various Xanthomonas sp. strains viz. X. axonopodis pv. citri, X. campestris pv. vasicatoria and X. axonopodis pv. punicae.Very few studies are recorded for antibacterial activity against plant pathogenic Xanthomonas strins. Xanthomonas strains are causing major diseases to plants which lead to yield loss. To minimize use of chemical bactericides and attack of *xanthomonas* sp. natural compound can be sued, present investigation was carried out.

II. Materials and Methods

Selected plant species were randomly collected from the various districts of Marathwada region *viz.* Aurangabad, Jalna, Beed, Parbhani, Osmanabad,Latur, Nanded and Hingoli,during the month of July-September and December-February.

Plant Extraction:

Plant materials of *Euphorbia prostrata, Euphorbia parviflora, Euphorbia cotinifolia, Euphorbia milli, Euphorbia nerifolia,* 50 g of each plant, were dried in the micro-oven and ground into powder by using an electronic blender. The blended material was used for extraction through Soxhlet apparatus. 100 ml of chloroform, and water was separately added into extract. After effective extraction solvent was concentrated using rotary evaporator. The crude extracts thus obtained were used for further analysis.

Antimicrobial activity study:

Extracts obtained from the selected plants material were analyzed for their antibacterial activity by agar well diffusion method (Parez *et al.*, 1990). A loop full of test cultures was inoculated aseptically in a conical flask containing 30 ml of nutrient broth (NA) separately. The nutrient agar (NA) was poured into petridishes to culture bacteria. *X. axonopodis* pv*. citri, X. campestris* pv. *vasicatoria and X. axonopodis* pv. *punicae* were used for testing antibacterial activity. Three wells were made in the petridish with sterile cork borer 4 mm size. 50 µl plant extract was introduced into the well and plates were incubated at 32°C for 48 hours. The experiment was performed under aseptic conditions. All the experiments were performed in triplicates.

Microbial growth was determined by measuring the diameter of inhibition zone. *Streptomycin* (30µg/ disc) was kept as positive control for bacterial cultures respectively.

III. Results and Discussion

The antimicrobial activity of the six different collections of plant extracts is reported in Table.1 and Fig.1. It was observed that all the five extracts *viz Euphorbia prostrata, Euphorbia parviflora, Euphorbia cotinifolia, Euphorbia milli, Euphorbia nerifolia,* showed significant antibacterial activity in aqueous extract. Aqueous extract of *Euphorbia prostrate* exhibited highest inhibition zone against X. *axonopodis pv. punicae*. *Euphorbia prostrata* and *Euphorbia milli* were active against all bacterial strains.

According to study of Kumari and Pandey (2017) *Euphorbia hirta* showed antibacterial activity against *Staphylococcus aureus*. Another study done by Kirbag *et. al.* (2013) on *Euphorbia* sp revealed that some of Euphorbia sp. has antibacterial activity.

Narendra *et. al.* (2015) used *Euphorbia milli* to find out its antibacterial activity. They used different extracts of flowers against *Bacillus subtilis, Staphylococcus aureus*, and gram negative organisms *Escherichia coli* and *Proteus vulgaris* by using cup plate method. *Euphorbia milli* was effective against all these strains. No record was found about study of antibacterial activity of *Euphorbia milli* against *Xanthomonas* sp. Hence this study has significant value. These *Euphorbia* sp. are potential source of natural antibiotics and can be used against *Xanthomonas* sp.

Table 1. Antibacterial activity of Selected Plant extracts

Sr. No.	Plant extract	Name of the Bacterial Strains (Inhinitory zone in mm)					
		*X.axonopodis*pv. *citri*		*X.campestris*pv. *vasicatoria*		*X. axonopodis*pv. *punicae*	
		Aq.	Chl.	Aq.	Chl.	Aq.	Chl.
A	*Euphorbia parviflora* L	20±0.3	-	15±0.2	-	17±0.54	
B	*Euphorbia prostrata* L.	25±0.7	-	18±0.56		27±0.45	
C	*Euphorbia Nerifolia* L.	15±0.5	-	12±0.3		16±0.43	
E	*Euphorbia cotinifolia* L.	15±0.2	-	14±0.83		20±0.68	
F	*Euphorbia milli* L.	18±0.8	16±0.43	13±0.71	15±0.06	18±0.42	
Std	*Sreptomycine*	45±0.25	45±0.62	35±0.8	34±0.05	45±0.6	45±0.3

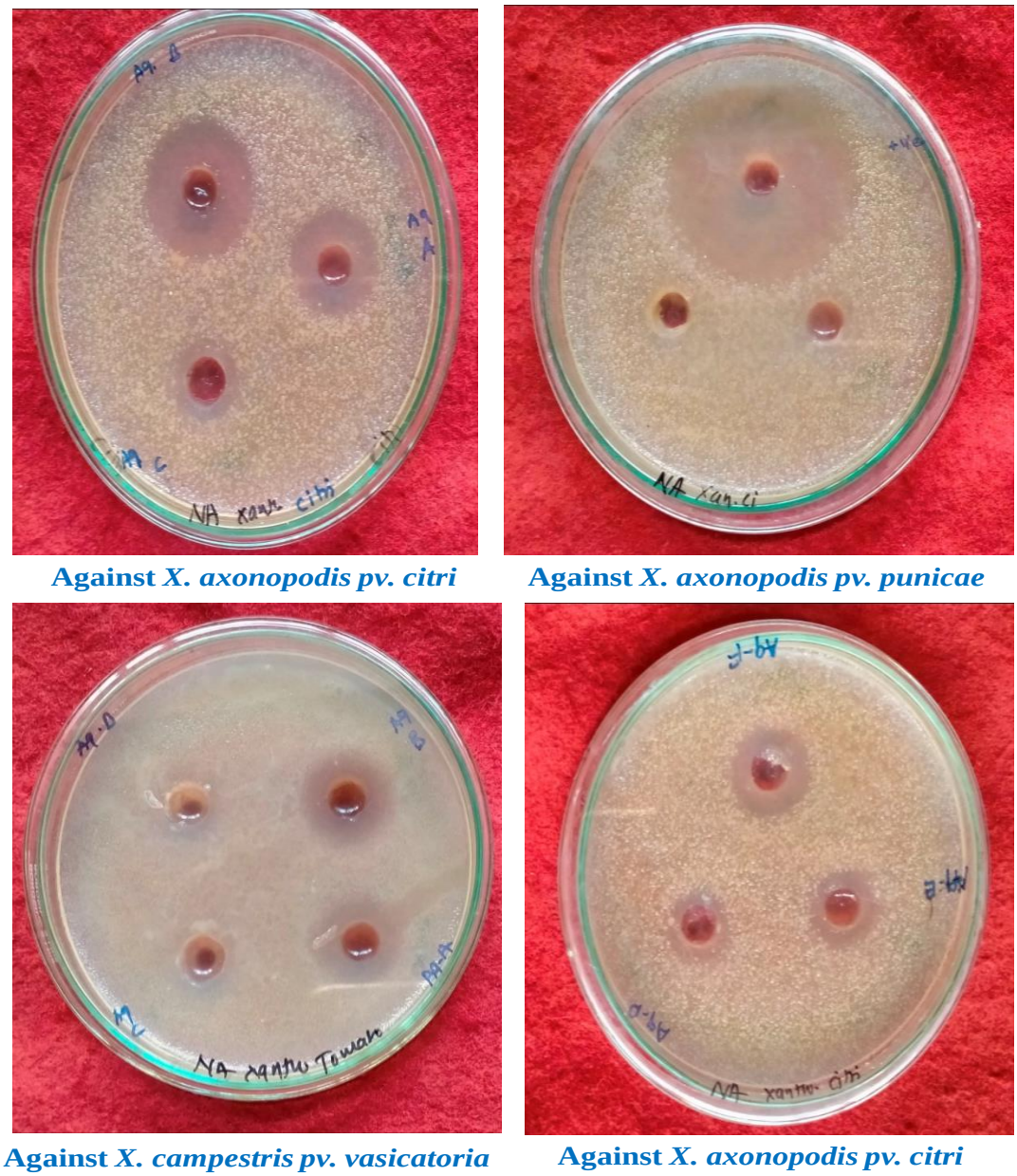

Fig. 1. Antibacterial Activity of Selected Plant Extracts

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Residual Effect of Non-Leguminous Organic Weed Manures on Growth of Crop *Vigna unguiculata*

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ABSTRACT

The experiment was conducted on the farm located at V-P High-tech Research farm, Dist. Beed. The experiment design was a randomized block design [RBD] with ten treatments and three replicates. Previous work in this laboratory and field shows that input, data for the organic manure treatments in form of Non-leguminous weed manures as green manure of *Achyranthes aspera* (AGM), green manure of *Parthenium hysterophorus* (PGM), mixed green manure of both (A&PGM), Dry manure of *Achyranthes aspera* (ADM), dry manure of *Parthenium hysterophorus* (PDM), compost of *Achyranthes aspera* (ACo) and compost of *Parthenium hysterophorus* (PCo), were applied to field for maize crop cultivation compared with treatment of chemical fertilizers PK, NPK and Control. First maize crop was harvested and after 42 days of interval *Vigna unguiculata* was sown in the same treatment plots of bed, having a previous residual effect of organic manures. The growth analysis of the plant was recorded after 29 and 55 days and Chlorophyll analysis of the plant was recorded after 30 and 56 days. Result shows that all organic manures showed good residual effect on growth of *Vigna unguiculata* crops plants. Green manure and compost manure of Non-leguminous weeds gives long term residual effect on crop *Vigna unguiculata* and improves the soil quality.

Keywords: Treatment, green, compost, dry manures, chlorophyll, analysis

I. INTRODUCTION

The cowpea (*Vigna unguiculata)* is a species of bean in the family Fabaceae. it is cultivated throughout the tropics for food. It is a very important annual herbaceous legume from the genus Vigna. Due to its tolerance for sandy soil and low rainfall, it is an important crop in the semiarid regions across Africa and Asia. It requires very few inputs, as the plant's root nodules are able to fix atmospheric nitrogen, making it a valuable crop for resource-poor farmers and well-suited to intercropping with other crops. The whole plant is used as forage for animals, with its use as cattle feed likely responsible for its name. The crop is mainly grown for its

seeds, which are high in protein, although the leaves and immature seed pods can also be consumed. The seeds are usually cooked and made into stews and curries, or ground into flour or paste.

Parthenium hysterophorus is a species of flowering plant in the aster family, Asteraceae. In India, it is locally known as carrot grass, congress grass or Gajar Ghas. It is an annual herb that aggressively colonizes disturbed sites. It grows on any type of soil and in a wide range of habitats. It affects the production of crops, animals, human and animal health, and biodiversity. *Achyranthes aspera* is a species of plant in the family Amaranthaceae. It is distributed throughout the tropical world. It can be found in many places growing as an introduced species and a common weed.

An application of manure usually shows a favorable influence on crop yields for several years. These beneficial effects are distributed over a longer time than those of chemical fertilizers. Present investigation state that the residual effect of Non-leguminous (*Parthenium hysterophorus* and *Achyranthes aspera*) weeds organic manures as compost, green and dry leaf manure effect was studied on growth of *Vigna unguiculata* crops plants.

The residual effects of organic matter in soil following manure or compost application on crop yield and soil properties can last for several years. Four years after application, residual effects of one-time application of beef feed lot manure at rates varying from 123 to 590 Mg dry weight ha^{-1} (1280–6140 kg N ha^{-1}) resulted in a quadratic increase in corn grain yield but also in increased leaching of NO_3–N and Na to a depth of at least 1m **Wallingford, G. W. et al** (1975). The residual effects of organic materials on soil properties can contribute to improvement in soil quality for several years after application ceases **Ginting, D. et al** (2003).

Ayoola O. T. and Makinde E. A. (2007): Studied that complementary Organic and Inorganic Fertilizer Application: Influence on Growth and Yield of Cassava/maize/melon Intercrop with a Relayed Cowpea and concluded that complementary application reduces the dependence of the farmer on inorganic fertilizer use. It also reduces the exposure of the soil to the consequences of inorganic fertilizer application. Organic amendments play a residual role in their ongoing maintenance. Residual amendment effects on total nitrogen (N) and phosphorus (P) were apparent 11.5 yr after application **Larney F. J. et al** (2011). Green manure and compost manure of Non- leguminous weeds gives long term residual effect on crop *Lablab purpureus* plant and its improves the soil quality **Gholap P. N.** (2021).

II. Materials and methods

Field site and experimental design - The experiment was conducted on the farm located at V-P High-tech Research farm, Dist. Beed. The experiment design was a randomized block design [RBD] with ten treatments and three replicates.

Treatments, Seeds variety and plot size - The present work related to treatments of plots depends on the basis of the previous work of the field. First maize crop was harvested then on bed of previous residual effect of organic manure plots like comparative residual effect of compost, green manure and dry leaf manure. Previous work in this field shows that input, data for the organic manure in form of chemical fertilizers PK and NPK at the rate of 120N, 80P and 40K and Control (CON) compared with Non leguminous weeds organic manures as green manure of *Achyranthes aspera* (AGM), green manure of *Parthenium hysterophorus* (PGM), mixed green manure of both ***A.aspera*** & ***P.hysterophorus*** (A&PGM), dry manure of *Achyranthes aspera* (ADM), Dry manure of *Parthenium hysterophorus* (PDM), compost of *Achyranthes aspera* (ACo) and compost of *Parthenium hysterophorus* (PCo). After 41 days of interval the Variety *Vigna unguiculata* was sown. It was produced by a Patel Seeds Corporation, old Mandi P.O. Padra (Baroda, Gujrat*).* 36gm/plots of size 3m x 3m i.e. at the rate of 40 kg/ha each.

Plant sampling - After 56 days of age finally the total crop *Vigna unguiculata* was harvested, before it during the early hours of the day, growth and chlorophyll analysis of green foliage of *Vigna unguiculata* per plot was recorded on the field itself [100 gm plot $^{-1}$] samples of each treatment along with control they were oven dried at 90 ◦ C for 2 Days till it gives constant weight for the determination of dry matter (DM), this dried sample was grinded to fine powder and stored in sealed polythene bags for further analysis.

Analysis:

Chemical Analysis – Using **Arnon's method (1949)** chlorophyll analysis of green foliage of *Vigna unguiculata* per plot was recorded on the field itself [100 gm plot $^{-1}$] samples of each treatment along with control they were oven dried for further chemical analysis. **Jackson, M. L.** (1973).

Statistical Analysis - All the results were statistically analyzed by using analysis of variance [ANOVA] test and treatments means were compared using the least significant difference [CD,P_0.05] which allowed determination of significance between different applications. **Mungikar A. M**. (1997)

III. Results and Discussion

Fig. 1 : Show that graph of residual effect of non-leguminous organic weed manures on *Vigna unguiculata* plant growth analysis. Plant height in cm was highest in the treatment of *Achyranthes* green manure 61.7cm followed by PK as 47.33cm then *Parthenium* green manure as 45.7cm and very short recorded in the treatment of control as 21.33cm followed by *Achyranthes* dry manure as 31.0cm then NPK as 33.0cm.

Total plant weight was highest in the treatment of PK as 20.3gm followed by *Achyranthes* green manure as 19.7gm then *Parthenium* green manure as 17.7gm. Total plant weight was lowest in the treatment of Control as 8.3gm.

Fig. 2 : Show that graph of residual effect of non-leguminous organic weed manures on *Vigna unguiculata* plant morphological growth analysis, The stem diameter was minimum in the treatment of control as 0.63cm as well as maximum in the treatment of *Achyranthes* green manure as 1.4cm then on PK as 1.27cm.

The root weight in gms was maximum in the treatment of PK as 1.30gm followed by the treatment of *Achyranthes* green manure as 1.27gm then *Parthenium* green manure as 1.20gm, as well as Minimum in the treatment of control as 0.70gm followed by *Achyranthes* dry manure as 0.93gm then *Parthenium* dry & compost manure as 0.97gm

In a weight of the fourth leaf was highest in the treatment of PK as 1.40gm then followed in order as *Achyranthes* Green manure 1.37gm, *Parthenium* green manure as 1.30gm and minimum weight of the fourth leaf was observed in treatment of control as 0.73gm then in *Achyranthes* dry manure as 0.87gm.

Fig. 3 : Show that graph of residual effect of non-leguminous organic weeds manure on *Vigna unguiculata* 4th leaf growth analysis. The plant was highest 4th Leaf length was on the treatment of *Achyranthes* green manure as 14.0cm followed by *Parthenium* Green manure and PK as 13.8cm and lowest 4th leaf length found on the treatment of Control as 8.8cm.

Likewise the plant was highest 4th Leaf width found on the treatment of *Achyranthes* green manure as 11.0cm followed by *Parthenium* green manure as 10.5cm and lowest 4th leaf width found on the treatment of Control as 7.0cm.

Fig. 4 : Show that graph of residual effect of non-leguminous organic weeds manure on *Vigna unguiculata* Fresh and dry leaves analysis. The plant fresh leaves number was highest on the treatment of *Achyranthes* green manure, *Parthenium* green manure and PK as 09 and lowest fresh leaves number found on the treatment of Control as 5.

Likewise the plant dry leaves number was highest on the treatment of *Parthenium* dry manure, *Parthenium* green manure and PK as 03 and lowest dry leaves number found on the treatment of *Achyranthes* green manure, NPK and Control as 02.

Fig. 5 : Show that graph of residual effect of non-leguminous organic weeds manure on *Vigna unguiculata* leaf area analysis. The plant was highest 4th Leaf Area on the treatment of *Achyranthes* green manure 20.40cm² followed by the treatment of PK as 15.66cm², then *Parthenium* Green manure as 15.11cm² and the lowest leaf area found on treatment of Control as 7.06cm² then followed up *Achyranthes* dry manure as 10.25cm² then NPK as 10.92cm².

Fig.6. Show that graph of residual effect of non-leguminous organic weeds manure on *Vigna unguiculata* analysis of estimation of Chl.a, Chl.b & Total chlorophyll, (Mg/gm), Chl.a highest in the treatment of

Achyranthes green manure & *Parthenium* green manure residual plots as 1.26mg/gm followed by *Parthenium* dry manure as 1.11mg/gm as well as lowest in the treatment of control 0.53mg/gm followed by the treatment of *Achyranthes* dry manure as 1.02mg/gm .

Likewise Chl.b (Mg/gm) highest in the treatment of PK as 0.80 mg/gm followed by *Parthenium* dry manure as 0.78mg/gm followed by the treatment of *Achyranthes* green manure & *Parthenium* green manure as 0.70mg/gm as well as lowest in the treatment of control 0.37mg/gm then *Achyranthes* dry manure as 0.58mg/gm.

Total chlorophyll highest in *Achyranthes* green manure & *Parthenium* green manure as 1.97mg/gm as followed by the treatment of PK as 1.85mg/gm as well as lowest in control 0.90mg/gm followed by *Achyranthes* dry manure as 1.59mg/gm.

IV. Conclusion

On the basis of the result obtained, it can be concluded that an application of the residual effect of Non-leguminous (*Parthenium hysterophorus* and *Achyranthes aspera*) weeds organic manures as compost, green and dry leaf manure, shows a favorable influence on *Vigna unguiculata* crop yields. These beneficial effects are distributed over a longer time for several years than those of chemical fertilizers.

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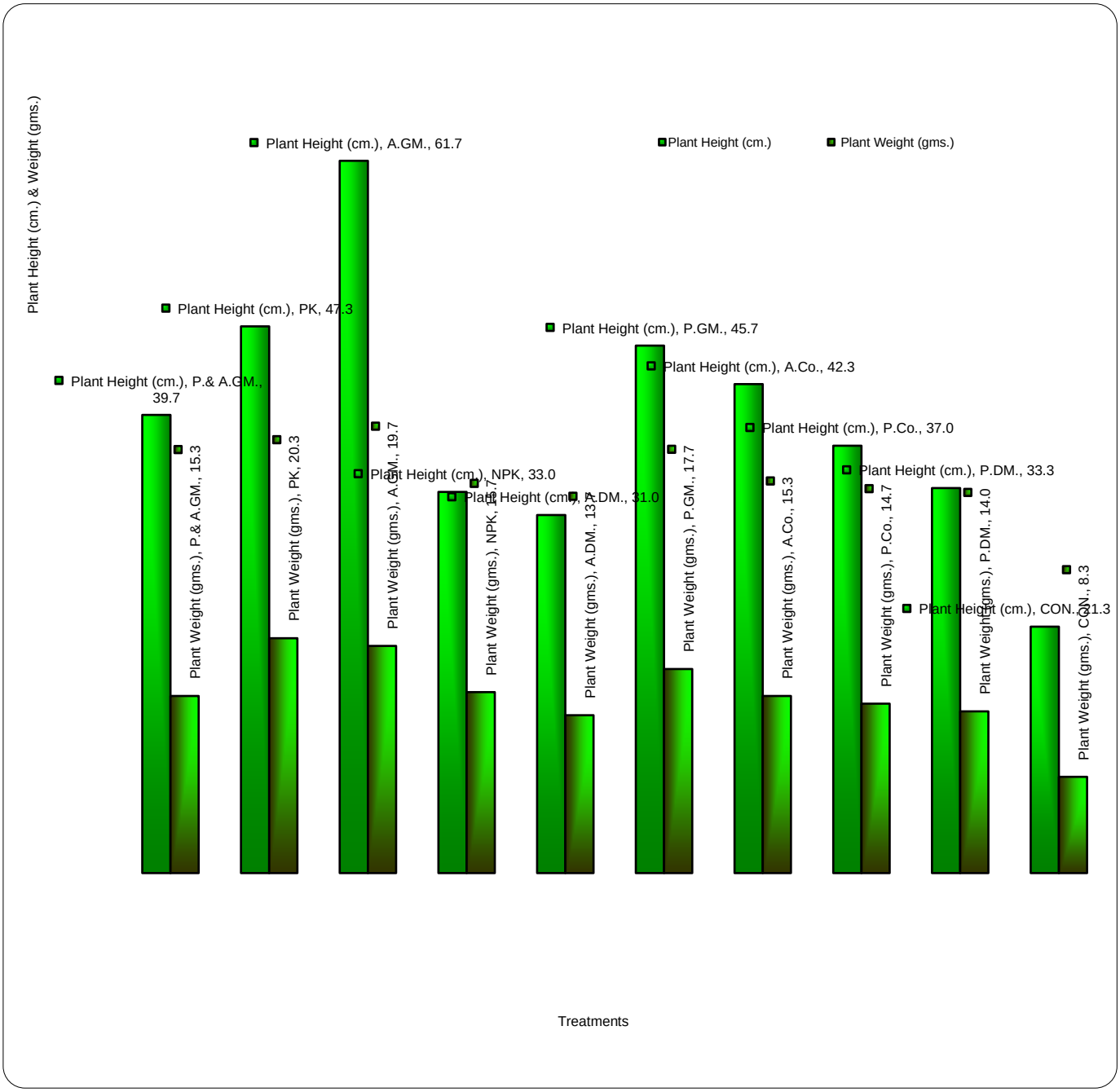

Fig. 1 : Graph of Residual Effect of Non-leguminous organic weed manures on *Vigna unguiculata* plant growth analysis.

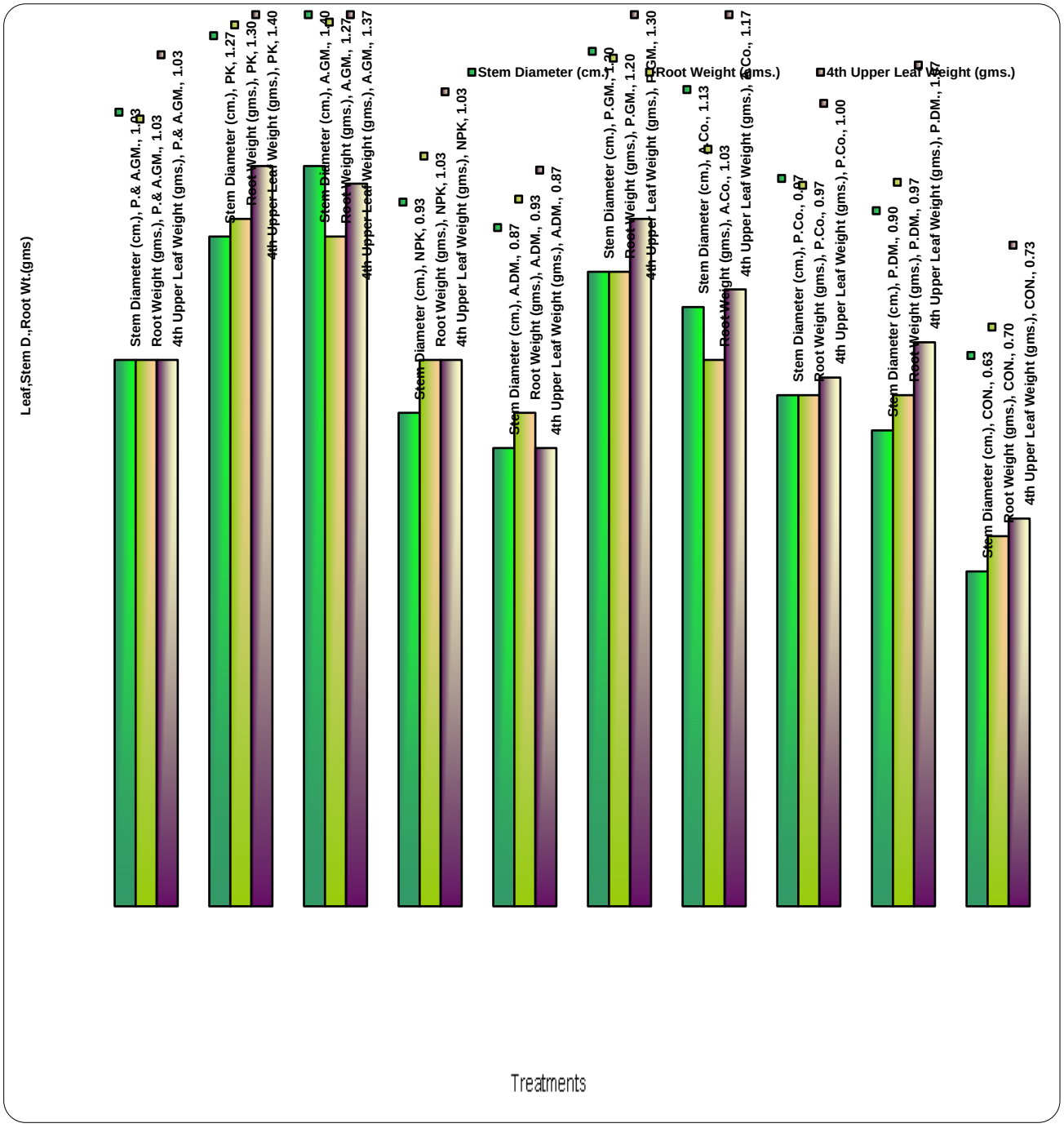

Fig. 2 : Graph of Residual Effect of Non-leguminous organic weed manures on *Vigna unguiculata* plant morphological growth analysis.

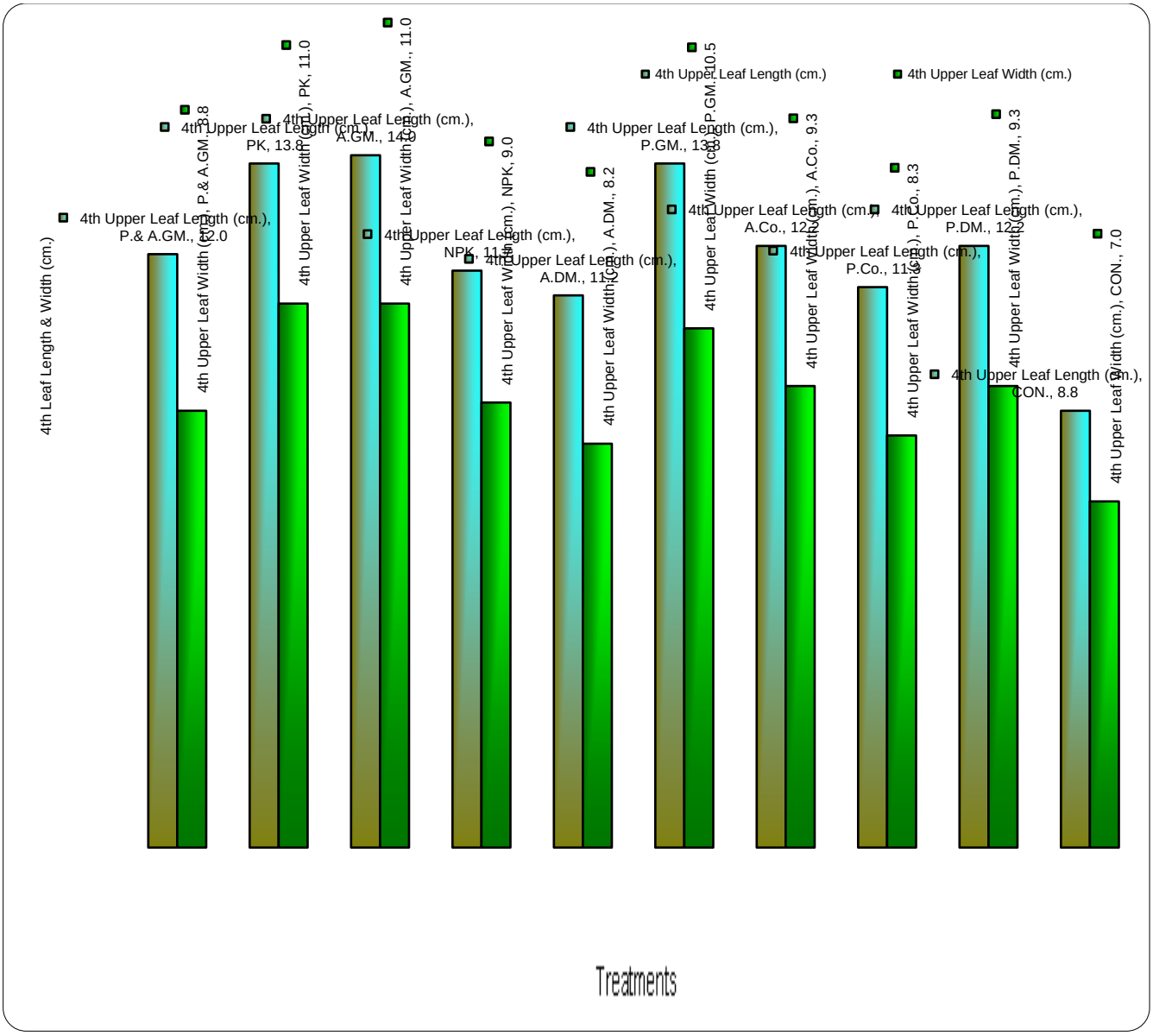

Fig. 3 : Graph of Residual Effect of Non-leguminous organic weeds manure on *Vigna unguiculata* 4th leaf growth analysis.

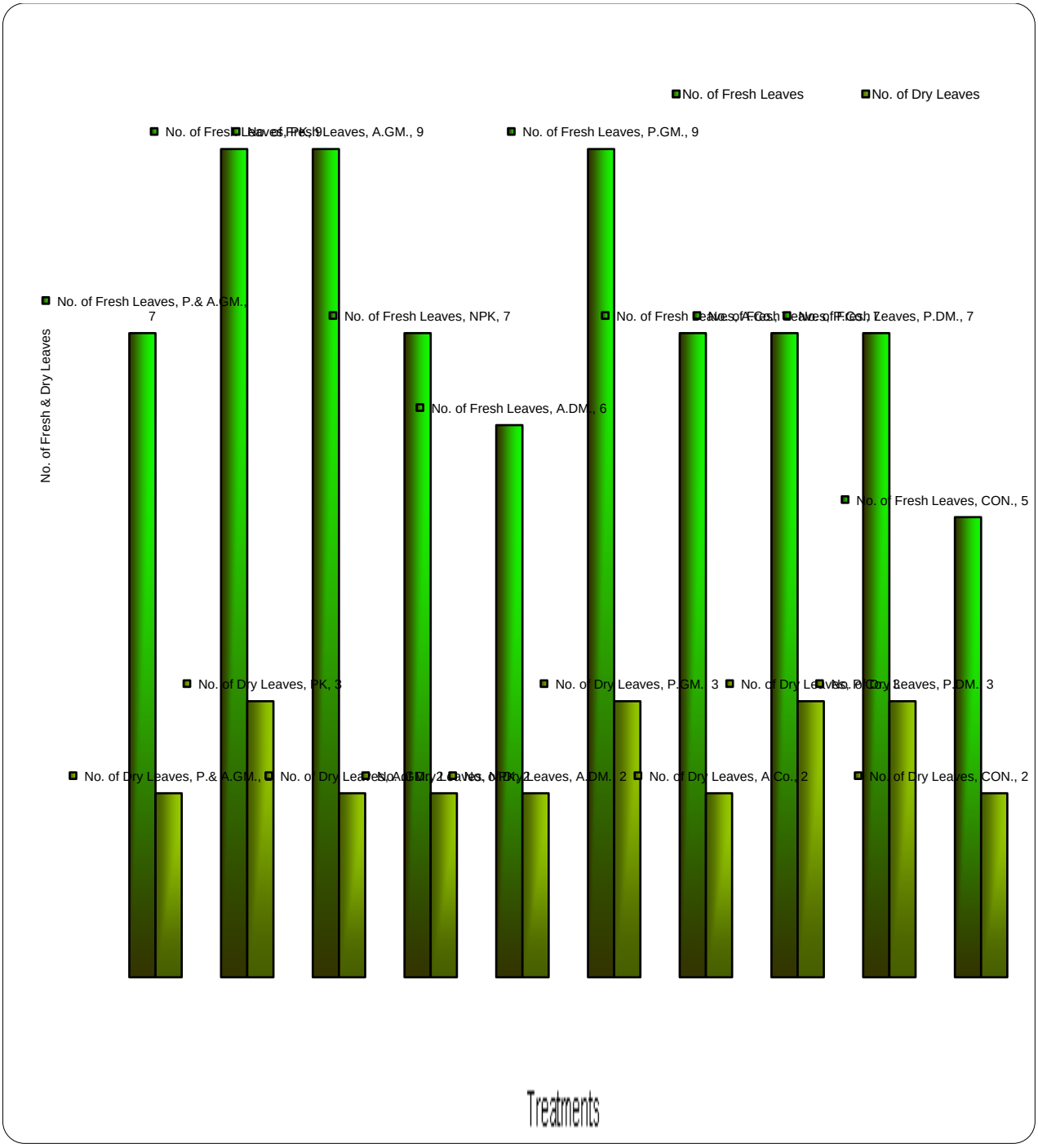

Fig. 4 : Graph of Residual Effect of Non-leguminous organic weeds manure on *Vigna unguiculata* Fresh and dry leaves analysis.

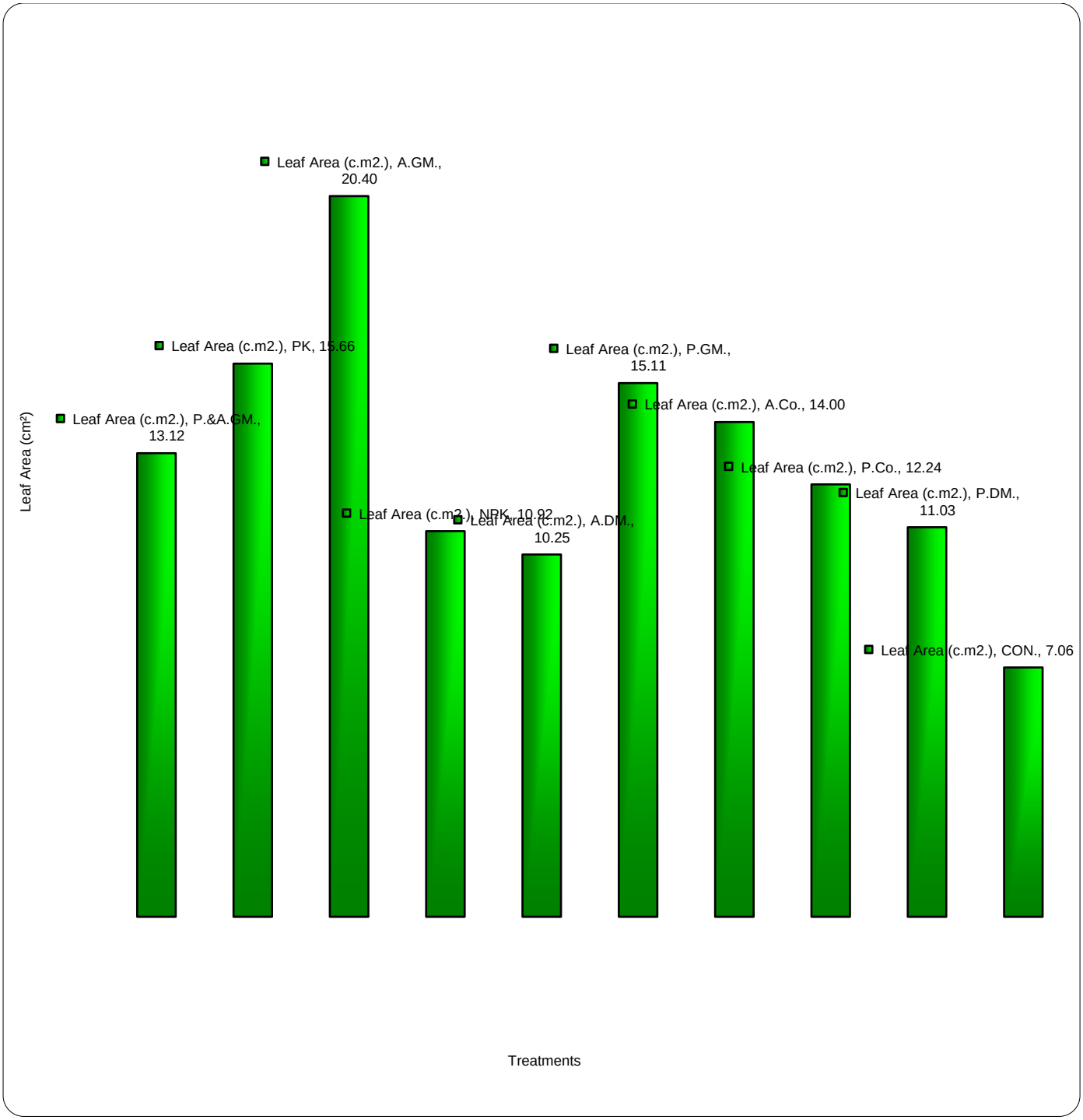

Fig. 5 : Graph of Residual Effect of Non-leguminous organic weeds manure on *Vigna unguiculata* Leaf area analysis.

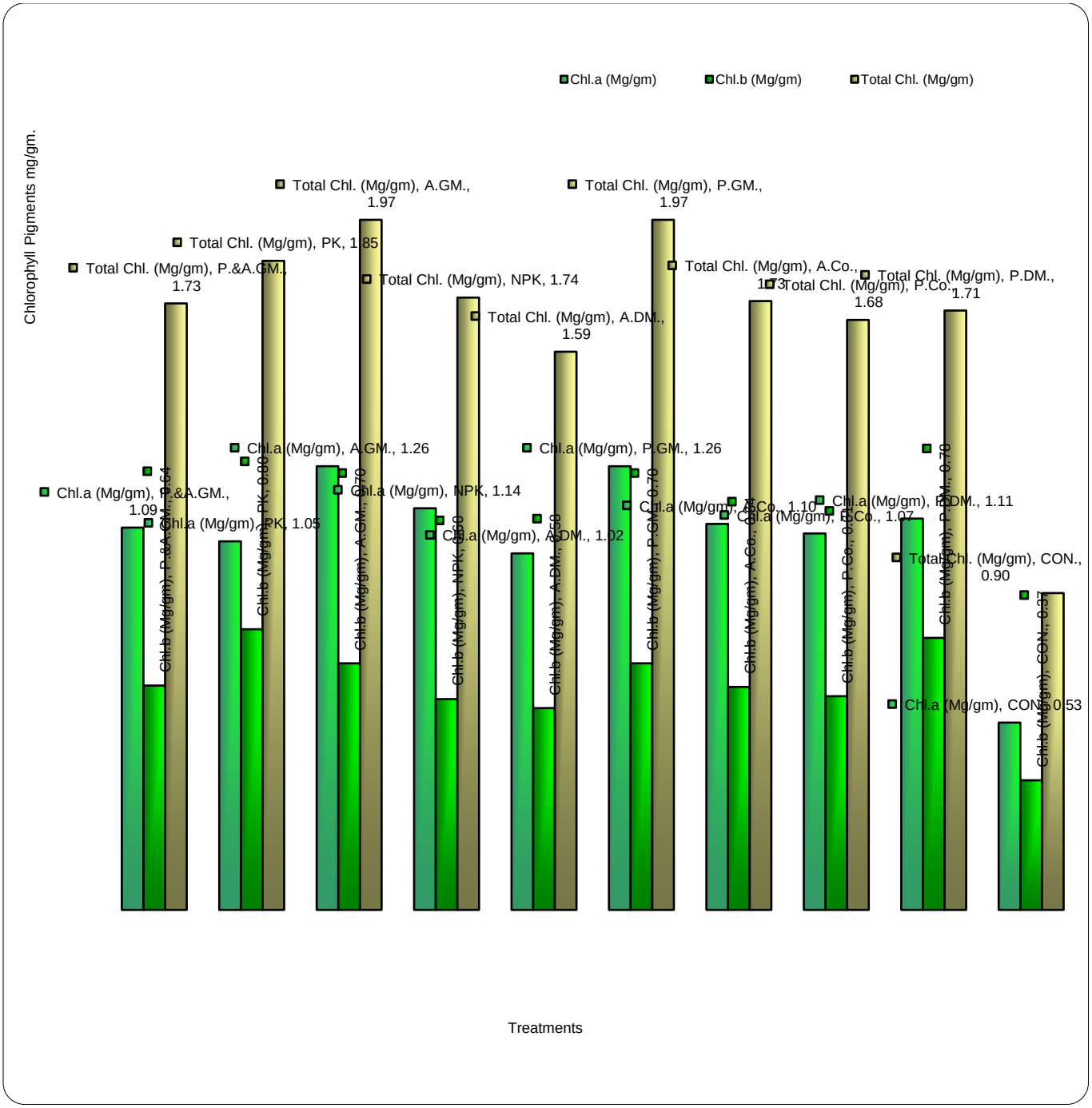

Fig. 6 : Graph of Residual Effect of Non-leguminous organic weeds manure on *Vigna unguiculata* Chlorophyll analysis. Chl.a (Mg/gm) S.C.= 0.09, C.D.= 0.20, Chl.b (Mg/gm) S.E.= 0.11, C.D.= 0.24 and Total Chl. (Mg/gm) S.E.= 0.11, C.D.= 0.22

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Effect of UVB radiation on antioxidant compounds and Carbohydrate content on medicinally important plant Simarouba glauca. DC

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ABSTRACT

The effect of UVB radiation on carbohydrate metabolism and antioxidant compound content in medicinally important plant *Simarouba glauca* were investigated under UVB chamber. Photosynthetic status determined on the basis of soluble sugar and starch. In present study carbohydrates metabolism were studied. Starch and total sugar content in root and stem tissue were increased significantly according to increasing enhanced UVB radations.The reducing sugar fount to be decreased according to increased enhanced UVB irradiations. Under UVB treatments the antioxidant compounds status has been determined under a UVB stress condition the considerable poline accumulation takes place while Ascorbic acid content were alter significantly. Ascorbic acid content decreased under but in leaf tissue it was enhanced significantly. In our study this result presumes that in future increased the enhanced UVB irradiations will have significant impact on the photosynthetic productivity and defensive mechanism.

Keywords-UVB radiations,Antioxidant compounds,Free Proline, Ascorbic acid,Carbohydrates.

I. INTRODUCTION

On the earth's surface due to depletion of stratospheric ozone layer increased UVB radiation is one of the change in current climate change pattern, because of such technological difficulties ambient and enhanced UVB radiations effects on plants has been recorded. A present research approach was used to integrate the effects of enhanced UVB radiation on oil yielding plant *Simaruba glauca.* In all green plants carbohydrates plays an important role in primary metabolism. Carbon skeletons for several carbon compounds were supplied by carbohydrates which are present in plant tissues in higher plants protective cell wall of cells is a major constituent of sugar polymers like cellulose and pectin. The complete degradation is very difficult of these polysaccharides due to their complex structure of cell wall.

Among the 20 amino acid proline is Pyrrolidine – 2 – carboxylic acid, a five carbon cyclic amino acid which belonging to glutamate family. This amino acid is synthesized from a glulamic acid or arginine (Funk *et al.,* 2008), containing intermediate ornithine through the action of ornithin – d – aminotransferase in seedlings of *Arabidopsis (*Roosens *et al.,* 1998). For proline synthesis energy in the form ATP as well as reducing equivalents is consumed. Furthermore, proline biosynthesis is an expensive process which is highly

energetic.Proline accumulates in leaves under abiotic stress condition. According to Matysik *et al* 2002 proteinogenic amino acid a proline which serves as a role of, Osmolyte, free radical scavenger, electron sink as well as stabilizer of macromolecules and component of cell wall. Proline plays a key role under a osmotic stresses (Voctberg and Sharp, 1991).

Ascorbic acid or vitamin (c) is found in eukaryotes like plants and animals (except human beings) but completely lacking in prokaryote is (except cynobacteria). According to Muller Moule *et al.,* (2004) Ascorbate and glutathione is an antioxidant as water soluble. Along with chloroplasts in all subcellur compartments containing the apoplast ascorbic acid is found (Smirnoff 2000).

In present study it has been provide the observations and conclusions on the besis of existing knowledge on the interactive effects of UV-B on medicinally important plant *Simarouba glauca* particularly focus on the possible implications for plant defensive performance and protection against given UVB stress.

II. Materials and Methods

A.Plant Material-

Simarouba glauca DC. edible oil tree is commonly planted along wastelands or dry land forest areas by Department of forest in Maharashtra, Karnataka and Andhra Pradesh as well as in agricultural Universities of these states. Freshly harvested seeds of *S. glauca* were purchased from Sri Sri Institute of Agriculture, Bangalore.

B. Methods

Supplementary UV-B radiation treatments-

One year old seedlings of *S.glauca* where purchased from social forestry Kagal. Seedlings with plastic bags were kept in polyhouse under minimum and maximum air temperature at 21 to 31^{0}C respectively with relative humidity of air up to 55%.

In early April seedlings were exposed to UV-B treatments. UV-B radiations was artificially supplied by UV-B tubes (Philips TL20 W/16,NV,Holland).The UV-B irradiance was provided for10h(08:00am-18:00pm)for different days (4,8,12 and 16 days) as per the method described by Lydon *et al.* ,(1986). The tubes were installed 15Cm above perpendicular to the seedlings and oriented in an east-west direction. Tubes were wrapped with 13 mm cellulose diacetate (CA) film to remove out UVC radiation shorter than 290 nm. CA paper was changed per week to avoid photo degradation.Control seedlings were exposed to normal day light.

Carbohydrate content-

The sugars were analysed with the help of method described by Nelson (1944). Oven dried 0.250 g powder of root, stem & leaves from UV-B irradiated and control seedlings were homogenized in mortal with pestle by using 80% ethyl alcohol and filtered through Buchner's funnel using Whatman No.1 filter paper. Residue with the filter paper was used for starch analysis. The volume of filtrate was adjusted to 50 ml and was reduced on water bath to about 5 ml and for decolourization to this 2 g lead acetate and potassium oxalate (1:1) were added and by adding 40 ml distilled water and filtered through Buchner's funnel. Finally total volume of filtrate was measured and served as an extract for determination reducing sugers. For quantification of total sugars a 20 ml extract from above filtrate was hydrolyzed for 30 minutes with 4 ml concentrated hydrochloric acid. After cooling filtrate were neutralized with anhydrous Na_2CO_3 and filtered, and served as an extract for analysis of Total sugars.

The insoluble residue along with a filter paper was transferred to the conical flask and used for starch analysis. To this 50 ml distilled water and 5 ml concentrated HCl were mixed and hydrolyzed at 15 Lbs. pressure (1½ hour) and cooled at room temperature. The conical flasks were neutralized by the addition of anhydrous sodium carbonate and filtered. The final volume of filtrate was measured used for determination of starch.

For quantification of reducing sugars, total sugars from each filtrates 0.2 ml. were taken in a separate set of tubes respectively. In other test tubes different grades of glucose (0.1 mg ml^1) were taken. For making final volume 1 ml requisite amount of distilled water was added. The blank was prepared with1 ml. distilled water. Somogy's alkaline copper tartarate reagent was prepared by mixing 4 g $CuSo_4$.$5H_2O$, 24 gm unhydrous Na_2Co_3, 16 gm Na-K-tartarate and 180 gm. unhydrous Na_2So_4 in 1 liter distilled water. Nelson's arsenomolybdate reagent prepared by mixing (25 g ammonium molybdate in 450 ml distilled water, 3 gm. sodium arsenate dissolved in 25 ml distilled water, 21 ml concentrated HCl, these ingredients were mixed and allowed to digest for 48 hours at 37° C) 1ml each of there were carefully added. The reaction mixture was further diluted to 10 ml with distilled water. The absorbance of these samples was measured at 560 nm on a double beam spectrophotometer (Shimadzu, 1900).

Antioxidative compounds-

a. Free proline-

According to the method of Bates *et al.,*(1973) free proline content was determined. 0.250 mg of oven dried powder of root, stem and leaves from control and UV-B irradiated plants were taken and homogenized in 10ml 3% sulfosalicylic acid and filtered through Buckner's funnel using Whatman No.1 filter paper. With 3% sulfosalicylic volume of filtrate was adjusted to 20ml. Then 0.5ml filtrate were allowed to react with 2ml glacial acetic acid and 2ml acid ninhydrin reagent (1.25g Ninhydrin dissolved in 30ml glacial acid and 20ml 6 M phosphoric acid by warming and agitation and stored at 4^0C) and boiled for 1 h. in a boiling water bath at 100^0C. For different concentration of standard proline solution (0.1 mg ml^{-1}) was also followed similar

procedure. The reaction was stopped by transferring the test tubes immediately to ice bath. 2 ml of toluence were added in to this and mixed vigorously for 15-20 seconds. The absorbance of coloured complex in toluene layered was measured at 520 nm on double beam spectrophotometer. Proline content was calculated from calibration curve of standard praline final values are expressed as mg $100g^{-1}$ dry tissue.

b. Ascorbic acid content-

A method described by Dhopte and Phadanwis (1989) was used for determination of ascorbic acid content from root, stem and leaves. One gram of root stem and leaf tissues was taken and crushed in 10ml of 0.4% oxalic acid in mortar with pestle.Through a double layered muslin cloth this extract was filtered and by making equal volume of filtrate, these extracts were centrifuged for 20 min at 10,000rpm. Supernatant was slowly taken out and volume made 15ml with 0.4% oxalic acid.Reduction of dichlorophenol indophenols reagent (in 150ml of distilled water 50 mgs of DCPIP was mixed.On a water bath this solution was heated to dissolve the dye.To this solution 42mgs of NaHCO3 was added and kept for cooling.After cooling volume of this solution was made 200ml. with distilled water) and was measured.For standardization of DCPIP standard ascorbic acid solution(0.1mg/ml in 0.4% oxalic acid solution)was used.Five ml of standard ascorbic acid solution was titrated against DCPIP reagent until the solution becomes pink.With a standeredized indophenols reagent 5ml of root stem and leaves extracts were titrated, in the similar manner and readings were recorded.In plant samples the ascorbic acid content was expressed as μg of ascorbic acid per gram of fresh weight.

III. Result and Discission

Effect of UV-B radiations on carbohydrate content in root,stem and leaves of *Simarouba glauca* is shown in fig.1,2,3.It is noticed from fig. that the starch content(fig.1.) is elevated in root, stem tissue with increasing UV-B irradiations, while in leaf tissue it is slightly increased up to 12day UV-B irradiation and decreased in 16days treated plants.

The total sugar content(fig.3.) of root, stem and leaves is significantly increased with increasing days of exposures to UV-B irradiations and this increase is more significant in case of leaf tissue. The reducing sugar content(fig.2.) of root, stem and leaves is found to be decreased with increasing the exposure of UV-B irradiations and this decrease is more significant in stem tissue at 12 and 16 days of exposure to UV-B irradiations.

In all green plants carbohydrates plays an important role in primary metabolism. Carbon skeletons for several carbon compounds were supplied by carbohydrates which are present in plant tissues in higher plants protective cell wall of cells is a major constituent of sugar polymers like cellulose and pectin. The complete degradation is very difficult of these polysaccharides due to their complex structure of cell wall. Starch and sucrose indicates the main output of steady state photosynthesis furthermore synthesis of starch carried out in plastid while synthesis of sucrose takes place in Cytosol. In higher plants the main product photosynthetic

carbon assimilation is oligosaccharides that are sucrose which serves as non reducing sugars utilized in plants growth and development as energy source (George 1993). Growth of sink tissue is depends on the limiting supply of transport sugar and sucrose (Farrar, 1996).

Sucrose breakdowns in to Glucose and Fructose which is a major reducing sugar in plants generally utilized as substrate for respiration and as substrate for starch synthesis in storage organs like seeds and tubers. Along with respiratory substrate and source for carbon skeletons sugar further plays vital role in osmoregulation.

Between the autotrophic source tissue and number of sink tissues carbohydrate partition is competing a common pool of carbohydrates a processes which is highly peculiar that characterized all stages of growth and development in higher plants (Roitsch *et al.,* 2003). The variable level of different carbohydrates in a plant tissue which is highly characterized by both endogenous and environmental factors. Therefore it is most important to access the overall metabolic status of the tissue level of various carbohydrate fractions.

In the present investigation the elevation in total sugar and starch content was observed in root, stem and leaf tissue of *Simarouba glauca* in response to UV-B irradiation. This increased levels of carbohydrates under stress condition might be helpful for the allocation of carbon for various metabolic activity this will helpful to develop stress tolerance of *Simarouba glauca.*

Antioxidative compounds-

a. Free Proline:

The effect of UV-B radiations on the free proline content of *Simarouba glauca* is shown in fig.4. It is noticed from fig. the free proline content of root, stem and leaf tissue is considerably altered. It is indicated that the proline content of root, stem and leaves tissues is increased with increasing treatments of UV-B irradiations. This increase in proline content under UV-B stress is more significant in leaves and stem tissues.

Among the 20 amino acid proline is Pyrrolidine – 2 – carboxylic acid, a five carbon cyclic amino acid which belonging to glutamate family. This amino acid is synthesized from a glulamic acid or arginine (Funk *et al.,* 2008), containing intermediate ornithine through the action of ornithin – d – aminotransferase in seedlings of *Arabidopsis (*Roosens *et al.,* 1998). For proline synthesis energy in the form ATP as well as reducing equivalents is consumed. Furthermore, proline biosynthesis is an expensive process which is highly energetic.Proline accumulates in leaves under abiotic stress condition. According to Matysik *et al* 2002 proteinogenic amino acid a proline which serves as a role of, Osmolyte, free radical scavenger, electron sink as well as stabilizer of macromolecules and component of cell wall. Proline plays a key role under a osmotic stresses (Voctberg and Sharp, 1991). Thomas (1990) reported that, not only proline plays important role in the protection of enzyme from denaturation in salt accumulation proline shows a hydroxyl radical (OH^-) scavenging activity Smirnoff and Cumbes (1989). Proline helps in stabilization of membrane by interacting with phospholipids (Rudolph *et al.,* 1986). Proline acts as cryoprotectant which protects the tissue from

freezing damage in higher plants (Santarius 1992).It helps in protein salvation (Paleg *et al.,* 1984). In several plants proline is responsible for the stomatal closure (Rajagopal, 1981).

Proline is a less harmful amino acid even it is present in high concentration in cell. Proline causes a least disturbance in metabolic processes at higher concentration thus proline also called as compatible solute (Athawale *et al.,* 2005). Proline increases the bound water under stress condition due to it is highly soluble in water. Due to free proline accumulation osmotic pressure of cell sap gets increased which is most important for water relation of the cell.

Under a stress condition proline provide energy by sparing nitrogen for growth and development for confirming resistance (Stewart *et al., 19*66). Accumulation of proline take place after biosynthesis or proteolysis activator in a radiation treated plants (Agrawal *et al., 19*94).

In the present study considerable accumulation of proline takes place due to UV-B radiation stress. In number of experiments it is indicated that under abiotic stress condition proline may acts as osmoticum or it may protect the tissues from damage as well as it helps in stabilization of membrane. Thus, the elevated level of proline under UV-B stress might be helpful to stabilize the membrane from damage of UV-B radiation stress.

b.Ascorbic acid content -

Effect of UV-B radiation on ascorbic acid content in root, stem, and leaves of *S. glauca* is shown in fig.5. It is noticed from fig that the ascorbic acid content is slightly decreased in root and stem tissue in response to UV-B stress. In leaf tissue the ascorbic acid content is increased by 10 to 15 % over the control in response to UV-B stress.

Ascorbic acid or vitamin (c) is found in eukaryotes like plants and animals (except human beings) but completely lacking in prokaryote is (except cynobacteria). According to Muller Moule *et al.,* (2004) Ascorbate and glutathione is an antioxidant as water soluble. Along with chloroplasts in all subcellularr compartments containing the apoplast ascorbic acid is found (Smirnoff 2000). In plants, several antioxidants are present from these vitamin c or ascorbic acid attracting most attention of stress physiologists. Ascorbic acid is structurally simplest vitamin. Generally in most of cell parts like cytosol, chloroplasts, vacuoles, mitochondria and cell wall ascorbate occurs (Anderson *et al.,* 1983; Rauten kranz *et al.,* 1994). Under stress condition concentration have been reported as high as 50 mm and about 30-40% ascorbate is found in chloroplast of plant cells (foyer and Noctor 2005).

For water soluble antioxidants examination is essential to study Ascorbic acid content. Under UV-B radiation ascorbic acid content alter significantly. Ascorbic acid content decreased under ambient UV-B radiation ($p=0.0002$) but DHA and total ASA content (ASA+OHA) enhances under UV-B radiation ($p<0.0001$ and $p=0.0069$ resp.) Thus, ratio ASA/DHA reduces after a exposure of UV-B radiations ($P<0.0001$) (Xu *et al.,* 2008).

Adedooye *et. al.,* (2008) observed that after 4 hour treatment of UV-B light ascorbic acid concentration reduces but after an 8 hour treatment concentration get increased as compared to control plants. They concluded that initial reduction shows sudden response to stress condition as defense mechanism to encounter stress condition giving stimulus to synthesis the antioxidant as ascorbic acid. Ascorbic acid content increased under a U-B radiation in a starting stage significant growing up to 54.3% under a UV-B 2 (+3.6kj m^{-1}) radiation as compared to control plants. Further stage shows reduction in ascorbic acid content which acts as antioxidant which react with hydroxyl radical, singlet oxygen and superoxide radicals. According to several studies it is clear that increments in ascorbic acid content due to UV-B stress condition (Costa *et. al., 20*02; Nasibi and kalantari, 2005). Under a stress condition reduction in ascorbic acid content due to increment in ascorbate peroxidase activity under a UV-B condition and resulted into higher consumption of ascorbic acid for effective quenching of oxyradicals. It is reported by Agrawal and Rathore (2007) in wheat and mung bean under a supplemental UV-B stress condition ascorbic acid content get reduced.

In the present study the ascorbic acid content in root and stem tissue was decreased while in leaf tissue it was slightly elevated. Thus the water soluble antioxidant ascorbic acid is found to be decreased in root and stem tissue and slight elevation in leaf tissue which might be used for effective quenching of oxiradicals, which might be helpful to maintain a balanced antioxidant system under UV-B stress.

Summary and Conclusion-

The elevation in total sugar and starch content was observed in root, stem and leaf tissue of *S. glauca in* response to UV-B irradiation. This increased level of carbohydrates under stress condition might be helpful for the allocation of carbon for various metabolic activities.

The free proline content of root, stem and leaf tissue was considerably altered. It was indicated that the proline content of root, stem and leaf tissues was increased with increasing treatments of UV-B irradiations. This increase in proline content under UV-B stress was more significant in leaf and stem tissues. In number of experiments it is indicated that under abiotic stress condition proline may acts as osmoticum or it may protect the tissues from damage as well as it helps in stabilization of membrane. Thus, the elevated level of proline under UV-B stress might be helpful to stabilize the membrane from damage of UV-B radiation stress.

The ascorbic acid content was slightly decreased in root and stem tissue in response to UV-B stress. In leaf tissue the ascorbic acid content was increased by 10 to 15 % over the control in response to UV-B stress. Thus the water soluble antioxidant ascorbic acid was found to be decreased in root and stem tissue and slightly elevated in leaf tissue which might be helpful for effective quenching of ROS and helps to, maintain a balanced antioxidant system under UV-B stress.

Table 1 : Effect of UV-B radiation on starch content of root, stem and leaves of *S. glauca*.

Treatments	Root	Stem	Leaves
Control	2.59	2.95	2.09
4 (Days)	2.03 (-21.62)	2.46 (-16.61)	2.04 (-2.39)
8 (Days)	3.99 (+54.05)	3.79 (+28.47)	3.16 (+51.19)
12 (Days)	2.91 (+12.35)	3.42 (+15.93)	3.18 (+52.15)
16 (Days)	2.88 (+11.19)	3.68 (+24.74)	1.82 (-12.91)

Each value is mean of three determinations.

Values are expressed as g 100^{-1}g dry wt.

Values in parenthesis indicate percent increase (+) or decrease (-) over the control.

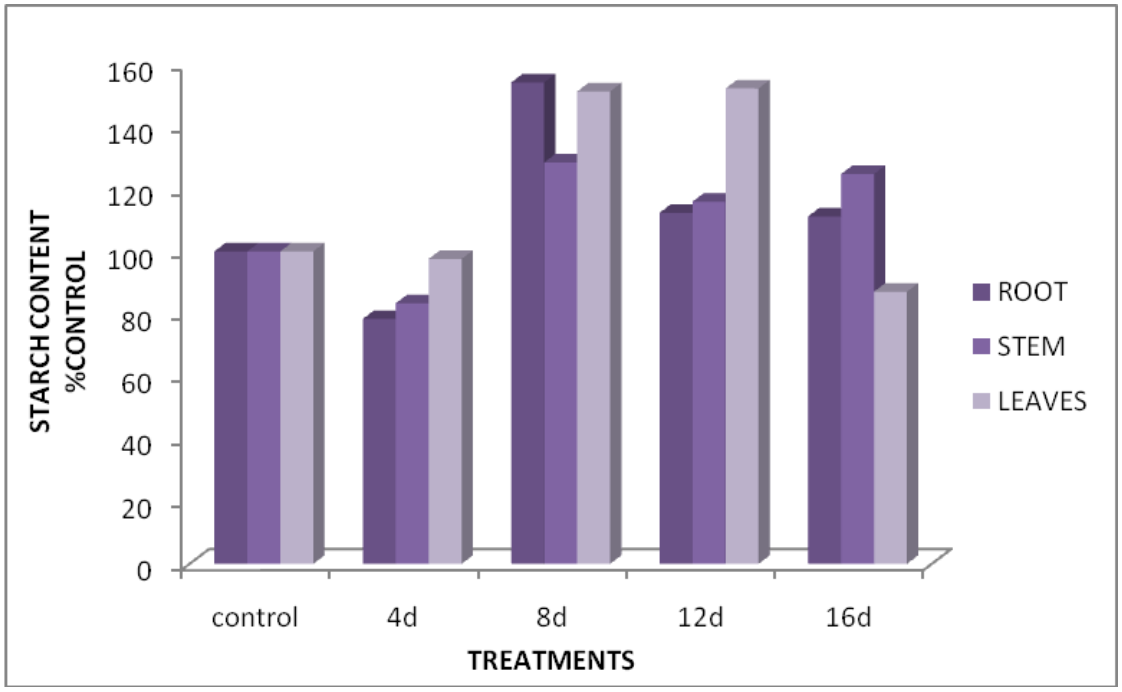

Figure 1. Effect of UV-B radiation on starch content of root, stem and leaves of *S. glauca*.

Table 2: Effect of UV-B radiation on reducing sugars of root, stem and leaves of *S. glauca*.

Treatments	Root	Stem	Leaves
Control	0.07	0.10	0.41
4 (Days)	0.06 (-10.07)	0.23 (+129.56)	0.45 (-9.8)
8 (Days)	0.13 (+74.93)	0.13 (+33.30)	0.40 (+2.8)
12 (Days)	0.07 (+4.77)	0.07 (-25.93)	0.36 (+13.42)
16 (Days)	0.14 (+94.96)	0.04 (-51.86)	0.38 (+8.93)

Each value is mean of three determinations.

Values are expressed as g 100^{-1}g dry wt.

Values in parenthesis indicate percent increase (+) or decrease (-) over the control.

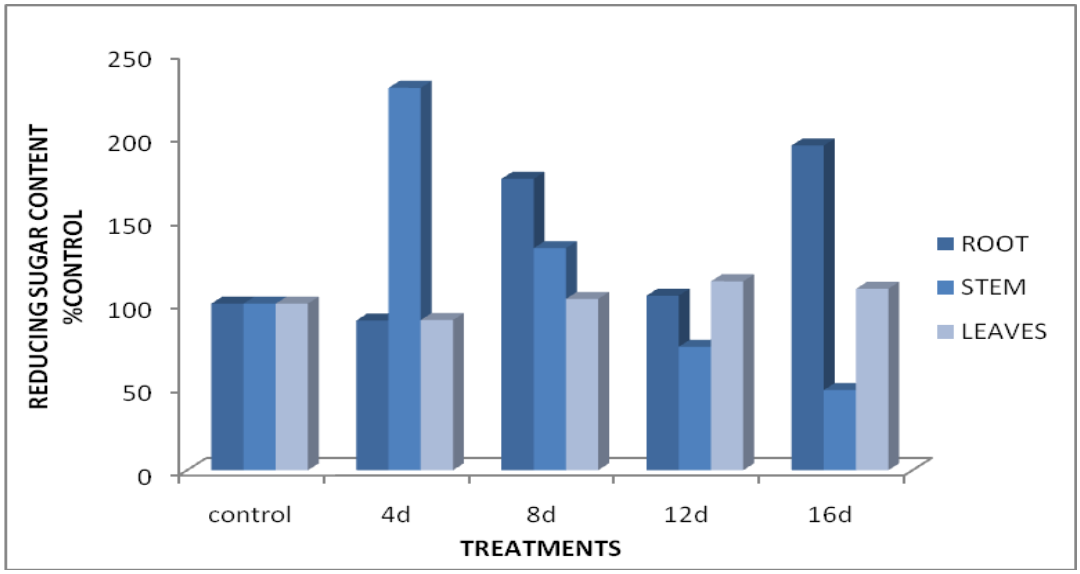

Figure 2: Effect of UV-B radiation on reducing sugars of root, stem and leaves of *S. glauca*.

Table 3: Effect of UV-B radiation on total sugars of root, stem and leaves of *S. glauca*.

Treatments	Root	Stem	Leaves
Control	0.44	0.33	0.56
4 (Days)	0.49 (+11.36)	0.37 (+12.12)	0.58 (-3.44)
8 (Days)	0.48 (+9.09)	0.48 (+45.45)	0.92 (-39.13)
12 (Days)	0.64 (+45.45)	0.39 (+18.18)	0.99 (-43.43)
16 (Days)	0.54 (+22.72)	0.47 (+42.42)	0.79 (-29.11)

Each value is mean of three determinations.

Values are expressed as mg 100^{-}g dry wt..

Values in parenthesis indicate percent increase (+) or decrease (-) over the control.

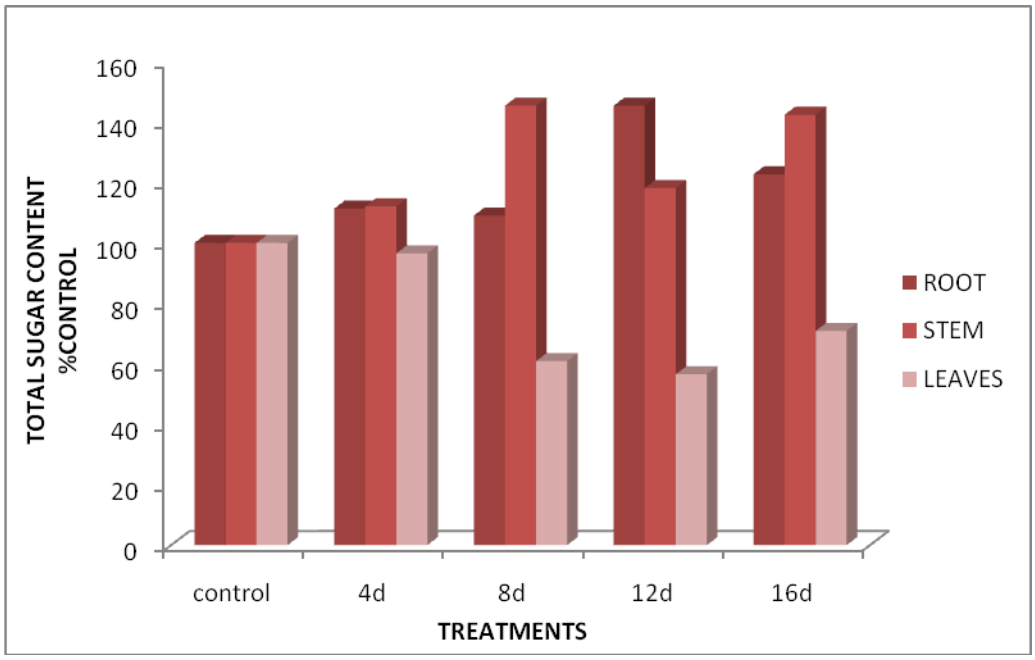

Figure 3: Effect of UV-B radiation on total sugars of root, stem and leaves of *S. glauca*.

Table 4 : Effect of UV-B radiation on free proline content of root, stem and leaves of *S. glauca*.

Treatments	Root	Stem	Leaves
Control	19	25	21.1
4 (Days)	29.1 (+53.15)	56.9 (+127.6)	42.0 (+99.05)
8 (Days)	28 (+47.36)	56.4 (+125.6)	43.7 (+107.10)
12 (Days)	25.8 (+35.78)	106.4 (+325.6)	76.6 (+263.03)
16 (Days)	45.1 (+137.36)	165.4 (+561.6)	98.9 (+368.72)

Each value is mean of three determinations.

Values are expressed as mg 100^{-1} g dry wt.

Values in parenthesis indicate percent increase (+) or decrease (-) over the control

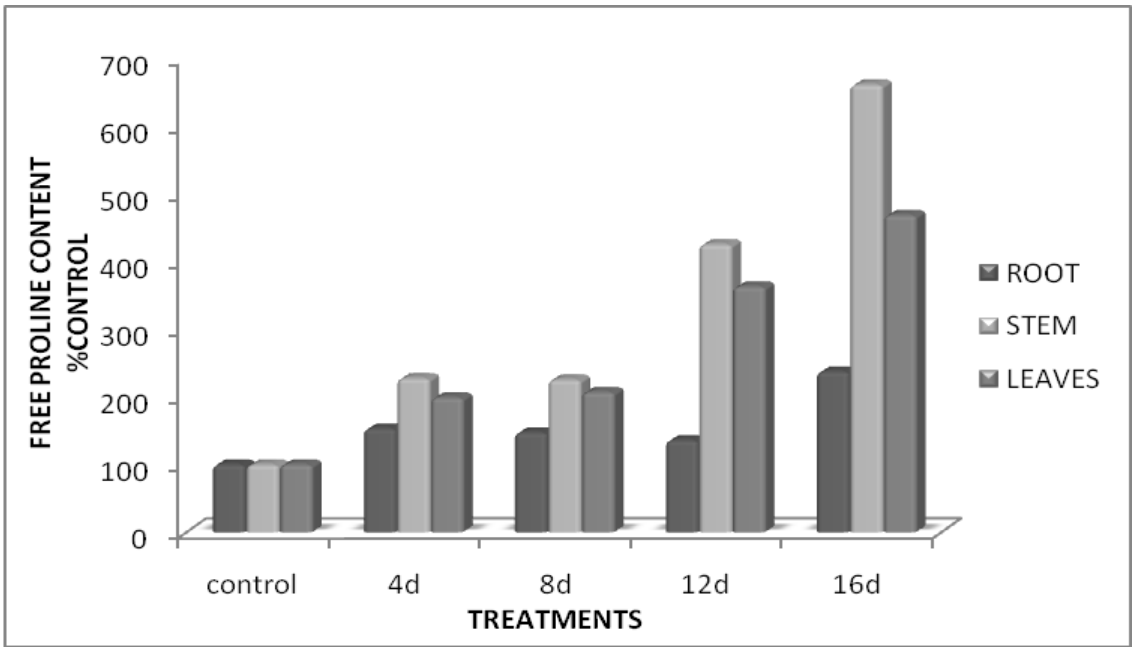

Figure 4: Effect of UV-B radiation on free proline content of root, stem and leaves of *S. glauca*.

Table 5 : Effect of UV-B radiation on Ascorbic acid content of root, stem and leaves of *S. glauca*.

Treatments	Root	Stem	Leaves
Control	0.033	0.07	0.033
4 (Days)	0.026 (-21.21)	0.067 (-4.28)	0.056 (-69.69)
8 (Days)	0.028 (-15.15)	0.038 (-45.71)	0.045 (+36.36)
12 (Days)	0.028 (-15.15)	0.043 (-38.57)	0.039 (+18.18)
16 (Days)	0.032 (-3.03)	0.044 (-37.14)	0.044 (+33.33)

Each value is mean of three determinations.

Values are expressed as mg 100^{-1} g dry wt.

Values in parenthesis indicate percent increase (+) or decrease (-) over the control

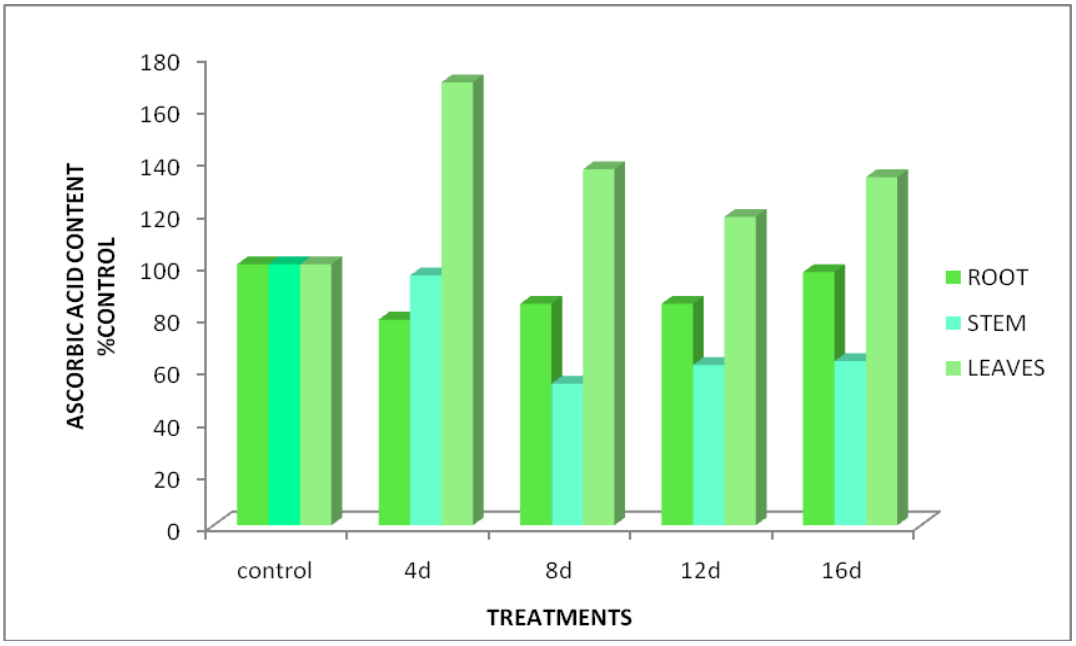

Figure 5 : Effect of UV-B radiation on Ascorbic acid content of root, stem and leaves of *S. glauca*.

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Taxonomy and diversity of stereum from The Parbhani and Nanded district of Marathwada, Maharashtra (India)

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ABSTRACT

A study of stereum SP is the genus from order Aphyllophrales with more than 27 species. The type of species is medicinally important many other species are worked out for various medicinal properties only a valid species have been reported from India but the present study reports 03 species. The species are each described and the fruit bodies, spores and cutis are illustrated.
Key words – Aphyllopharales, Stereceae, Marathwada, Aundha Nagnath, Parbhani Districts.

I. INTRODUCTION

Stereum is type generous of the family of fungi, in the Russulales order. Common names for species of this geneus include leaf fungus, Wax fungus and shelf fungus. Fungi having a shape similar to a stereum are said to have a stereoid shape. Stereum contains 27 species that have a wide spread distribution. This genus includes white rot fungi. Their economic importance lies in their wood destroying properties and carbon recycling of or arid forest ecosystems (Overholts 1939, Woon and Junk 1999).

The stereoid morphotype covers annual to perennial, tough-leathery substipitate to resuplnate fruit bodies with a more or less even hymenophore Generically, the stereum pileal covers are trichodermoid, often transforming to a fomitoid crust. The hymenium is veriably coloured, occasionally staining yellow-orange or red when injured cross sections of the cream – coloured context reveal thin dark reddish deposits between the tomentam and fruit body core. Russulloid pseudocystidia with refractive contents and weakly amyloid spores are characteristics at the microsporical level the typhal system is a variously described as dimitic or monomitic, but motst species have a pseudodimitic hyphal system dominated by thick walled hyphae with living protoplasts. All hyphal are densely packed so that the fruit bodies are rather hard.

The concept of stereum adopted by person (1794) and fries (1938), was long used as an infrageneric division of thelephora earth on the other hand, the concept of this union was rather broad. After generic speraration and intensive microscopical studies, the concept of stereum became increasingly narrow: Lentz (1955), Dank (1957), Boidin (1958 a, b, 1959 a,

b, 1960) pouzar (1959), parmasto (1968) welden (1971), and chamuris (1988) seqregated stereum into smaller genera, there by making the remaining genus a more homogenous group. However, some of these segregate genera (e.g. Haematostereum pouzar, xylohous p. Karst, emend. Boidin) have been “morged” into the core

stereum group, creating additional Taxonomical problem. Some hylobolus characteristics – such as amyloid binuaeate, basieliospores, hymenial acanthophy soid elements, and homothallism – are also basic generic characters for stereum, suggesting that seqregation of the genus has been premature.
Aundha Nagnath forest of the heignts, this species follows its host usually oak, in Europe, Asia, Austrilia, and North America. We present the first report of stereum gausapatum as well as S. Hirsutum, and S. Sanguinolontum (Found growing on fallen pink wood in the Aundha Nagnath Forests.

II. Material and Methods

Collection of the samples was done from various locations from the Aundha Nagnath (Parbhani district) for the morphological details, thin, hand sections were taken from the cutis context and from the tube layer of each sample respectively. Spores were isolated from a block of tube layer, techniqual described by steyaert (1972) to loosen the hyphae, the section material was treated with 10% koh, washed with water and stained with 1% phloxine. These sections were again washed with water and finally stained with cotton blue Lactoglycene (50%) was used as mounting media. All the preparations were semi-permanent. The slides were observed under Bausch and Lomb compound microspore having a combination of 10 × eyepiece and 10 ×145 × soil immersion (i.e. 100 ×) objectives.
The spores were observed under Olympus Bx-40 at 100x objective with phase contrast and the dermis sections at 40x objective of the same photographas were taken using Olympus Bx40 attached with photomicroqraphy unit.

Key to species of stereurm :
1. A cantnohypidia absent 2
1. A cantnohypidia present 3
2. Basidioles cylindrical, peadogstidia basal wall equal / less than 1.5 em thick; Abhymenial surface condensed, subtomontose to nude. Hymenium blecding when bruised, with crysescent condicting hyphae ……..5 gausapatum.
2. Basidioles acuminate – cylindrical pseudocystidic thick – walled, basal walls usually more than 2 cm thick, ab-hymenial surface hirsute
– Tomentose, hymenium when injured, in basidiocarps with active growth, some times staining yellow – orange red.
3. Basidiocarps annual, touqh – coriaceous, not deeply cracking. Hymenium bleeding when injured, with abendent conducting hyphar pseuedocystidia basal walls 1.5 - 2 cm wide. Basidiospores (6) 7-10 (-10.5) × 2.5-3 (-3.5) cm S. Sanguinolentum.

Species description :
1. S. Gausapatum (Fr.) fr ; Hymonomyc.Eur.; 638, 1874. Thelephora gausapata fr., Elench. Fung. 1 :171, 1828. Basidio carp : Effused – reflexed to pileate, gregarious, broadly confluent, coriaceous, tough when dry, 0.5-1

mm thick; pilei 1mm wide, protruding 30-40 mm diameter, laterally complicated; upper surface : greyish orange brownish orange to light brown, yellowish white to pale yellow at the margin, usually zonate by exposing brown to dark brown cutiaein narrow bands, Tomentose, some what glabrescent; margin finely tomentose, soon entire; pore surface : brownish orange, light brown with age, yellowish white to pale yellow at the margin, bleeding when cut or bruished and dark brown on drying, smooth near the base; context: pale separated from the tomontarm by a cuticle.

Hypal system :
Dimitic generative hyphal 2.4 – 3.2 cm wide in the sub-hymenium, hyaline, thin to some what thick walled, separate without clamps, frequently branched and twisted, with transition to pseudocysidial hyhae; skeletal hyphae : 3-7 wide, thick walled, sparsely branched; cystidia of two kinds, both numerous, pseudocystidia often more than 160 cm long 5.2-7.2 cm wide, yellowish brown, thick walled except the apex; pseudocystidia 20-28
× 2.8 - 4 cm hyaline, thin walled; basidia: 32-40 ×4.9 - 5.6 cm narrowly clavate, 4 sterigmate.
Basidiospores : 5 - 7.5 × 2.5 - 3 cm narrowly ellipsoid, amyloid.
Habitat : On dead tree trunk; specimins examined : on dead tree trunk of Azadirachta indica (mu – 189)
Remarks : Himachal Pradesh, U.K. Jammu Kashmir, Africa, Japan, West Bengal, Mexico, Austrilia, Cuba, North America, Brazil, India.

2. Stereum hirsutum (Willd ex. Fr.) Grey Nat. Arrangm, Brit . I : 653. 1821 = Thelephora hirsute willed ex. Fr; Syst Mycol, I: 439m 1821. Basidiocarp : dimidiate to pileate or ressupinate to effused – reflexed soften extending upto 12×4.5 cm loosly adnate, or conchate , upto 3 cm across and 500cm thick in section, 'Imbricate'; Upper surface : strongly hirsute concntrally zonate, zones of erect and appressed, light brown greyish brown to almost grey especially at the hyphae; hymenial surface : pinkish buff to pale, brown, smooth; margines thin acute, concolorous; context subhyaline; in section, composed of compactly arranged hyphae; with a thick brown cuticle on the abhymenial side.

Hyphal system : Dimitic; generative hyphae ; 2.5 – 4.5 cm wide, branched septate, clamps, absent, walls thin to thick; skeletal hyphae : 5-7.5 cm wide, sparsely branched, a septate, clamp absent ; the walls subghyaline, thiak often leaving little or no lumen : Tomantose hyphae 4.5-7.5 cm wide, unbranched to rarely branched, aseptate or few retraction septa; clamps absent, the walls tinted brown, thick and after leaving capillary lumen; Cystidiod hyphae : 7-12 cm broad, cylindrical to hyploid, being the prologations of skeletal hyphae which curve in the hymenium.
Basidia : 25-30 × 4-5 cm, clavate, 4 spored sterigmata upto 5 cm long; Basidiospore; 4.5-5.5 × 2.2-2.8 cm, ellipsoid, shortly apiculate, the walls thin, hyaline, smooth, amyloid.
Habitat : on stumps under amgiosperms.
Specimens examined : On stumpy santalum album (mu – 449)
Remarks : South Asia, Java, Indonesia, Japan, Pakistan, Austrilia, India.

3. Stereum Sanguinolentum (Alb. And Schwein) fr. Epicr. Syst. Mycol. : 549,1838 = Thelephora sanguinolenta Alb. And schwein, Consp. Furg. Lugat. : 274,1805

Basidiocarps : Effused – reflexed to pileate, but mostly occurring in resupinate form, looly adnate often arising as small circular colonies which may coalesce Later and become widely effused up to 600 cm thick in sections, upto 2.5 cm long and 8 cm broad, upto 1 mm thick at the base narrowly reflexed to flabelliform, occasionally imbricate; upper surface pinkish buffto almost light brown, faintly, concentrically zonate, of appressed and erect tomentum, margin : becoming thin pale to concoloures to concoloures; pore surface: deep cream with a red tinge when fresh but turns greyish brown on drying, smooth, bleeds profusely when fresh specimans are cut or bruished; context : subhyalix in section, composed of compactly arranged hyphae, with a thick brown cuticle on the ab-hymenias side.

Hyphal system : Dimitia :
Generative hyphae : 2-3 (4) cm wide, branched, septate, clamps absent the walls subyaline thin; skeletal hyphae : 3-8 cm wide, unbrached torarely branched, aseptate the walls subhayline, thin to mantose hyphae : 3-4 cm wide, unbrand asptate, the walls subhyaline to slightly tinted brown, thick; conducting hyphae: often arising from the upper layer of the context, of variable length, 6-10 (14) cm wide with orange coloured granular contents, cylindrical, immersed or projecting uto 10 cm out of the hymenium, the walls thin subhyaline;
Basidia : 30-35 × 45 cm, clavate – cylindrical, 4 spored sterigmata upto 5 cm long,
Basidiopores : 5.5 – 7 × 2.8 – 32 cm, ellipsoid to subgllantoid, minutely apiculate, the walls thin, hyaline, smooth, a myloid.
Habitat : on stump and on long.
Secimans examined : on stumpy tamarindus indica (mu – 456)

Remark : Wide spread, Florida, Singapore, Phillipines, Central America, Austrilia, Africa, Canada, North America, India.

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