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on

"Role of Researcher's towards Green Economy" (RRGE)

Sponsored by

Pratap Memorial Charitable Trust Gondia

Organized by

Shankarlal Agarwal Science College, Salekasa

(Affiliated to R.T.M. Nagpur University Nagpur)

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Shanakarlal Agrawal Science College Salekasa, Dist Gondia, established in a rural, undeveloped and remote area with an aim to spread and percolate an excellence among the socially deprived students of this area. College has a strong commitment with the students for their 'All round development" to competence himself not only for employment, entrepreneurship but also will be able to understand his role and responsibilities towards Family, Society and Nation.

About IARA

Indian Academicians and Researchers Association (IARA) is an educational and scientific research organization of Academicians, Research Scholars and practitioners responsible for sharing information about research activities, projects, conferences to its members. IARA offers an excellent opportunity for networking with other members and exchange knowledge. It also takes immense pride in its services offerings to undergraduate and graduate students. Students are provided opportunities to develop and clarify their research interests and skills as part of their preparation to become faculty members and researcher. Visit website www.iaraedu.com for more details.

About the Conference

Shankarlal Agrawal Science College Salekasa, Dist. Gondia, is organizing one day national conference for the first time. Pratap Memorial Charitable Trust Gondia, run our college also play vital role of sponsoring this auspicious event. The main aim of this national conference is to provide common platform to all the researchers, academicians and industrialist from different areas of science and technology and for communicating & exchanging of their knowledge & Experiences. Hence, we hope that this conference will open new doors of scientific works to face new challenges in the different areas of the science and technology for the betterment of Society & Nation.

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MESSAGE

I am happy to know that Shankarlal Agrawal Science College, Salekasa is organizing One Day National Conference on "Role of Researcher's towards Green Economy" on 16th November 2017.

The aim of the Conference is to provide a platform to all the researchers, academicians and industrialists from different areas of Science and Technology and for communicating and exchanging of their knowledge and experiences and will thus open new doors of scientific works to face new challenges in the different areas of the Science and Technology for the betterment of Society and Nation. I am, therefore, sure that this Conference will be meaningful, relevant, purposive, interactive and credible worth remembrance and will be the best platform for dealing with all issues related to the field.

I extend my best wishes for successful organization of the National Conference.

(S.P. Kane)

Nagpur/November 10, 2017

From Pro- Vice Chancellor's Desk

राष्ट्रसंत तुकडोजी महाराज नागपूर विद्यापीठ
Rashtrasant Tukadoji Maharaj Nagpur University

डॉ. प्रमोद येवले
प्र-कुलगुरू

"सेंट्रल प्रोव्हींसेस ॲजसन डिस्ट्रीक्ट युनिव्हर्सिटी अधिसूचना क्रमांक 513 दिनांक 1 ऑगस्ट, 1923 द्वारा स्थापित व महाराष्ट्र सार्वजनिक विद्यापीठ अधिनियम, 2016 सन 2017 चा महाराष्ट्र अधिनियम क्रमांक 6) द्वारा संकलित राज्य विद्यापीठ
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No.RTMNU/PVC/17/360

Dated : 10th November 2017

:: **MESSAGE** ::

I am pleased to know that **Shri Pratap Memorial Charitable Trust Gondia's Shankarlal Agrawal Science College, Salekasa, Dist. Gondia** is organizing One Day National Confernce on emerging topic **"Role of Researchers towards Green Economy"(RRGE)** to be held on November 16 2017.

The focal theme of the seminar is of immense interest and importance. The recent developments in the field of Science stream has also changed the expectations of the users in many ways. Hence there is a greater responsibility on the faculty of Science & Technology personnel to identify and adopt innovative and effective practices to meet the demands of end users.

I am sure the deliberations of this National Confernce will surely provide a platform to the researchers, academicians and Science & Technology professionals to exchange their ideas, perspectives and research with resource persons and experts in the field.

I congratulate the organizers for this endeavour and extend my warm greetings to the delegates and the organizers and wish the Confernce a grand success.

(Dr. Pramod Yeole)
Pro - Vice-Chancellor

PA to Pro-VC/YB-17

From President's Desk

I was pleased to know, that Shankarlal Agrawal Science College, organizing one day National Conference on "Role of Researcher's towards Green Economy" on 16th November 2017 at Salekasa. I hope this conference will provide a great chance, to know recent development in the field of Science & Technology.

I wish all the success to the conference and expect that this good work will be continue in future.

Shri Vishal G. Agrawal
President,
Pratap Memorial Charitable Trust, Gondia

From Secretary's Desk

I am extremely pleased to learn that, Shankarlal Agrawal Science College as organizing one day National Conference on "Role of Researcher's towards Green Economy" on 16th November 2017 at Salekasa.

It is appreciated that all the research articles related with the topic will be published on the same day in Conference Proceedings as well as in International Journal.

I welcome all the guests & delegates and wish the success for the conference & future endeavor.

Shri Praful G. Agrawal
Secretary,
Pratap Memorial Charitable Trust, Gondia

From principals Desk

Respected All the Dignitaries,

I am delighted to inform you that, for the first time Shankarlal Agrawal Science College Salekasa, District:-Gondia organizing One Day National Conference on emerging topic "Role of Researchers towards Green Economy" (RRGE) which will be held on 16th November 2017.

The main aim of organizing conference is to provide, a common platform for all the participants & learners coming from various fields, so that they can share their knowledge, innovates new thoughts & ideas, discus on various issues and interact with each other. Hence, college has selected multidisciplinary theme for the conference. The theme itself, express the vital Role of all Researchers & their contribution for any kind of development and Green Economy gives an idea about Sustainable Development without degrading the surrounding Environment, which is the utmost need of an hour.

The Key Note Address, Plenary Talk and Poster Presentation will definitely showcase a new scenario of knowledge to all participants. Thus, with this view our college promote all the eminent scientists, researchers and academicians towards recent trends in Science & Technology and contributing in the welfare of Society &Nation.

I acknowledge with deep sense of gratitude, to our college Honourable President &Honourable Secretary and all the executive members of Pratap Memorial Charitable Trust, Gondia for their remarkable Support & Cooperation as well as Sponsoring the conference.

I also express my gratitude to, Indian Academicians and Researchers Association (IARA) for publishing all research paper on the same day of conference.

Lastly, I welcome all the participant & wish this conference will prove to be educative, informative &fruitful for all and achieve a grand success.

With lots of good wishes & Regards

Dr. Aparna S. Khursel
Officiating Principal,
Shankarlal Agrawal Science College, Salekasa

Organizing Secretary's Message

Dear Researchers,

It is a proud privilege for the Shankarlal Agrawal Science College Salekasa Dist Gondia to host 1ST one day National conference on "Role of Researchers towards Green Economy" in Association with Indian Association of Academician and Researchers. The entire faculty from our college are eagerly looking forward to welcome you all, from across the country.

As said by Ayurveda which is ancient and popular Indian medication that all five elements earth, fire, water, air and space are inside the body just as they exist in the outside world. In a harmonious body fire doesn't burn, water doesn't flood it, the earth doesn't become barren, air cannot blow us away but any disharmony in the five elements indicates that the body needs heeling. This applies to all living organisms including micro organisms like bacteria, plants, birds, animals, reptiles and insects. The contribution of the above all is very much necessary to preserve green in the earth.

As the result of rapid industrialization and increased pollution level in the above said five elements, the mankind is being forced to lead their life in an adverse environmental condition with disharmony. However, it is the responsibility of every human being to preserve and restore the nature in its usual form. This conference with the theme "Role of Researchers towards Green Economy" is a right platform to discuss the suitable technologies to restore green earth. Eminent key note speakers are going to present their view in different perspectives. I hope that the Conference Proceedings will serve as a comprehensive compilation of the present knowledge and experience and will be used widely by researchers who are concerned with the subjects.

The success of the conference depends ultimately on the many people who have worked with us in planning and organizing this technical program. Eventually, I would like to thank our President, Trustee, secretary, Principal and all teaching faculties for their guidance, support and motivation for the success of this National Conference.

Prof . Avinash R. Thakare
Organizing Secretary, RRGE-2017,
Shankarlal Agrawal Science College, Salekasa

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Research Papers

KEY NOTES

"Some Aspects of Green Chemistry"

"Price of amazing achievements of chemistry have been heavy like, toxicity and environmental pollution. The convention of compounds of Natures chiral pool to drugs using enzymes and resolution of chiral drugs is a great advancement and has led to the synthesis of greener synthetic mimics. Supramolecular chemistry is one such area. Today chemistry has moved in to Molecular biology and at IUPAC it is argued that should the chemistry- a central science of yesteryears be renamed as "Molecular Science " Efforts are being made to replace hazardous chromic acid with green oxidants. Unlike in the past green catalytic reactions like Heck reactions are being developed.

It is high time that in our universities emphasis should be laid to bring greener aspect of chemistry in teaching and research the lecture will highlight some of these aspects"

Prof. P. S. Kalsi
Key Notes Speaker, "RRGE-2017"
Shankaral Agrawal Science College
Salekasa

Plenary Talk

E-Chemistry of Drug Synthesis and Design for Green Economy in India

India, though a developing country, is third big player in the field of chemistry especially in pharmaceutical industry. Indian researchers have proved their virtuoso talent in developing novel methodologies and synthetic routes for a variety of chemicals like drugs, polymers, paints, a few to mention. The good as gold contribution of pharmaceutical industry in Indian economy is reflected from the fact that many multinational companies have either established their units in India or partnered with one or more Indian companies. Hence worth, chemistry is considered a recession proof and job oriented area. Unfortunately, this boom in chemistry in the recent time has resulted in increased level of pollution also. To curb the ill-effects of pollution, novel approaches are required. In recent time, a variety of approaches like Green Chemistry, Click chemistry, Domino reaction, e-Chemistry, etc. have emerged to address various issues. e-Chemistry is a novel approach in the terrain of chemistry with its prodigious emphasis on **e**asy, **e**fficient, **e**conomical and **e**co-friendly reactions or approaches or methodologies. The wunderkind reactions and approaches that satisfy the basics of e-Chemistry are need of the hour for the common good of environment and mankind.

In recent time, through computational chemistry, e-Chemistry has revolutionized the method and techniques used for drug design and synthesis. The drugs are designed and their syntheses are planned using extensive computer simulations and softwares. This has resulted in saving of time, reduced number of trial and error cycles, escalated economical-efficiency of the process, helped in reducing animal trials, lesser pollution and eco-friendly synthesis, and provided ample opportunities to researchers having limited resources for doing research.

Dr. Vijay H. Masand
VidyaBharati Mahavidyalaya,
Amravati

"Green Economy and Indian Scenario"

Green Economy aims at reducing environmental risks of ecological scarcities and aim to sustainable development without upgrading environmental related with ecological economics.

In order to active the goals of green economy, researches are required to come out of their tradition concepts. Throughout India researcher scholars is an entity not which is observed publically. They are confined to universities, colleges, few Industries but not available to public. The hurdles identified for green economy by 5 UN agencies i.e. UN environment, UN Conference on Trae & development (UNCTAD). The food & Agriculture organization (FAO), UN Industrial development organization (UNIDO), ITC, are raising cost of certification, low consumer awareness & lack of Technological support.

If consumers are made to be aware, an army of trained person is required having send knowledge of principles of Green Economy risk to environment by habits of consumers. Till today campaign to train people to use toilet is not fulfilled. Several hundred peoples died of using insecticides either nurotopeins or contact poisons. Research scholar failed to teach administrators, politicians, director of companies about hag adorns effects of person on human being & resistant development capacity of insects. Conflate failure of BT cotton seeds was not predicted by researchers which destroyed the economy of cotton growing area leading to suicide of several hundred formers. Alternative means to fight insect attack are pheromone traps, light traps, installation of on bird's habitat which is common enemies of insect should be avoided by under the guidance of data collected by Researchers.

One muse example of economy distraction was observed in lakh producing ruler area. Installation of tower by mobile companies destroyed lakh colonies which was denied by related so colled intelligent stake holders for not getting theoretical logical explanation. Vast increase in no of thermal power plants covering highways & water canals increase life of Roads & prevent water loss in canals.

Moreover this simple solution eradicates the problem of land acquisition & solves the problem of insufficient power supply particularly in rural area. Use of solar energy directly from son during daytime could have solved the problem of huge electricity bills of corporate sector, academic institutions & government offices.

A news of politicians, administrators & fuginessment which are busy in exploiting mother nature for their own short term gain may be prevented if scholars provide the sufficient data of environment impact including losses caused by environment desertion in true sense, loss of biodiversity & ecosystems.

Plantation of only teak plants in Navegao Bandh reserve forest was successfully prevented by nature lover Mahadevrao patil conversing them prime minister Indhira Ghandhi Mahta forest of village Nilaj 8 kms from Gondia was protected by villages since last 300 years why our scholars could not participate in such moves? People are really to welcome such personalities having sound knowledge & goal literate them they will do the rest.

Dr P.R. Dhote
Head, Department Applied Chemistry
M.I.E.T., Gondia

Well Managed Ecotourism: A Sustainable Part of Green Economy

Green economy India aims to transition India into a low carbon economy through enhancing and promoting such issues which are mostly related to Bioresources. Indeed ecological factors bounded us to cogitate more and more for green economic models. Among such models, Ecotourism is also a unit which strengthened the Green Economy. The term 'ecotourism' came into existence during the mid-1960s when the following principles were felt necessary to make sustainable nature-related tourism: less impact exertion on the environment, raising the benefits of local people and consequently increasing tourist satisfaction. Indeed the concept of ecotourism originated as an output of cogitation for environment protection. It was a period when developing countries were realizing that the nature-based tourism could be the best source for earning foreign currencies in very less expenditure. As a result, by the mid-1980s, various countries developed ecotourism as one of the major earning resources. Surveys suggest that the tourist's interest trend is continuously shifting from developed countries towards the third world destinations to enjoy the virgin environment and pristine culture. A widely accepted definition given by Ceballos-Lascura (1987) for eco-tourism states "traveling to relatively undisturbed or uncontaminated natural areas with the specific objective of studying, admiring, and enjoying the scenery and its wild plants and animals, as well as any existing cultural manifestations (both past and present) found in these areas''. The meaning of ecotourism can be explained only on the base of 3 words "Nature, Culture, and Future" i.e., conserve Nature with Culture for Future. India is one of those blessed countries, which is having a blend of all such natural resources which can attract all sorts of tourists around the world. Further, the footprints of our cultural heritage which is one of the oldest in the world are promulgated all around. Under eco-tourism, where from one perspective we are presenting the culture and scenic beauty of India in front of the world at the same time we have to be alert to preserve them for our future generation. In India, we have the following Eco- Resources, presently serving as Ecotourist spots: Biosphere Reserves; Mangroves; Coral Reefs; Deserts; Mountains and Forests; Flora and Fauna; Seas, Lakes, and Rivers, and Caves. Among them, caves are the most overlooked eco-resource. Indeed caving comes under adventurous tourism, but in India, the tourists who are the visitors of Tajmahal are the same who are taking interest to visit caves, so we have to consider the caving as a part of ecotourism.

In India, till date, the concept regarding and caving among the laymen are not clear. Caves are always a precious and irreplaceable part of every Nation's natural heritage. The complete absence of light, almost constant geophysical characteristics, low energy input etc. characteristics evolve some specific types of faunal species inside the caves which sometimes fail to maintain its phylogenetic race outside the cave. On the other hand, various pre-historic footprints time to time reported from the caves strongly suggest that ancient Homo sapiens used these subterranean passages as their temporary or permanent shelters. Further, presently, the cave rocks (spelothems) are considered as the perfect paleoclimate proxies preserved in natural archives to study the past climate or environments. Conclusively, the tourists are always remaining curious to know about the figure and facts of caves. In the present talk, some light will be tried to shed on some facts and figures of the caves and how it could be protected from vandalism and sustain for our future generation.

Dr. Jayant Biswas
Central Zone, National Cave Research
and Protection Organization, Raipur

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ZOOPLANKTON DIVERSITY OF FRESHWATER PERENNIAL PONDS IN ARJUNI/MORGAON, GONDIA DISTRICT, MAHARASHTRA

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[1]Department of Zoology, S. S. Jaiswal College, Arjuni/Morgaon
[2]Department of Zoology, M. B. Patel College, Deori, Dist. Gondia

ABSTRACT
Zooplankton is known to inhabit all freshwater habitats of the world as they are cosmopolitan in nature. They are integral part of aquatic food web and contribute significantly to aquatic biological productivity in freshwater ecosystems. It is helpful in evaluating the ecological status of the aquatic habitats as they are important nutritive level as well as used for determining the health of an aquatic ecosystem. The present study reveals that the study site, the Gao Lake is rich in biodiversity. 18 taxa of Zooplankton were recorded from Gao Lake which comprised of 5 species of Copepods, 6 species of Rotifera, 4 species of Cladocera and 3 species of Protozoa and one species of Ostracoda whereas in Bada lake the zooplankton diversity was relatively poor and represented by 14 species which includes 4 species of copepod, 4 species of Rotifera, 3 species of Cladocera and 2 species of Protozoa and one species of Ostracoda. Abundance status of zooplankton in Gao Lake shows high percentage composition of 40% of Copepoda followed by 36% Rotifera followed by 14 % Cladocera and 8% of Protozoa. High diversity of Copepoda and Rotifera indicates the presence of suspended material in the water body may lead to the degradation of the perennial water body. The present investigation may help the authorities for conservation and management of these water bodies.

INTRODUCTION
Fresh water represents a very small part of the total water on earth but it is indispensible as almost all animal that live on the land consume it and it is the habitat for multitude of aquatic animals. The inland water on the surface of the earth such as lakes, ponds become the focus of special attention of an early stage in development of science of ecology. In last 25 years the unrestrained population growth and rapid industrialization coupled with intensive agriculture with excessive input of inorganic fertilizers and insecticides have exerted intolerable stress on the aquatic resources. For effective exploitation of as aquatic ecosystem basic information on its biodiversity is a must.

Freshwater, its availability and sustainability is posing a global challenge and there is an all round acceptance of the fact that world is facing freshwater crisis (Kodarkar, 2003).

Arjuni/Morgaon taluka is the rural area of the Gondia district, water bodies are mainly used for agricultural & drinking purposes. The application of excessive fertilizers, insecticides and other anthropogenic activities putting a great strain on fitness of such freshwater resources and off course on health of living organisms inhabiting therein. Therefore biota of such water bodies getting eutrophied and the water quality also deteriorated.

The animals living in the wetlands provide the best indications of the overall health and ecological condition (Wankhede, 2007). Every animal has unique environmental requirement to be healthy and to reproduce successfully. The advantage of using bioindicators over chemical and physical tests to evaluate water quality is that the presence of living animals inherently provides information.

Present study involves the quantitative analysis of the zooplankton of Gao & Bada Lake with reference to variety within their community. Zooplanktons provide food for fishes in freshwater ponds and play a major role in fish production. A natable contribution on planktonic forms of freshwater ecosystems is available due to Sharma & Micheal 1987, Sharma 1996 & Kodarkar 1999. Probably Prasada, 1916 was the first to study the limnological profile of freshwater pond in India, subsequently several workers studied water bodies from limnological view point (Purthy, 1933; Sewell, 1934; Sreenivasan, 1970; Jana, 1973; Datta et al., 1983; Datta & Chaudhari, 1986; Michael & Sharma, 1998). Several workers also attempted to study hydro biological profile of varied water bodies (Singh, 2000; Kaushik & Sharma, 1994; Patil & Karikal, 2001; Sunkad & Patil, 2003) and diversity of organisms.

Biodiversity is achieving a tremendous importance in present day research where collection of base line data related to flora and fauna is important. If such studies are not carried out many of the existing aquatic faunal species may go unnoticed. This research article only is an attempt to document zooplankton from two water bodies (Gao & Bada) lake located in two different areas of Arjuni/Morgaon town of Gondia district of Maharashtra.

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MATERIAL & METHODS

DESCRIPTION OF STUDY AREA

The Arjuni/morgaon taluka is situated in the eastern part of Maharashtra just 120 km away from Nagpur. This district of Maharashtra is popularly known as Lake District. It possesses more than 1500 water bodies. In the rural area of this district water bodies are mainly used for agricultural, drinking purposes & also for aquaculture.Gao lake is situated near the state highway towards Wadsa 1 km east of Arjuni/Morgaon town & Bada Lake is on a state way towards Sakoli. They receive the water from the catchment during monsoon as well as from municipal drainage. Gao & Bada lakes spread over 5.5 to 10 hects respectively. The average depth of Gao & Bada Lake are 3 M & 3.5 M respectively. The marginal shallow areas covered with Ipomoea, water hyacinth was main floating weeds in Gao Lake. Hydrilla, Potamogeton, Vallisnaria, Ceratophylum, Nymphea, Nelumbo were dominant macrophytes.

For quantitative zooplankton study samples were collected during December 2014 to November 2015 with the help of plankton net made of bolting cloth no. 25 from littoral zone, preserved in 4% formalin & examine under microscope. The planktonic organisms were identified as per Ward & Whipple, 1959 & Batish, 1992.

OBSERVATION & RESULTS

The zooplankton community in these water bodies mainly comprised of four major groups viz. Rotifera, cladocera, copepod & Protozoa. Besides that some other organisms also contributed to zooplankton community but only few could be identified. In Gao lake altogether 18 species were recorded which comprised 5 species of Copepoda, 6 species of Rotifera, 4 species of Cladocera and 3 species of Protozoa and one species of Ostracoda. Whereas in Bada lake the zooplankton diversity was relatively poor and represented by only 14 species which comprised of 4 species of Copepoda, 4 species of Rotifera, 3 species of Cladocera, 2 species of Protozoa and one species of Ostracoda (Table.1.) the monthly variations in zooplankton population is shown in Table 1.1 & 1.2.

The monthly variation of different groups of zooplankton in both the lakes, the Copepods remained the most dominant group contributing 41% followed by Rotifers 35%, Cladocerans 14% 14% Protozoans and Misc. with 2% in Gao lake (Fig. 1) whereas in Bada Lake the contributions were Copepods 40%, Rotifers 24%, Cladocerans 18%, Protozoans 15% and Misc. 3% (Fig. 2).

Table – 1: List of Zooplankton species occurring in Gao & Bada Lakes of Arjuni/ Morgaon

Sr. No.	Zooplankton species	Gao Lake	Bada Lake
	Copepoda		
1	*Heliodiaptomus viduus*	+	+
2	*Phyllodiaptomus annae*	+	-
3	*Neodiaptomus sp.*	+	+
4	*Mesocyclops leuckarti*	+	+
5	*Eucyclops sp.*	+	+
6	**Rotiferra** *Brachionus caudatus*	+	-
7	*Brachionus calyciflorus*	+	+
8	*Brachionus rubens*	+	+
9	*Keratella tropica*	+	+
10	*Asplanchna brightwelli*	+	+
11	*Fillinia lingiseta*	+	-
12	**Cladocera** *Daphnosoma sarsi*	+	+
13	*Ceriodaphnia cornuta*	+	+
14	*Simocephalus vetulus*	+	-
15	*Moina brachiata*	+	+
16	**Protozoa** *Arcella sp.*	+	+
17	*Diffugia sp.*	+	+
18	*Vorticella sp.*	+	+

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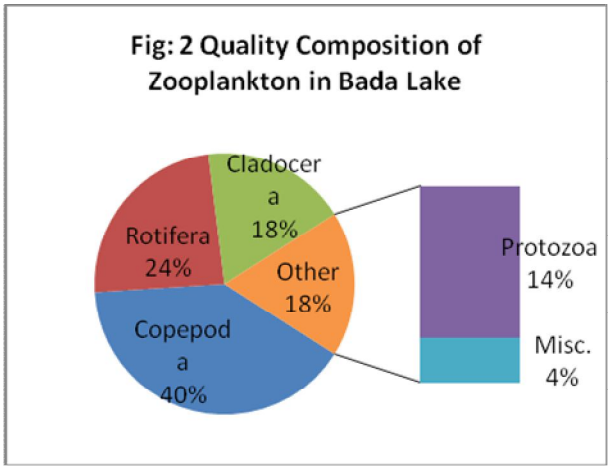
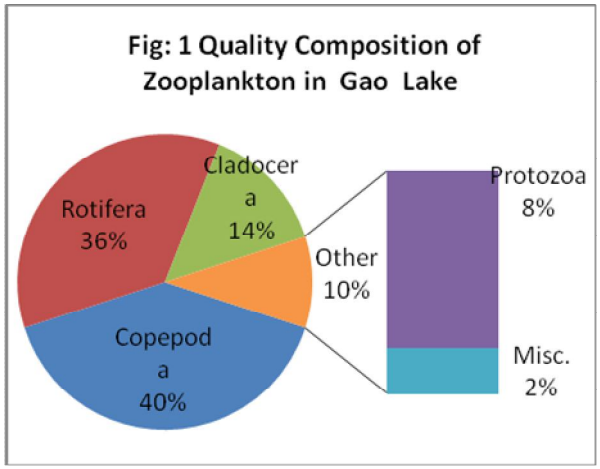
Table - 1.1: Monthly variations of Zooplankton population (u/l) in Bada Lake

Month	Total zooplanktons	Copepods	Rotifers	Cladocera	Protozoa	Misc.
Dec 14	722	296	167	132	94	33
Jan 15	327	164	82	49	26	6
Feb 15	216	76	65	32	28	15
Mar 15	217	106	32	64	10	5
Apr 15	374	130	76	112	48	8
May 15	552	163	175	108	80	26
Jun 15	196	19	34	56	84	4
Jul 15	98	12	16	18	48	4
Aug 15	346	138	92	36	72	8
Sep 15	278	172	65	22	14	5
Oct 15	218	134	52	18	10	4
Nov 15	140	78	32	16	8	6

Table - 1.2: Monthly variations of Zooplankton population (u/l) in Gao Lake

Month	Total zooplanktons	Copepods	Rotifers	Cladocera	Protozoa	Misc.
Dec 14	205	82	85	22	11	5
Jan 15	265	116	95	34	18	2
Feb 15	290	108	134	28	18	20
Mar 15	192	92	58	20	16	6
Apr 15	230	72	85	40	24	9
May 15	424	166	171	39	37	11
Jun 15	266	123	77	39	18	9
Jul 15	421	172	135	70	34	10
Aug 15	459	194	166	59	34	6
Sep 15	657	241	246	109	47	14
Oct 15	789	312	246	138	84	9
Nov 15	485	191	176	74	36	8





DISCUSSION & CONCLUSION

The zooplankton community, which is a vital link in the aquatic food chain, exhibits relatively lesser diversity in tropical waters than temperate waters because its diversity in influenced by a number of physico-chemical and biological factors. Temperature is considered as one of the determining factors in the seasonal distribution of zooplankton population (Byars 1960). In the present study the distribution of zooplankton related inversely with water temperature, nitrate, phosphate and positively with pH of water. Similar observations by Sharma (1989). According to Davis (1999) and Wright (1965) the abundance of zooplankton is chiefly dependent on the abundance of phytoplankton. In the present study the major peak was observed in summer or early monsoon.

The zooplankton community structure in Gao and Bada lakes showed the dominance of Copepods (Copepods > Rotifers > Cladocerans > Protozoans). A common feature in the lakes of Bihar (Sanjeer & Sharma 1995b). Ganpati and Rao (1954) observed temperature to be controlling factor in the seasonal variation of Copepods.

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Rotifers have shown the ability to survive in different environments as many among of them feed on various phytoplankton, some feed on detritus and bacteria, while other planktonic rotifers feed largely on sediment particles (Hutchinson, 1967). High adaptive nature of this group apparently favored its good proliferation among zooplankton community in Gao and Bada lakes. The relative abundance of Rotifers in the lakes under study may be attributed to infestation of macrophytes and high accumulation of organic nutrients due to their annual decomposition (Edmondson, 1944, 1945, 1946). In Gao Lake the maximum peak of Rotifers is observed in winter. Among rotifers Brachionus sp and Keratella sp were predominant in winter. In the present study the water temperature ranged between 20 and 24 degrees C., which seems to be favorable for their growth (Pennak, 1953).

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ULTRASONIC STUDY OF MOLECULAR INTERACTIONS IN TERNARY LIQUID MIXTURE OF 1,4-BIS(DIPHENYLAMINOBENZENE) WITH 3-NITROBENZOIC ACID AND PICRIC ACID IN ETHANOL AT 298K

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ABSTRACT
Densities and ultrasonic speeds of the ternary liquid mixture of 1,4-Bis(diphenylaminobenzene) with 3-nitrobenzoic acid and Picric acid in ethanol at 298 K over the entire composition range were measured. From these data, acoustical parameters such as adiabatic compressibility (β), free length (L_f), acoustic impedance (Z) and molar volume (V_m). Excess values of above parameters have been also evaluated. The evaluated data have been analyzed in terms of Nomoto's Relation (NR), Ideal Mixing Relation (IMR), Free Length Theory (FLT), Impedance Dependence Relation (IDR) and Junjie's method (JUN). Theoretical data of ultrasonic velocities obtained from these theories compared with experimental values.

Keywords: Ultrasonic speeds, Acoustical properties, Molar excess volume, Ternary liquid mixtures, Molecular interaction

1. INTRODUCTION
Measurements of ultrasonic investigations find extensive applications in predicting the physico-chemical behaviour of liquid mixtures [1-4]. The viscosity of liquid mixtures is required in several calculations of engineering that involve fluid dynamic and heat and mass transference [5]. These studies can also be used to identify complexation and to calculate the stability constants of complexes [6-7]. Several researchers [8-11] carried out ultrasonic investigations on binary and ternary liquid mixtures and compared the experimental values with theoretical relations [12-16] of Nomoto's relation (NR), Ideal Mixing Relation (IMR), Free Length Theory (FLT), Impedance Dependence Relation (IDR) and Junjie's method (JUN) and the results are explained in terms of molecular interactions. The donor-acceptor complex formation is biologically important. Oxygen transfer in blood involves reversible complexation between haeme and oxygen. Electron-deficient carbons of carbonyl group can act as electrophiles. Basic groups like amino groups can interact with this group to form a complex and influence the properties of such compound [17]. In this paper, the results obtained in the study of molecular interaction between 1,4-Bis(diphenylaminobenzene) with 3-nitrobenzoic acid and Picric acid in ethanol solvent have been reported over the entire composition at 298 K. Molecular interactions among the components of the mixtures were inferred from the sign of the excess and deviation properties.

2. EXPERIMENTAL
1,4-Bis(diphenylaminobenzene), 3-nitrobenzoic acid and Picric acid were AR grade. The solvent ethanol was purified by distillation (b.p.69^{o}C) before use. Densities, Viscosities and Ultrasonic Velocities were measured at 298 K over a wide range of concentrations. The densities of pure compounds and their solutions were measured accurately using Rudolph digital densitometer (accuracy ± 0.1). Viscosities of pure compounds and their mixtures were determined using Ostwald's Viscometer calibrated with double distilled water. The ultrasonic velocity was measured by using variable path single crystal interferometer (Model F-81S, Mittal Enterprise, India) at fixed frequency 2 MHz with accuracy of ± 0.1 ms^{-1}. The temperature of the solution under study is maintained constant using the electronic Juloba thermostat. This thermostat is equipped with a heater, a stirrer, a thermometer and a regulator. The temperature was maintained with an accuracy of ±0.1K. Acoustical parameters such as adiabatic compressibility (β), free length (L_f), acoustic impedance (Z) and molar volume (V_m) were calculated using standard equations [18].

$$\text{Adiabatic compressibility } (\beta) = 1/U^2 \rho \quad (1)$$

$$\text{Free length } (L_f) = K \beta^{1/2} \quad (2)$$

Where K is temperature dependant constant
The acoustic impedance is given by the product of ultrasonic velocity and density as shown below.

$$\text{Acoustic impedance } (Z) = U\rho \quad (3)$$

Where ρ is the density and U is the ultrasonic velocity in the liquid system.

$$\text{Molar Volume } (V_m) = M_\rho \quad (4)$$

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Where M is mean molecular weight. It is calculated as $M = X_1M_1 + X_2M_2 + X_3M_3$, X_1, X_2 and X_3 are mole fractions and M_1, M_2 and M_3 are molecular weights of constituent components of ternary liquid mixtures.

The excess thermodynamic parameters are defined as the difference between the experimental and ideal mixture values. The excess values of the parameters have been computed from the following expressions.

$$Y^E = Y_{EXPT} - \sum_{i=1} \quad (5)$$

Nomoto [19] established an empirical formula for ultrasonic velocity in binary liquid mixtures on the assumption of linear dependence of the molar ultrasonic velocity on concentration in mole fractions and additively for molar volumes as,

$$U_{NR} = \{(X_1R_1+X_2R_2+X_3R_3) / (X_1V_1+X_2V_2+X_3V_3)\}^3 \quad (6)$$

Ideal Mixing Relation, Van Deal and Vangeel [20] suggested following relation for ultrasonic velocity in binary liquid mixtures

$$U_{IMR} = \{1/X_1m_1+X_2m_2+ X_3m_3\}^{1/2} X \{X_1/m_1U_1^2+X_2/m_2U_2^2+ X_3/m_3U_3^2\}^{-1/2} \quad (7)$$

Free Length theory concept in ternary liquid mixtures is introduced by Jacobson ultrasonic velocity of liquid mixture (U_{FLT}) is given by

$$U_{FLT}\, L_{mix}\, \rho_{mix}^{1/2} = K \quad (8)$$

Where, K is temperature dependant constant.

Impedance Dependence Relation [21] for ultrasonic velocity of ternary liquid mixture is given by

$$U_{IDR} = \sum XZ / \sum X\rho \quad (9)$$

Jungie's Method [22] provides following relation for ultrasonic velocity of ternary liquid mixtures

$$U_{JUN} = X_1V_1+X_2V_2+ X_3V_3/(X_1M_1+X_2M_2+ X_3M_3)^{1/2}[X_1V_1/\rho_1U_1+ X_2V_2/\rho_2U_2+ X_3V_3/\rho_3U_2]^{-1/2} \quad (10)$$

3. RESULTS AND DISCUSSION

The values of ultrasonic velocity (U), density (ρ) and adiabatic compressibility (β), free length (L_f), acoustic impedance (Z) and molar volume (V_m) of ternary liquid mixtures of 1,4-Bis(diphenylaminobenzene), 3-nitrobenzoic acid and Picric acid for different compositions at 298 K are presented in Table 1. Respective values of excess parameters have been evaluated and listed in Table 2. The theoretical values of ultrasonic velocity calculated on the basis of Nomoto's Relation (U_{NR}), Ideal Mixing Relation (U_{IMR}), Free Length Theory (U_{FLT}), Impedance Dependence Relation (IDR) and Junjie's method (JUN) for ternary liquid mixtures at 298 K, the modulus of percentage deviation of theoretical velocities from experimental velocities are provided in Table 3.

Table 1: Values of ρ, U, L_f, β, Z and V_m for ternary mixtures of 1,4-Bis(diphenylaminobenzene) with 3-nitrobenzoic acid and Picric acid in Ethanol at temperature 298 K.

Mole X1	ρ (Kgm^{-3})	U (ms^{-1})	β (10^{-10}m^{2}N^{-1})	L_f (A^o)	Z (10^6Kg m^{-2}s^{-1})	V_m (10^{-6} m^{3}mol^{-1})
		1,4Bis(diphenylaminobenzene) + 3-nitrobenzoic acid				
0.03	1521.5	1821.5	1.9809	8.6980	2.7714	221.06
0.06	1527.4	1815.3	1.9867	8.7109	2.7726	242.21
0.09	1533.1	1810.1	1.9907	8.7196	2.7750	249.79
0.12	1538.5	1805.4	1.9941	8.7270	2.7776	253.40
0.15	1544.8	1799.2	1.9997	8.7392	2.7794	255.13

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0.18	1550.3	1793.6	2.0050	8.7509	2.7806	256.11
0.21	1557.1	1786.7	2.0110	8.7655	2.7820	256.34
0.24	1563.7	1780.1	2.0181	8.7794	2.7835	256.28
0.27	1569.2	1774.3	2.0242	8.7927	2.7842	256.18
0.30	1574.8	1768.5	2.0303	8.8058	2.7850	255.91
		1,4-Bis(diphenylaminobenzene) + Picric acid				
0.03	1510.1	1886.1	1.8615	8.4318	2.8481	311.39
0.06	1515.6	1880.3	1.8662	8.4424	2.8497	316.54
0.09	1521.2	1875.5	1.8688	8.4484	2.8530	321.59
0.12	1526.7	1870.2	1.8727	8.4571	2.8552	326.58
0.15	1530.5	1866.6	1.8752	8.4629	2.8568	331.86
0.18	1535.1	1851.1	1.9010	8.5209	2.8416	336.92
0.21	1539.2	1847.8	1.9028	8.5248	2.8441	342.00
0.24	1544.8	1842.7	1.9064	8.5329	2.8466	346.67
0.27	1550.3	1837.4	1.9106	8.5423	2.8485	351.29
0.30	1556.6	1831.1	1.9160	8.5543	2.8502	355.66

Table 2: Values of β^E, L_f^E, Z^E and V_m^E of 1,4-Bis(diphenylaminobenzene) with 3-nitrobenzoic acid and Picric acid in Ethanol at temperature 298 K.

CM	β^E ($10^{-10}m^2N^{-1}$)	L_f^E (10^{-10} m)	Z^E (10^6Kg $m^{-2}s^{-1}$)	V_m^E (10^{-6} m^3mol^{-1})
	1,4-Bis(diphenylaminobenzene) + 3-nitrobenzoic acid			
0.03	-0.0493	0.0017	0.5643	0.0136
0.06	-0.0434	0.0009	0.3100	0.0106
0.09	-0.0395	0.0006	0.2136	0.0089
0.12	-0.0361	0.0004	0.1636	0.0076
0.15	-0.0305	0.0003	0.1329	0.0063
0.18	-0.0251	0.0003	0.1120	0.0052
0.21	-0.0185	0.0002	0.0974	0.0039
0.24	-0.0121	0.0002	0.0867	0.0027
0.27	-0.0060	0.0002	0.0779	0.0017
0.30	0.0000	0.0002	0.0710	0.0007
		1,4-Bis(diphenylaminobenzene) + Picric acid		
0.03	-0.0263	0.0084	2.8383	0.0306
0.06	-0.0215	0.0083	2.8300	0.0302

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0.09	-0.1883	0.0083	2.8234	0.0299
0.12	-0.0149	0.0083	2.8159	0.0297
0.15	-0.0124	0.0083	2.8078	0.0296
0.18	0.0134	0.0083	2.7830	0.0294
0.21	0.0151	0.0083	2.7759	0.0292
0.24	0.0187	0.0083	2.7689	0.0289
0.27	0.0229	0.0082	2.7614	0.0287
0.30	0.0283	0.0082	2.7539	0.0285

Table 1 show that the ultrasonic velocity decreases but density increases with increasing concentration for both the system. Adiabatic compressibility (β) is a measure of intermolecular association or dissociation or repulsion. It also determines the orientation of the solvent molecules around the liquid molecule. The structural arrangement of the molecule affects the adiabatic compressibility. Excess parameters provide information in the study of molecular interactions. Adiabatic compressibility, free length, molar volume and acoustic impedance increases with increasing concentration for both the system.

The decrease in U and ρ indicates weak intermolecular forces between the molecules. The increase in β, L_f, Z and V_m with increase in concentration can be explained by taking into consideration the fact that the loss of weakly polar association and difference in size and shape of component molecules. Such an increase in β, L_f, Z and V_m may also be attributed to lose packing of molecules which may be brought by weakening of intermolecular forces [23].

Table 2 shows that value of excess adiabatic compressibility are negative for system 1,4-Bis(diphenylaminobenzene) + 3-nitrobenzoic acid. Earlier workers [24,25] found that increasing negative value of excess compressibility indicates strong interaction between the components of the mixtures. Positive values in excess properties correspond to the existence of dispersive forces which are present in system 1,4-Bis(diphenylaminobenzene) + picric acid. The positive deviation in β^E in ternary systems has been attributed to dispersive forces that show weak interaction between the molecules.

Tables 2 shows that values of excess free length are positive in both systems. The positive excess values indicate the existence of molecular interaction in the mixtures. Fort & Moore [26] indicates that the positive values of excess free length should be attributed to the dispersive forces and negative excess values should be due to charge transfer for all the systems.

The excess values are found to be positive in the both systems. Adgaonkar et al. [27] showed negative values in excess molar volume indicate the existence of strong molecular interaction in liquid mixtures whereas positive values indicates least interaction.

Table 3: Experimental velocities (U_{expt}/ m.sec^{-1}), theoretical velocities (U_{theo}/ m.sec^{-1}), percentage deviation for the systems 1,4-Bis(diphenylaminobenzene) with 3-nitrobenzoic acid and Picric acid in Ethanol at temperature 298 K.

	Ultrasonic velocities in ms^{-1}						Percentage deviation (%)				
Conc.	U_{exp}	U_{NR}	U_{IMR}	U_{FLT}	U_{IDR}	U_{JUN}	U_{NR}	U_{IMR}	U_{FLT}	U_{IDR}	U_{JUN}
	1,4-Bis(diphenylaminobenzene) + 3-nitrobenzoic acid										
0.03	1821.5	1822.7	1824.5	1823.1	1820.9	1826.9	-0.06	-0.16	-0.09	0.03	-0.29
0.06	1815.3	1817.1	1818.5	1817.8	1816.3	1819.1	-0.10	-0.18	-0.13	-0.05	-0.21
0.09	1810.1	1811.5	1811.1	1812.6	1809.8	1812.5	-0.08	-0.06	-0.14	0.02	-0.13
0.12	1805.4	1806.2	1807.7	1807.1	1804.5	1808.2	-0.04	-0.13	-0.09	0.05	-0.15
0.15	1799.2	1800.3	1802.9	1801.6	1798.8	1804.6	-0.06	-0.20	-0.13	0.02	-0.30

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0.1	1793	1794	1794.	1793	1794	1795.	-	-	-	-	-
8	.6	.4	6	.8	.1	1	0.04	0.05	0.01	0.03	0.08
0.2	1786	1787	1789.	1788	1786	1790.	-	-	-		-
1	.7	.8	3	.1	.3	4	0.06	0.14	0.07	0.02	0.21
0.2	1780	1781	1781.	1780	1780	1782.	-	-	-	-	-
4	.1	.5	5	.7	.5	3	0.08	0.08	0.03	0.02	0.12
0.2	1774	1775	1776.	1776	1768	1778.	-	-	-		-
7	.3	.2	8	.2	.5	2	0.05	0.14	0.10	0.32	0.22
0.3	1768	1769	1770.	1769	1768	1772.	-	-	-		-
0	.5	.7	1	.1	.5	1	0.07	0.09	0.03	0.00	0.20
	I,4-Bis (diphenylaminobenzene) + Picric acid										
0.0	1886	1888	1888.	1889		1889.	-	-	-		-
3	.1	.1	6	.3	1858	3	0.11	0.13	0.17	1.48	0.17
0.0	1880	1882	1888.	1889	1858	1885.	-	-	-		-
6	.3	.3	1	.8	.1	7	0.10	0.41	0.50	1.18	0.29
0.0	1875	1875	1877.	1876	1858	1880.	-	-	-		-
9	.5	.8	5	.2	.1	9	0.02	0.11	0.04	0.92	0.28
0.1	1870	1871	1873.	1874	1858	1875.	-	-	-		-
2	.2	.3	3	.5	.2	2	0.06	0.16	0.23	0.64	0.27
0.1	1866	1866	1871.	1874	1858	1871.		-	-		-
5	.6	.6	7	.9	.2	5	0.00	0.27	0.44	0.45	0.26
0.1	1851	1852	1854.	1852	1858	1868.	-	-	-	-	-
8	.1	.7	4	.4	.2	7	0.09	0.18	0.07	0.38	0.95
0.2	1847	1848	1852.	1849	1858	1863.	-	-	-	-	-
1	.8	.2	2	.5	.2	5	0.02	0.24	0.09	0.56	0.85
0.2	1842	1843	1855.	1844	1858	1858.	-	-	-	-	-
4	.7	.3	5	.1	.2	9	0.03	0.69	0.07	0.84	0.88
0.2	1837	1838	1837.	1838	1858	1837.	-	-	-	-	-
7	.4	.6	6	.7	.2	9	0.06	0.01	0.07	1.13	0.03
0.3	1831	1832	1833.	1833	1858	1832.	-	-	-	-	-
0	.1	.2	5	.3	.2	6	0.06	0.13	0.12	1.48	0.08

Theoretical evaluation of ultrasonic speeds in liquid mixtures offers a simple and convenient method for the study of the nature of molecular interactions in these mixtures. On comparison, the results indicate that for both the systems of 1,4-Bis(diphenylaminobenzene) with 3-nitrobenzoic acid and Picric acid in Ethanol, JUN shows negligible deviation in the experimental values of ultrasonic velocities. The IDR theory shows large deviation. The ultrasonic velocity predicted by IDR does not agree well with the experimental velocity.

4. CONCLUSIONS

The results of the present study indicate that the thermodynamic parameters are sensitive to the molecular interactions present in the liquid mixtures. The positive values of L_f^E and the negative values of β^E indicate the presence of weak dipolar and dispersive interactions between the component molecules over the entire composition range of both ternary mixtures. The theoretical values of ultrasonic velocities are calculated by using Nomoto's relation, Ideal Mixing Relation (IMR), Free Length Theory (FLT), Impedance Dependence Relation (IDR) and Junjie's method (JUN). Among the five theories taken up for the prediction of sound velocity, a good agreement in experimental and theoretical values of velocity is observed in case of Junjie's method (JUN) for both ternary systems.

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EFFECT OF SILVER NANOPARTICLE ON OPTICAL PROPERTIES OF PARA RED DYE

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ABSTRACT
Nanotechnology is rapidly growing by producing nanoproduct & nanoparticle that can have novel & size related physio-chemical properties differing significantly from large matter. The novel properties have been exploited in a wide range of potential application in medicine, cosmetics, renewable energies environmental remediation & biomedical devices. Among them silver nanoparticle have attracted increasing interest due to the their unique physical, chemical & biological properties compared to their scaled. Silver nanoparticle has distinctive physio-chemical properties, intensity a high electrical & thermal conductivity, surface enhanced of Raman scattering, chemical stability, catalytic activity & non linear optical behavior.

Keywords : Nano silver, Para Red Dye, Optical Property, UV-Vis Spectroscopy, Emission Spectra.

INTRODUCTION
Nanomaterial is defined as material with an particle size less than 100 nm. Silver nanomaterial are nanoparticles of silver. Silver particles are between 1nm-100nm in size. Some are composed of a large percentage of silver oxide due to their large ratio of surface to bulk silver atoms. silver nano-particle are one of the promising products in the nanotechnology industry. The development of consistent process of the synthesis of silver nanomaterial is an important aspect of current nanotechnology research. One of such promising process is green synthesis .Silver nanoparticle can be synthesized by several physical, chemical, &biological methods. However for the past few years various rapid chemical method have been replaced by green synthesis because of avoiding toxicity of the process & increased quality. Nanosilver can be use in liquid form such as colloid (coating & spray) or contained within a shampoo(liquid) & can also appear embedded in a solid such as polymer master batch or be suspended in a bar of soap (solid). Nanosilver can also be utilized either in the textile industry by incorporating it into the fiber or employed in filtration membranes of water purification system.

Nanosilver is use for purification & quality management of air, biosensing imagine, drug delivery system. Biologically synthesized silver nanoparticle have many application like coating for solar energy absorption &intercalation material for electrical batteries as optical receptor as catalyst in chemical reaction, for biolabelling & as antimicrobials. Though silver nanoparticles are cytotoxic but they have tremendous application in the field of high sensitivity bimolecular detection & diagnostics, antimicrobial & therapeutics, catalysis & micro-electronics.

CHEMICAL SYNTHESIS OF SILVER NANOPARTICLE (AG-NP)
Take 2 ml of 0.1 M $AgNO_3$ into a small beaker. To it Add 5 ml of 0.1 M glucose making sure that it come into contact with the $AgNO_3$. Invert the starch solution several times. Add 10 ml of the starch solution. Heat the solution on hot plate on a high setting until it is boiling vigorously. Do not stir the solution. Boil the solution for 10 min . The solution should turn yellow. Remove the sample from the hot plate & let it cool.

Fig. - 1: Liquid form of Silver Nanoparticle

PREPARATION OF PARA RED DYE
Take 2 ml conc HCl in 10 ml water. Place 1.4 g of p-Nitroaniline in a beaker. Add above acid solution to it. Heat gently to make solution homogeneous cool in ice bath. Add the solution of sodium nitrite (1 gm in 5 ml

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water) drop by drop with constant stirring keeping the temperature below 5^0C. Prepare the solution of β-napthol (1.5 gm in 10 % NaoH solution 25 ml) Place it ice bath . To this solution add the above solution of p-Nitrobenzene diazonium chloride drop by drop with constant stirring maintaining temperature at 5^0C . stirr for 10 -15 min. Acidify with 1N HCl . Red solid will be formed filter it dry it at 80^0 C & crystalline from alcohol / acetic acid & dry it in oven at 100^0 C.

Para red is the Azo dye. Azo dye contain at least one nitrogen double bond (N=N) however many different structure are possible. Monoazo dye have only one N=N double bond, while diazo & triazo dye contain two and three N=N double bond respectively. The azo dye are generally connected to benzene & naphthalene ring but can also be attached to aromatic heterocyclic or enolizable aliphatic group. When describing a dye molecule nucleophiles are reffered to as Auxochromes while as aromatic group are called Chromophore.

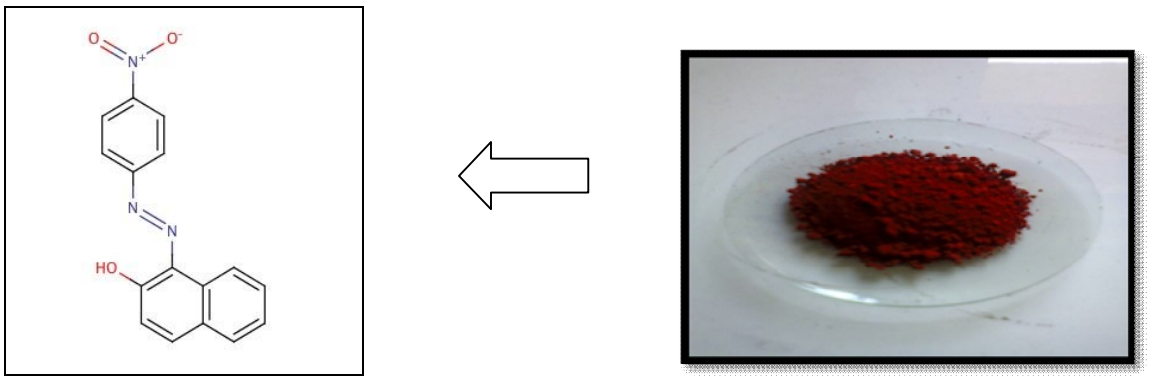

Fig - 2 : Para Red Dye PPT

EFFECT OF AG-NP ON PARA RED DYE

After the formation of silver nanoparticle & para red dye we have to study about effect of UV spectroscopy & luminescence on silver nanoparticle & para red dye for this we prepared different system of different concentration and took the spectra of different system.

System	Para Red Dye Solution	Ag-Np
I	1ml	1ml
II	1ml	2ml
III	1ml	3ml
IV	1ml	4ml
V	1ml	5ml

The optical properties of spherical silver nanoparticles are highly dependent on the nanoparticle diameter. The extinction spectra of 10 sizes of NanoXact Silver nanoparticles at identical mass concentrations (0.02 mg/mL) are displayed in the figure below. Smaller nanospheres primarily absorb light and have peaks near 400 nm, while larger spheres exhibit increased scattering and have peaks that broaden and shift towards longer wavelengths (known as red-shifting).

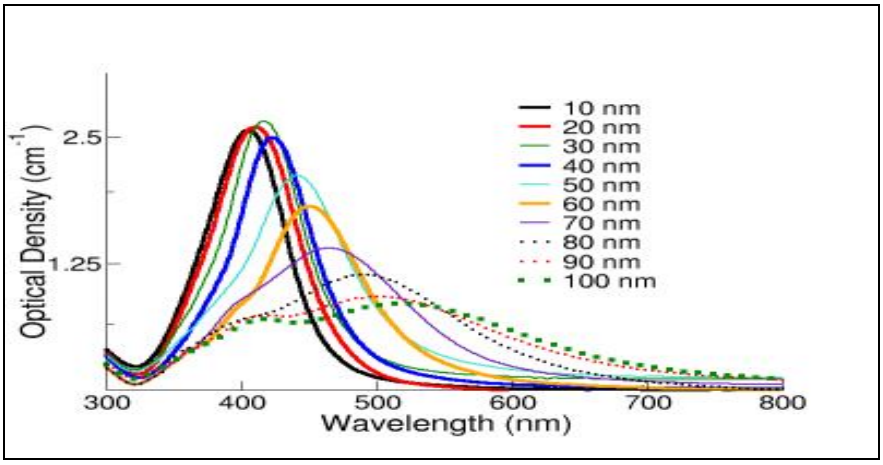

Fig.3. Extinction (the sum of scattering and absorption) spectra of NanoXact silver nanoparticles with diameters ranging from 10 - 100 nm at mass concentrations of 0.02 mg/mL. BioPure nanoparticles have optical densities that are 50-times larger)

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UV/ VIS SPECTROSCOPY ANALYSIS

In metal nano particles such as in silver, the conduction band and valence band lie very close to each other in which electrons move freely. These free electrons give rise to a surface plasmon resonance (SPR) absorption band, occurring due to the collective oscillation of electrons of silver nano particles in resonance with the light wave. Classically, the electric field of an incoming wave induces a polarization of the electrons with respect to much heavier ionic core of silver nanoparticles. As a result a net charge difference occurs which in turn acts as a restoring force. This creates a dipolar oscillation of all the electrons with the same phase.

When the frequency of the electromagnetic field becomes resonant with the coherent electron motion, a strong absorption takes place, which is the origin of the observed colour. Here the colour of the prepared silver nanoparticles is dark reddish brown. This absorption strongly depends on the particle size, dielectric medium and chemical surroundings. Small spherical nano particles (< 20nm) exhibit a single surface plasmon band . The UV/Vis absorption spectra of the silver nano particles dispersed in chloroform is shown in the fig. 4. The absorption peak (SPR) is obtained in the visible range at 410 nm. With the above mentioned concentration. The stability of silver nanoparticles is observed for 4 months and it shows a SPR peak at the same wavelength.

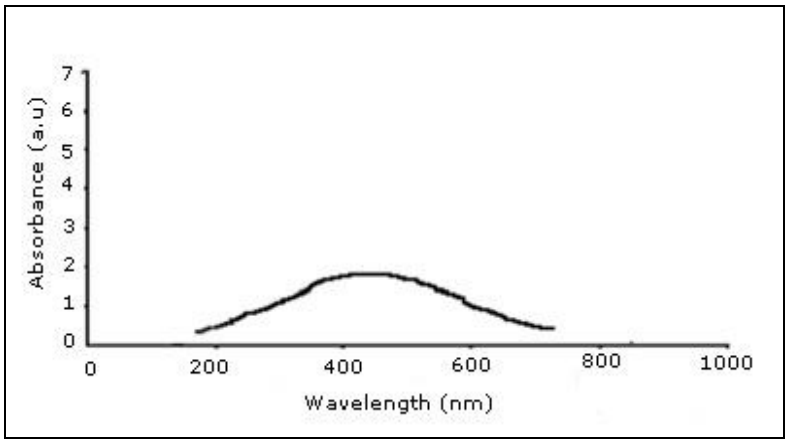

Fig.- 4 :The UV/Vis absorption spectra of Ag-Np

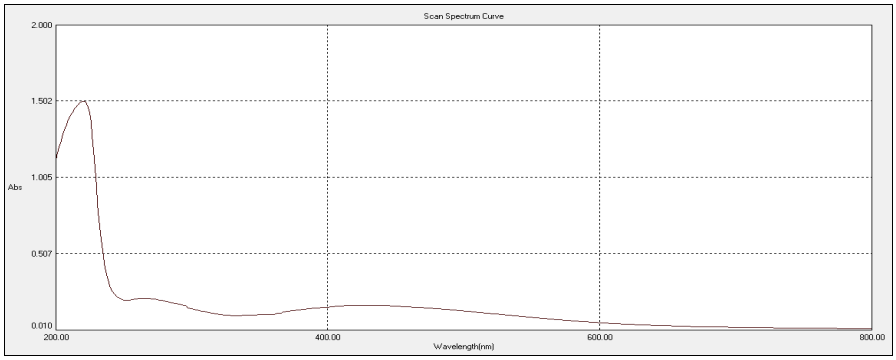

Fig - 5: UV Spectra Of Pure Ag-Np

UV-VIS SPECTROSCOPY OF PURE PARA RED DYE AND SYSTEM CONTAINING AG-NP AND PARA RED DYE

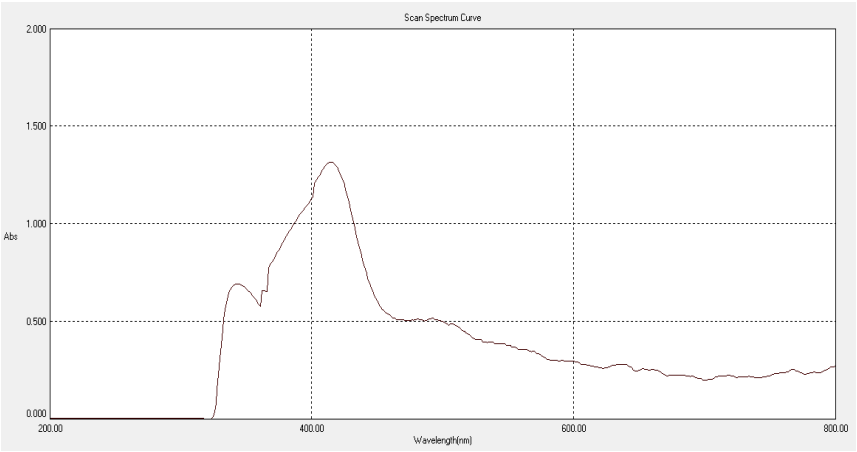

Fig - 6 : UV Spectra of pure para red dye

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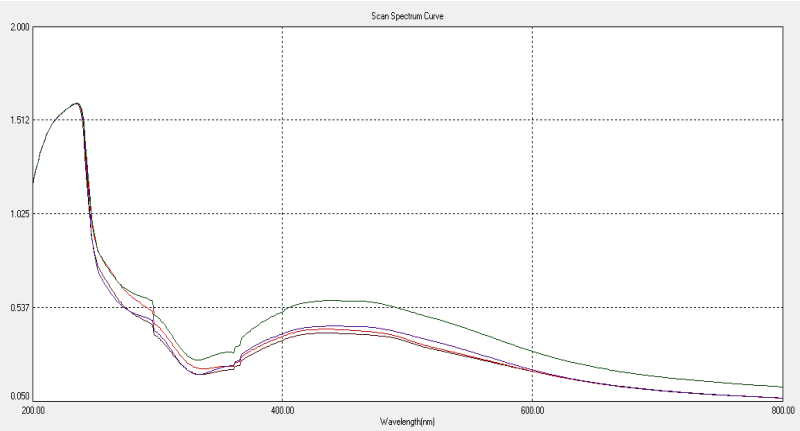

Fig - 7: UV spectra of system of para red dye & Ag-Np

In the emission spectra it is observed that the emission of silver nanoparticle quenched by adding para red dye & when the concentration is increases further decrease of emission observed**.**

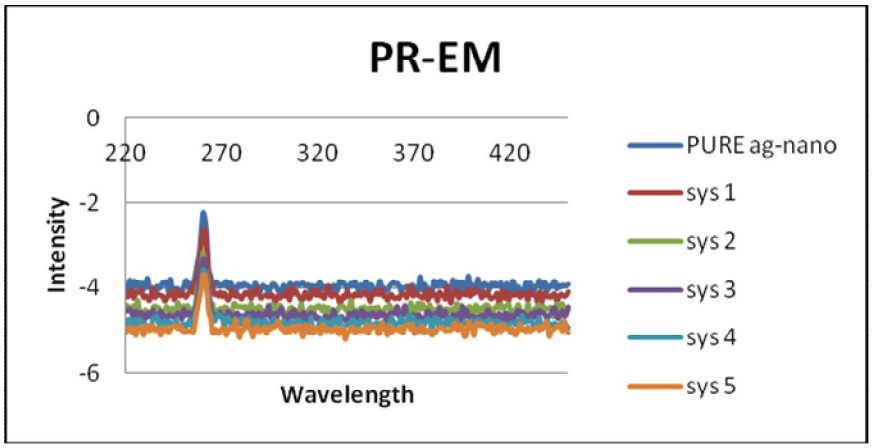

Fig- 8: Emission Spectra of System Containing Para Red Dye & Ag-Np

CONCLUSION

The above discuss study of spectroscopy shows that there is interaction take place between silver nanoparticles & dye molecules. Emission spectra of red dye show changes when associated with Ag-Np.

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SYNTHESIS AND STUDY OF ANTI-MICROBIAL ACTIVITY 3-(1, 2-DIHYDRO-1-SUBSTITUTED-2-OXOPYRROLO [2, 3-B] PYRIDINE-3-YLIDENEAMINO) 2-METHYLQUINAZOLIN-4(3H)-ONES

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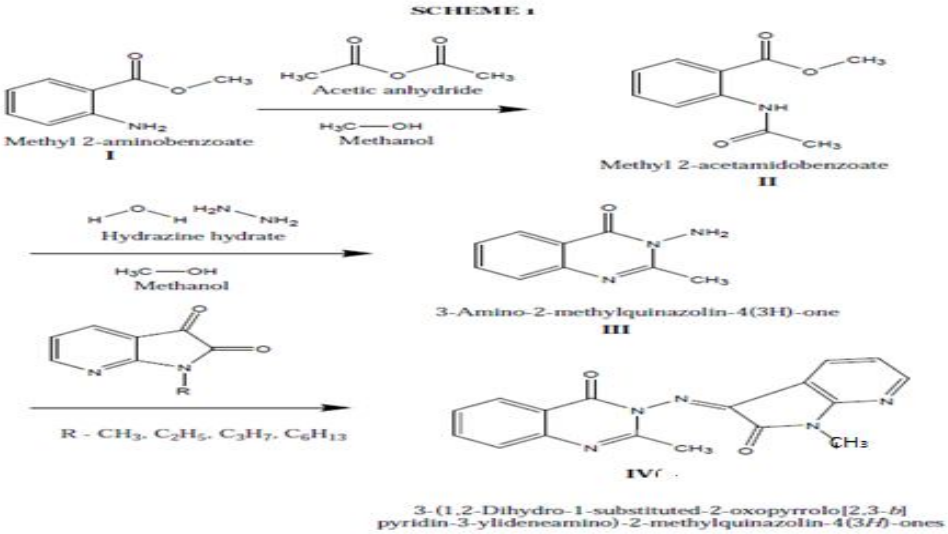
ABSTRACT
150 naturally occurring alkaloids were produced from Quinazolines. C-2 and N-3 substituents of the quinazoline molecule play in acute role in promoting some biological activities. Hence a new azaisatins derivative has been designed and synthesized which contain 4(3H) quinazolinones. By using basic elemental analysis and spectral studies structures have been elucidated. quinazolinones compound synthesized were screened for their potential antimicrobial activities, which exhibited some authentic results towards testing organism invitro and invivo studies.

Keywords: Quinazoline, azaisatins, antimicrobial

INTRODUCTION
Modifications and Change in the culture and lifestyle of human being the new diseases were being occurred which indicated that the search for improved new drug is still needed. To inhibit the growth of gram positive bacteria and active transplantable tumors Quinazoline were potent antibiotics that are known [1]. First synthetic derivative of quinazoline was 2-cyano- 4(3H) quinazolinone. Condensation of anthranilic acid with amides or primary amines is the most common method for the synthetic of 4(3H) quinazolinone. Quinazolinone derivatives have been reported for potential biological activities like anti-hypertension [2], [3], antifungal, anti-bacterial activity [4], [5] anti-cancer [6], anti HIV [7] and pharmacological compounds [8] Literature survey reveals that azaisatins are biological active compounds that are reported for their application in antibacterial, antifungal, and antiobesity. In view of their biological importance we report the synthesis of new azaisatins derivatives containing 4(3H) quinazolinones. Representative compounds have been characterized for antimicrobial activities.

MATERIAL AND METHODS
The entire chemicals used were procured from Merck, Mumbai, India and were of analytical or chemically pure grade. The IR spectra were recorded on a Perkin Elmer BX 1 spectrometer using KBr cm-1.and 1HNMR on BRUCKER NMR spectrometer (400MHz) using $CDCl_3$ as internal standard. Mass spectra were recorded on an Agilent Mass spectroscopy 1100 series using ESI technique.

GENERAL PROCEDURE
A) Synthesis of Methyl-2-acetamidobenzoate [9] (II)
In 100ml round bottom flask, a Methyl-2-aminobenzoate (I)(0.016 mole) in acetic anhydride (0.0127 mole) solution were taken and refluxed for overnight and the reaction was monitored by TLC for completion. The solution was cooled, poured into cold water (50ml) containing a drop of pyridine and stirred until the oil was solidified. The product was filtered, washed with cold water (4x50) and dried. The solid product was recrystallized from ethanol (6ml/gm).
Yield: 80%, m.p: 100 ^{0}C



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B) Synthesis of 3-Amino-2-methylquinazolin- 4(3H)-one [9] (III)
In 100ml round bottom flask, a hydrazine hydrate solution (10ml) and Methyl-2- acetoamidobenzoate (II, 0.01 moles) in ethanol were taken and refluxed for overnight and the reaction was monitored by TLC for completion. The solution was cooled, poured into cold water and the product was filtered, washed with cold water and dried. The solid product was recrystallized from ethanol.
Yield: 84%, m.p: 151 – 152 ^{0}C

C) Synthesis of 3-(1, 2-Dihydro-1-substituted-2-oxopyrrolo [2, 3-b] pyridine-3-ylideneamino) 2-methylquinazolin-4(3H)-ones [10] (IV)
A mixture of 3-Amino-2-methylquinazolin-4(3H)- one (III, 0.001 mole) and substituted azaisatin (0.01mole) in 10ml of glacial acetic acid were refluxed for 10-15 minutes and the reaction was monitored by TLC for completion. The resultant solution was poured into cold water. The product was filtered, washed with cold water and dried. The solid product was recrystallized from absolute alcohol.
Yield: 80%, m.p: 160 ^{0}C

CHARACTERIZATION
a) 3-Amino-2-methylquinazolin-4(3H)-one (III)

- **Infrared spectroscopy**

3537.96,3302.76 (d,N-H,stretch), 3198.21 (C-H, stretch), 1718.19 (C = O, stretch)

- **H^1 NMR**

d [ppm]: 8.223 (d, 1H, Ar-H), 7.734(t,1H,Ar-H), 7.652 (d, 1H,Ar-H), 7.448 (t,1H,Ar-H), 4.907 (s, 2H,NH_2), 2.713 (s, 3H, CH_3)

- **Mass Spectrometry m/z**

The molecular ion was observed at 176.3 [M +H]+

b) 3-(1,2-Dihydro-1-methyl-2- oxopyrrolo[2,3-b]pyridin-3-ylideneamino)-2-methylquinazolin-4(3H)-one[IV]

- **Infrared spectroscopy**

1718.25 (C = O, stretch), 1700.21 (C=O, stretch), 1654.23 (C=N, stretch)

- **H^1 NMR**

d [ppm]: 8.334 (d, 1H, Ar-H), 8.095 (d,1H,Ar-H), 6.948 (t, 1H,Ar-H), 7.855(d,1H,Ar-H), 7.752 (t, 1H,Ar-H), 7.554 (m,2H,Ar-H), 2.320 (s, 3H, CH3) ,3.914 (q, 2H, CH2), 1.33 (t, 3H,CH3)

- **Mass Spectrometry m/z**

The molecular ion was observed at 333 [M+] 372 [M +K]+ and 689 [2M + Na]+

ANTI-MICROBIAL ACTIVITY
A new synthesized quinazolinone compound was screened for antibacterial activity against gram positive bacteria Bacillus subtilis, Staphylococcus aureus, Streptococcus pneumonia and gram negative bacteria E. coli, Proteus vulgaris, Pseudomonas aeruginosa and four fungus Aspergillus niger, by using disc diffusion method at 10 μg/disc. The cultural media used for fungi was potato-dextrose-agar medium and for bacteria it was nutrient agar- agar medium. Respectively solutions of Ciprofloxacin and Fluconazole were cast-off as customary antibacterial and antifungal drugs. The compound IV has been found to be relatively active against gram positive & gram negative bacteria and funguses. IV was moderately active against Bacillus subtilis, Proteus vulgaris and all four funguses.

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SYNTHESIS AND ANTIMICROBIAL ACTIVITY OF SOME NEW 2-NITROPHENOL INCORPORATED AZO DYES

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ABSTRACT
Some new azo dyes containing 2-nitrophenol moieties were synthesized by coupling 2-nitophenol with the diazonium salts of different aromatic amines Aniline, o-Nitro aniline, p-Toluedine, α-Naphthylamine, Sulphanilic acid, m-Nitro aniline, Benzedine and Anthranilic acid. Structures of newly synthesized confirmed using the IR and NMR spectra. Theses dyes also tested for antimicrobial activity by using disc diffusion method. The compounds analysed for its antibacterial action showed moderate to significant inhibitory effect at some specific concentrations against the tested pathogens.

Keywords: Azo dyes, 2-nitrophenol, antimicrobial activity.

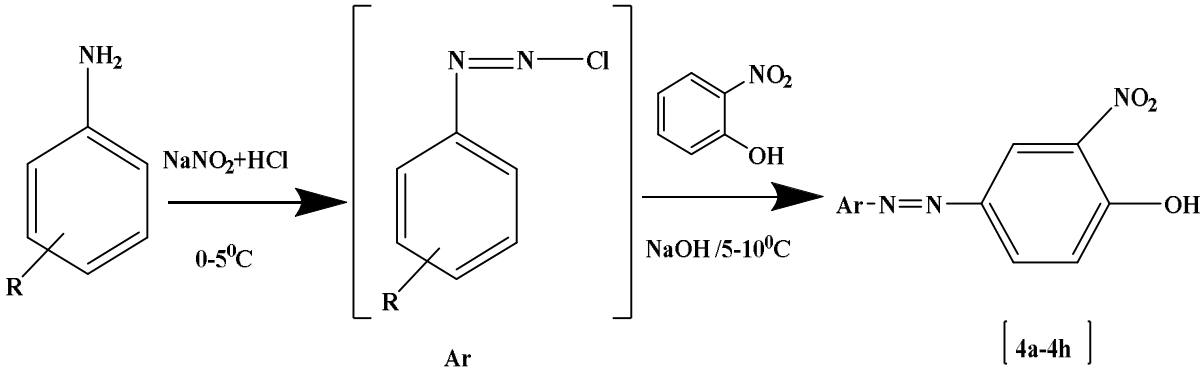
INTRODUCTION
Azo dyes are the most important group of synthetic colorants. The compounds containing azo moieties are of great importance because of a wide range of applications such as organic dyes[1], indicators [2], radical reaction initiators [3] and therapeutic agents [4]. Azo dyes are in use as dyestuffs for wool, leather and synthetic fabrics due to their excellent coloring properties [5]. These compounds have also received special attention in coordination chemistry due to their mixed hard–soft donor character and versatile coordination behavior [6-9]. Azo compounds are the most fundamental class of commercial dyes and are well colored that have been used as dyes and pigments[9, 10]. Azo compounds are known to be involved in a number of biological reactions such as inhibition of DNA, RNA and protein synthesis, carcinogenesis and nitrogen fixation[5, 6] also known for their use as antibacterial[12-17], antifungal, antiseptics, anticancer, anti-inflammatory and other useful chemotherapeutic agents[18-21].

In the present research work 2- is coupled with diazonium salt of eight different aromatic amines VIZ: Aniline, o-Nitro aniline, p-Toluedine, α-Naphthylamine, Sulphanilic acid, m-Nitro aniline, Benzedine and Anthranilic acid.

METHODS AND MATERIALS
All the chemicals used in these experiments were of analytical grade. All the melting points were determined by open capillary method and are uncorrected. The products were confirmed by ^{1}H NMR (Burker avernce II 400 NMR Specrtometer) and IR technique (Shimatzu). The biological activity was evaluated against two kinds of bacteria gram positive and gram negative. The products were recrystallized by ethanol as solvent.

GENERAL PROCEDURE FOR SYNTHESIS OF AZO COMPOUNDS
Substituted aromatic amines (0.01mole) were mixed with 2.5 ml conc. HCl and 2.5 ml (4N) cold solution of $NaNO_2$ was added with the stirring. The temperature of the reaction was maintained up to 0-5^0 C. Diazonium salt solution prepared above was added drop wise to the alkaline solution of 2-nitrophenol. The reaction mixture stirred for 10 – 20 minutes maintaining the temperature 5-10^0 C. The colored product so obtained is filtered washed with water and recrystallised from 80% ethanol. The general Scheme for the synthesis of azo dyes of 2-nitrophenol is shown in figure (I).

Figure I: General Scheme for the synthesis of azo dyes of 2-nitrophenol.



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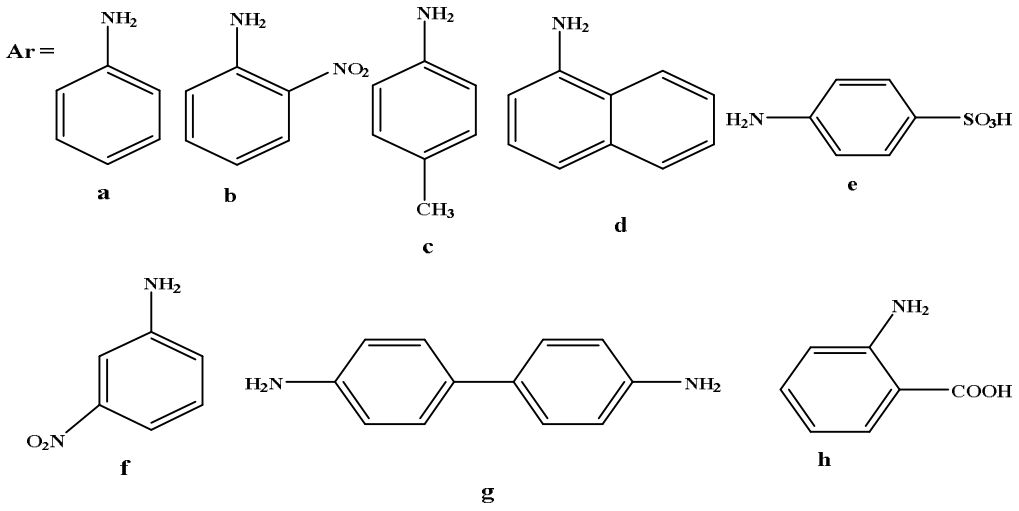
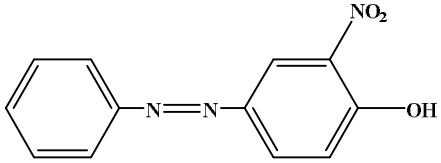
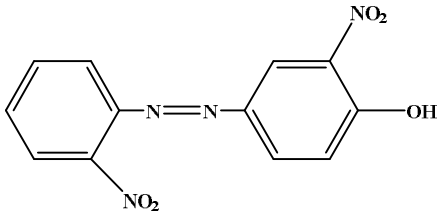
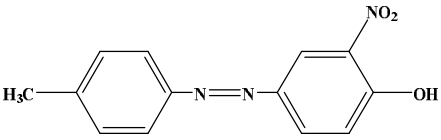
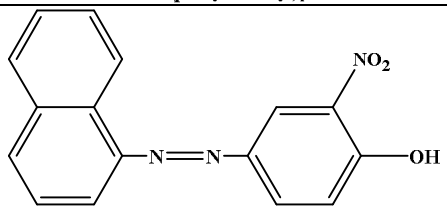
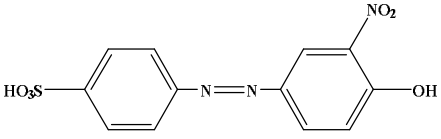
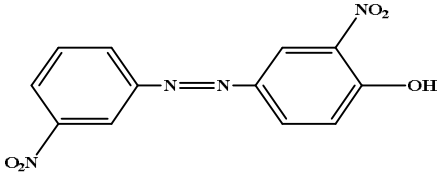


Table (I): The code, compound name, molecular formula, molecular weight, melting point and percentage yield of synthesized compounds of 2-nitrophenol

Sr. No.	Structure	Molecular Formula	Molecular Weight	Melting Point	Yield
4a	 2-nitro-4-(phenyldiazenyl)phenol	$C_{12}H_9N_3O_3$	243	176^0 C	43%
4b	 2-nitro-4-((2-nitrophenyl)diazenyl)phenol	$C_{12}H_8N_4O_5$	288	142^0 C	52%
4c	 2-nitro-4-(*p*-tolyldiazenyl)phenol	$C_{13}H_{11}N_3O_3$	257	153^0 C	48%
4d	 4-(naphthalen-1-yldiazenyl)-2-nitrophenol	$C_{16}H_{11}N_3O_3$	293	160^0 C	55%
4e	 4-((4-hydroxy-3-nitrophenyl)diazenyl)benzenesulfonic acid	$C_{12}H_9N_3O_6S$	323	312^0 C	48%
4f	 2-nitro-4-((3-nitrophenyl)diazenyl)phenol	$C_{12}H_8N_4O_5$	288	275^0 C	55%

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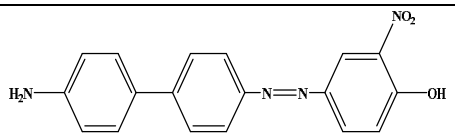
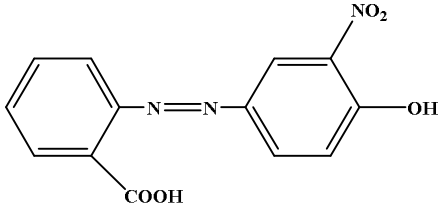
4g	 4-((4'-amino-[1,1'-biphenyl]-4-yl)diazenyl)-2-nitrophenol	$C_{18}H_{14}N_4O_3$	334	328^0 C	51%
4h	 2-((4-hydroxy-3-nitrophenyl)diazenyl)benzoic acid	$C_{13}H_9N_3O_5$	287	282^0 C	40%

ANTIMICROBIAL ACTIVITY

The newly synthesized azo compounds 4a-4h were analyzed for their antimicrobial activity against four gram positive and gram negative bacteria viz. *Escherichia coli, Staphylococcus aureus, Pseudomanas aeroginosa and Salmonella typhi* by using agar well diffusion method[18]. These compounds were mixed in Ethanol to form the solution of concentration 1mg/ml. sterile disc were dipped in the solutions, dried it and placed on the nutrient agar medium spreaded with the bacteria. The plates were further incubated for 24 to 48 hours at 37^0 C and the diameter of zones of inhibition was measured in millimeter.

RESULT AND DISCUSSION

The azo dyes synthesized were characterized by IR and NMR spectroscopic methods. IR and ^{1}H-NMR spectra showed the expected signals which correspond to various groups present in each compounds. The IR and ^{1}H-NMR spectral values for different synthesis dyes are shown in table II.

Table (II): FTIR AND ^{1}H NMR data of azo compounds of 2-nitrophenol

Compound	Spectra	Spectroscopic Data
SDB 4a	IR (KBr. cm^{-1})	3232 (Phenolic –OH stretch), 1625 (C=C Aromatic), 1539 (N=N), 1261 (C-N Stretch), 1328 (NO_2).
	NMR (δ ppm)	4.48 (s 1H of –OH), δ7.07-8.42 (m 8H of Ar-H).
SDB 4b	IR (KBr. cm^{-1})	3603 (Phenolic –OH stretch), 1614 (C=C Aromatic), 1512 (N=N), 1261 (C-N Stretch), 1332 (NO_2).
	NMR (δ ppm)	δ 3.63 (s 1H of –OH), δ6.57-8.47 (m 7H of Ar-H).
SDB 4c	IR (KBr. cm^{-1})	3194 (Phenolic –OH stretch), 1606 (C=C Aromatic), 1514 (N=N), 1255 (C-N Stretch), 2920 (C-H of CH_3), 1327 (NO_2).
	NMR (δ ppm)	δ 2.39 (s 3H of –CH_3), δ 3.74 (s 1H of –OH), δ6.91-8.38 (m 7H of Ar-H).
SDB 4d	IR (KBr. cm^{-1})	3595 (Phenolic –OH stretch), 1612 (C=C Aromatic), 1508 (N=N), 1255(C-N Stretch), 1323 (NO_2).
	NMR (δ ppm)	δ 4.16 (s 1H of –OH), δ6.73-8.11 (m 10H of Ar-H).
SDB 4e	IR (KBr. cm^{-1})	3562 (Phenolic –OH stretch), 1618 (C=C Aromatic), 1535 (N=N), 1228 (C-N Stretch), 1340 (NO_2).
	NMR (δ ppm)	δ 3.51 (s 1H of –OH), δ 3.24 (s 1H of –SO_3H), δ7.31-8.44 (m 7H of Ar-H).
SDB 4f	IR (KBr. cm^{-1})	3576 (Phenolic –OH stretch), 1620 (C=C Aromatic), 1531 (N=N), 1263 (C-N Stretch), 1344 (NO_2).
	NMR (δ ppm)	δ 3.55 (s 1H of –OH), δ6.65-8.48 (m 7H of Ar-H).

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SDB 4g	IR (KBr. cm^{-1})	3273 (Phenolic –OH stretch), 1616 (C=C Aromatic), 1535 (N=N), 1253 (C-N Stretch), 3074(N-H Stretch), 1325 (NO_2).
	NMR (δ ppm)	δ 6.70 (s 1H of –OH), δ 3.57 (s 2H of $–NH_2$), δ 7.28-8.40 (m 11H of Ar-H).
SDB 4h	IR (KBr. cm^{-1})	3277 (Phenolic –OH stretch), 1616 (C=C Aromatic), 1535 (N=N), 1236 (C-N Stretch), 1638 (C=O, Stretch of COOH), 1319 (NO_2).
	NMR (δ ppm)	δ 5.09 (s 1H of –OH), δ 7.10-8.10 (m 7H of Ar-H), δ 8.38 (s 1H of –COOH).

ANTIMICROBIAL ACTIVITY

A total eight azo compounds of 2-nitrophenol have been synthesized, recrystaliesed and used separately for its study of antimicrobial activity against four gram positive and gram negative bacteria viz. *Escherichia coli, Staphylococcus aureus, Pseudomanas aeroginosa and Salmonella typhi*. The data of antimicrobial activity of these newly synthesized azo dyes of 2-nitrophenol 4a-4h against four pathogens are presented in the tables 1-4.

Antibacterial properties of the synthesized azo compounds of 2-nitrophenol viz 4a – 4h [Zone of inhibition (mm)]

Table (1): Effect of azo compounds of 2-nitrophenol viz. 4a – 4h on the growth response of *Escherichia coli*.

Conc.(mg/ml)	4a	4b	4c	4d	4e	4f	4g	4h
0.5	I (>10)	I (11)	I (>10)	I (13)	I (>10)	I (10)	I (13)	I (>10)
1.0	I (10)	I (>10)	I (>10)	I (11)	I (>10)	I (10)	I (11)	NI
1.5	I (10)	I (13)	I(>10)	I (13)	I (>10)	I (11)	I (10)	NI
2.0	I (11)	I (11)	I (>10)	I (11)	I (>10)	I (11)	I (13)	I (>10)
2.5	I (13)	I (14)	I (>10)	I (10)	I (>10)	I (11)	I (>10)	I (>10)
3.0	I (10)	I (11)	I (10)	I (13)	I (10)	I (13)	NI	I (12)

I = Inhibition, values of inhibition are given in parenthesis, NI = No inhibition

Table (2): Effect of azo compounds of 2-nitrophenol viz. 4a – 4h on the growth response of *Staphylococcus aureus*.

Conc.(mg/ml)	4a	4b	4c	4d	4e	4f	4g	4h
0.5	I (13)	I (12)	NI	I (>10)	I (10)	I (10)	I (>10)	I (11)
1.0	I (13)	I (11)	I (>10)	NI	I (>10)	I (10)	I (10)	NI
1.5	I (>10)	I (>10)	I (>10)	NI	I (11)	I (13)	I (10)	I (11)
2.0	I (12)	NI	NI	I (>10)	I (10)	I (10)	I (>10)	I (>10)
2.5	I (10)	I (11)	I (>10)	I (>10)	I (12)	I (11)	NI	I (11)
3.0	I (14)	I (10)	I (>10)	I (>10)	I (12)	I (11)	I (>10)	I (>10)

I = Inhibition, values of inhibition are given in parenthesis, NI = No inhibition

Table (3): Effect of azo compounds of 2-nitrophenol viz. 4a –4h on the growth response of *Pseudomonas aeroginosa*.

Conc.(mg/ml)	4a	4b	4c	4d	4e	4f	4g	4h
0.5	NI	I (>10)	I (10)	I (10)	NI	NI	I (>10)	I (12)
1.0	I (>10)	I (13)	I (10)	I (>10)	NI	NI	I (10)	I (11)
1.5	I (11)	I (14)	I (>10)	I (11)	NI	I (>10)	I (>10)	I (>10)
2.0	I (10)	I (14)	I (11)	I (11)	NI	I(>10)	I (>10)	I (12)
2.5	I (>10)	I (24)	I (10)	I (12)	NI	I (10)	I (10)	I (13)
3.0	I (12)	I (10)	I (10)	I (>10)	I (13)	I (16)	I (10)	I (11)

I = Inhibition, values of inhibition are given in parenthesis, NI = No inhibition

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Table (4): Effect of azo compounds of 2-nitrophenol viz. 4a – 4h on the growth response of *Salmonella typhi*.

Conc.(mg/ml)	4a	4b	4c	4d	4e	4f	4g	4h
0.5	I (>10)	I (>10)	I (10)	I (>10)	NI	I (>10)	I (10)	I (11)
1.0	I (12)	I (11)	I (11)	I (11)	NI	I (13)	I (10)	NI
1.5	I (16)	I (15)	NI	NI	NI	I (11)	I (10)	I (21)
2.0	I (13)	I (10)	I (10)	I (>10)	NI	I (10)	I (10)	I (>10)
2.5	I (14)	I (12)	I (17)	I (>10)	I (10)	I (11)	I (10)	I (>10)
3.0	I (13)	I (13)	NI	NI	NI	I (13)	I (10)	I (17)

I = Inhibition, values of inhibition are given in parenthesis, NI = No inhibition

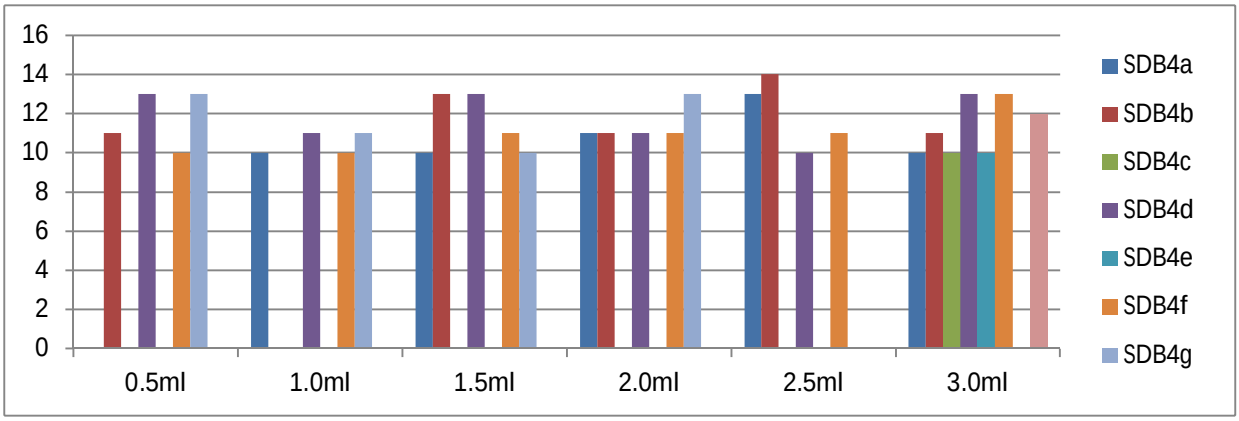

Figure 1: Graph showing effect of azo compounds of 2-nitrophenol viz. 4a– 4h on the growth of *E.Coli.*

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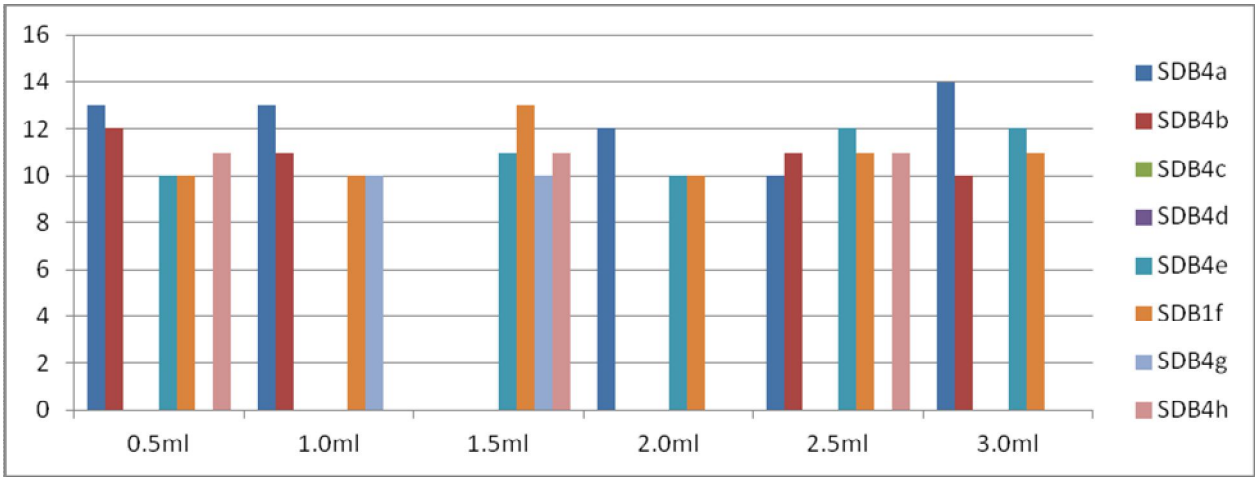

Figure 2: Graph showing effect of azo compounds of 2-nitrophenol viz. 4a– 4h on the growth of *S. aureusus.*

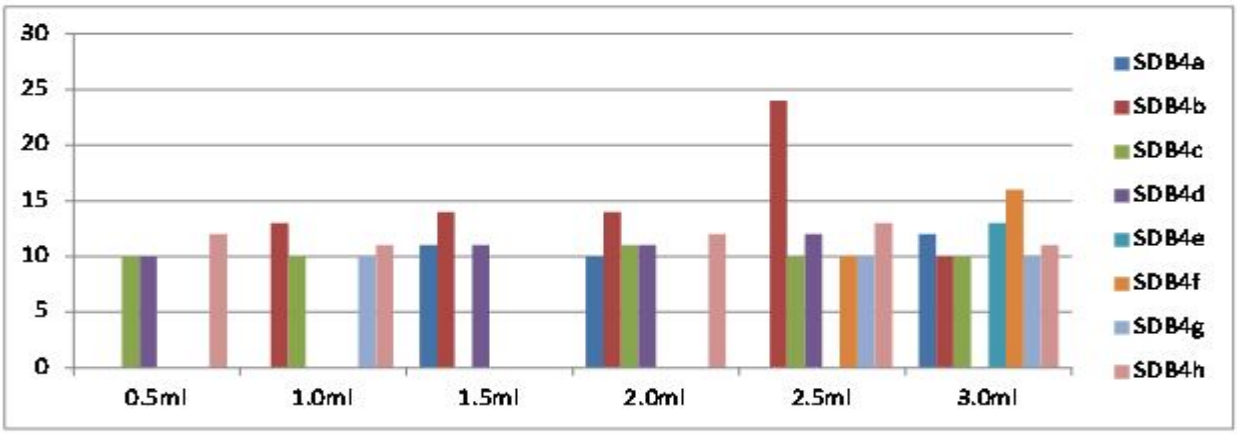

Figure 3: Graph showing effect of azo compounds of 2-nitrophenol viz. 4a– 4h on the growth of *P. aeroginosa.*

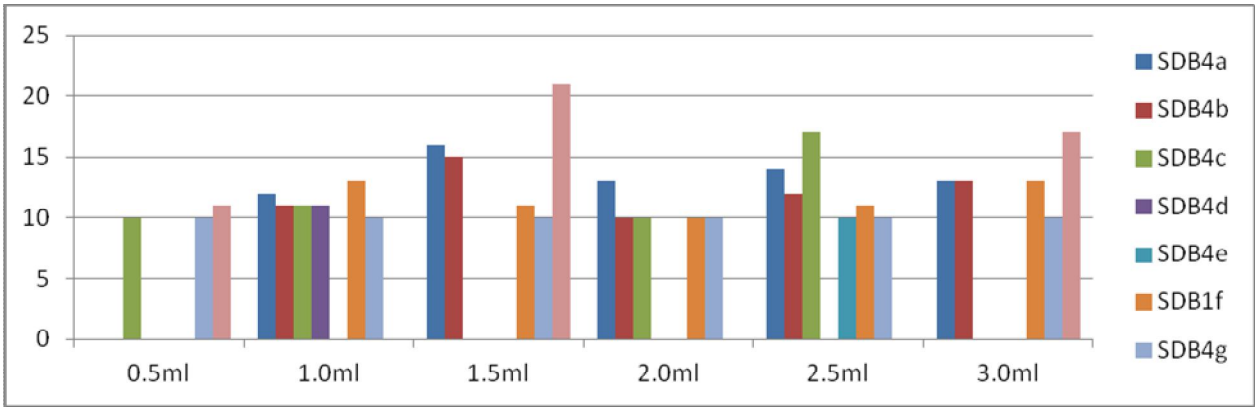

Figure 4: Graph showing effect of azo compounds of 2-nitrophenol viz. 4a– 4h on the growth of *S. typhi.*

CONCLUSION

All the eight novel azo compounds 4a–4h containing 2-nitrophenol moiety were successfully synthesized in excellent yield and their structures are confirmed using elemental analysis, FTIR & 1HNMR spectroscopy. The results on antimicrobial activity reveal that all the eight newly synthesized compounds viz 4a–4h found to have moderate antibacterial effect against *E.Coli, S. aureus, Pseudomonas aeroginosa,* and *Salmonella typhi* nearly at all the concentrations analysed.

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CURRENT STATUS AND POTENTIAL OF WILD EDIBLE PLANT ORIGIN NTFPS IN SALEKASA TEHSIL OF GONDIA DISTRICT (MS), INDIA

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ABSTRACT
Forest provide several types of non-wood or non-timber forest products (NTFPs), used for generating energy, edible, fodder, fiber, floss, gums, resin, minor wood, raw materials for medicines etc. Non-Timber Forest Products (NTFPs) make an important contribution to the livelihood of the households who gather and consume them. Wild edible plants play a significant role in the sustenance of tribal people residing in and within forested areas. Survey of wild edible plants has been carried out in ten villages of Salekasa tehsil, District- Gondia, Maharashtra, India. This article briefly describes current status wild edible plants NTFPs. This study focuses on the wild edible plants traditionally used for human consumption and its aim is to present data about the status and diversity of plants used as a nutrition source. The present study deals with the documentation of 85 wild edible plants, belonging to 78 genera and 56 families which are consumed traditionally by forest dwellers. The article concludes that forest dwellers are significantly depends on NTFPs used for edible purpose.

Keywords: Wild edible plants, traditional knowledge, forest dwellers, NTFPs, Gondia district.

INTRODUCTION
Historically, there has been little interest in NTFPs, because most NTFPs were consumed by local populations, and not marketed. Hence the name 'minor forest product' was often given to the NTFPs (Michael Arnold and Ruiz Perez, 2001). Populations living near or in forests have a long history of Non-Timber Forest Products (NTFPs) extraction for sustenance or sale. As implied in the term, NTFPs include all biological materials, except timber, that are found in the forest, such as wild food plants, honey, resin, spices, wildlife products, fuel wood, charcoal, and raw materials for handicrafts, such as rattan, vines, bamboo, and grasses.

Many non-timber forest products are harvested each year from forests around the world. Many of the products harvested are forest botanicals that are used personally or are sold as commercial trade in the food products industry. Berries, herbs and mushrooms are among some of the most valuable non-timber forest food products being harvested and sold to established markets throughout the world (Barfoot, 2006).

Wild edible plants have always been important in the folk traditions of the Mediterranean region (Hadjichambis *et al*., 2008). It is estimated that there are more than 30,000 edible plants known to man today. However, of these, only about 30 crop plants are used to provide more than 95% of man's plant food needs (Plotkin, 1988; ten Kate & Laird, 1999). This means that the large majority of food plant species are neglected. The neglected plants in many cases are wild food plants (WFPs), which grow naturally in the bush and do not have to be planted or tended before producing edible parts (FAO, 1988).

Wild edible plants are reported to play a vital role in supplying food for poor communities in many rural parts of the world (Sundriyal *et al*., 2003). Vegetables play a crucial role to meet the nutritional needs of the people in remote areas.

There are many useful wild species that are consumed as food (Haridasan *et al*., 1995). Systematic investigation of wild edible plants of Sikkim Himalaya is reported in recent times (Sundriyal and Sundriyal, 2001). Some traditional beverages, narcotics, wild edible plants and foods have also been reported for Ladakh (Navchoo *et al*., 1990). Andel (2006) reported the food products that include wild fruits, vegetables, nuts, edible roots, bush meat, edible insects, and honey and food additives like spices, flavorings, food colorants, fermentation agents.

Wild plants are an important source of edible fruits, leafy vegetables, and herbs, and are particularly important in ensuring food security and maintaining the nutritional balance in people diets (Taylor, 1995). During famine, wild plants become essential to human survival and at other times they both prevent the need for cash expenditure and provide a source of income to cash-poor households (Guedje *et al*., 2003).

Earlier work on wild edible plants from Maharashtra like Nasik, Amravari, Buldhana, Kolhapur, Jawhar were carried out by Vartak (1959); Vartak and Kulkarni (1987); Kulkarni and Kumbhoikar (1992), Patil and Patil (2000), Bhogaonkar *et al*., (2010), Kshirsagar *et al*., (2012), Mahadkar and Jadhav (2013), Joshi *et al*., (2013), Zode *et al*. (2016)). Similarly, in Tirora tehsil of Gondia district observed that total 45 plants NTFPs species, 26 plants used as edible, 31 for medicinal, 15 for commercial and only 4 plants were used as construction purpose

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(Zode *et al.*, 2014) Therefore forest dwellers of Gondia district especially living in and within forest area are more dependent on NTFPs (Zode *et al.*, 2015)

Wild foods provide a greater dietary diversity to those who rely on them. Ethnobotanical surveys of wild plants indicate that more than 7000 species have been used for human food at some stage in human history (Ogle *et al.*, 1985). The wild plants from forest provide many essential nutrients which help to improve both the physical and mental well-being of tribals. In remote, the forest areas where vegetable cultivation is not practiced and market is not available tribals depend on locally available plants which can be used as vegetables. This study reveals that forest dwellers living in particular area depend on wild plants as food sources and they have considerable knowledge on their use.

Given the dramatic loss of traditional knowledge regarding wild edible plants, our aim was to documenting the indigenous traditional knowledge, from the local inhabitants the edible use of wild plants growing in their ambience. It is hoped that the results of this research will help play an important role in initiating dialogue and planning among national and international scientific communities.

MATERIAL AND METHODS

The study was carried out in the Salekasa tehsil of Gondia district (MS), India (Figure 1 & 2). The total 10 villages were selected from the Tehsil for present study. These villages were chosen on the basis of forest area, their location in and around the forests. In each village, 5 households were sampled also by random sampling. Therefore, total number of household surveyed was fifty.

The Primary data was collected through, group discussion, semi-structured interviews and household survey (Martin, 1995; Pretty *et al.*, 1995). The information of wild edible NTFPs was collected through personal conversation with local inhabitants and also through market surveys by using the methods of Chadwick and Marsh (1994). For the classification and identification of plant species following floras used: Flora of Kolhapur District (Yadav, S.R. *et al.*, 2002), 'Flora of Maharashtra State: Dicotyledones' Vol. I. (Singh *et al.*, 2000), 'Flora of Maharashtra State: Dicotyledones' Vol. II. (Singh *et al.*, 2000), 'Flora of Maharashtra State: Monocotyledons' (Sharma, 1996), Flora of Nagpur District (Ugemuge, 1986) and Pteridophyte flora of the Western Ghats – South India (Manickam and Irudayaraj, 1992).

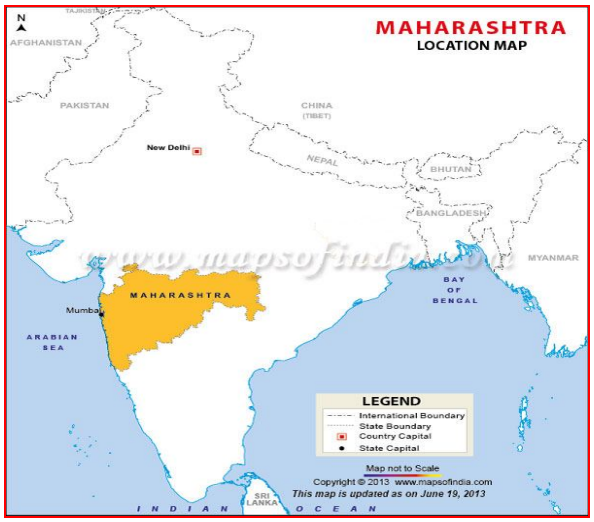

Fig. 1: Map showing Maharashtra state in India

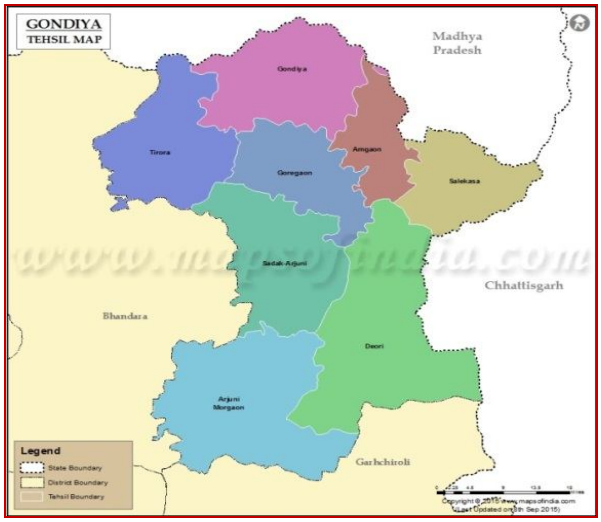

Fig. 2: Map showing Gondia district.

RESULTS AND DISCUSSION

Forest resources, mainly plants and plant products, have an important role in the daily life of forest dwellers. The forest communities are largely dependent on the forest produce for their sustenance. During the investigations, diversity of useful wild plant species was identified as NTFPs in the study area. A total of 85 wild edible plant species are gathered and consumed in the study areas by forest dwellers. These species belonging to 78 genera and 56 families were identified as wild edible plants (Figure 3). All data pertaining to plant materials are listed based on their respective taxa, and are ordered alphabetically together with their botanical, vernacular, the part(s) used, and season of availability (Table 1).

While analyzing the life forms of the wild edible vegetable species, it was noticed that, 39% were trees, 32% herbs, 15% shrubs and the remaining 12% climbers and 2% fungi (Figure 4). In the present study show that maximum utilization parts from tree and herb species while the utility of climber species was minimum.

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For getting the kindness from the 85 wild edible species, the forest communities were found to use different plant parts. Underground vegetative parts of 11 species are also used for edible purposes. Care must be taken for conservation of the species presently threatened or likely to be so in future due to use of their underground vegetative parts. Similarly, aerial vegetative parts (Leaves, Young leaves, Leafy shoot, above ground part, Young stem and Tendril) of the 28 plants species are also used as NTFPs for edible purpose. So far the use of reproductive organs (Flower, Unriped fruits, Ripe fruits, Fruiting body, Young inflorescences, Young pod & Seeds) of 51wild edible plants used by forest dwellers (Table 2). If such uses are not within limits, injuries are certain to be conveyed to the community to affect sustainability and stability. Thus if these issues need to be addressed one must take into account the number of species in which the plant is either totally uprooted or reproductive organs are heavily exploited. It is not unlikely that their over exploitation might force these species to become rare and eventually disappear from the site. Thus these species also deserve attention for conservation.

Many wild edible plants have been quoted and cited in the different selected villages, demonstrating that there is a common used pattern regarding the wild edible NTFPs. However, a few differences in the ITK regarding the consumption of wild edible plants between these selected villages were observed. It has been found that villagers of Managad, having highest ITK regarding 83 of wild edible plants. While Bijepar and Toyagondi were found to have ITK of about eighty two and eighty wild edible plant species respectively. Similarly in other villages were found to have ITK of about in 78-54 wild edible species as showing in Figure 5. The consumption of wild edible plants is an addition or a complement to a diet of cultivated food plants, while the quantity of indigenous traditional knowledge varies slightly among the studied localities.

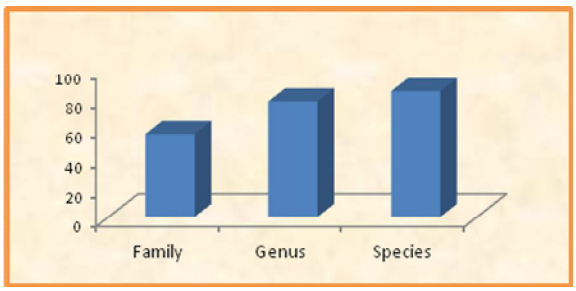

Figure 3: Taxonomic analysis of wild edible plant

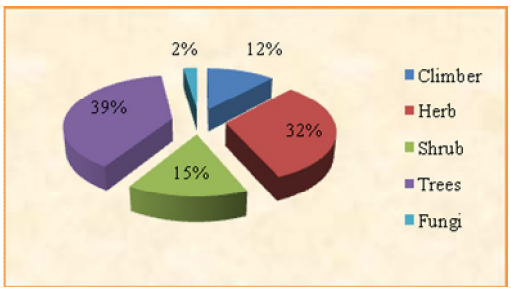

Figure 4: Life forms of wild edible plant NTFPs

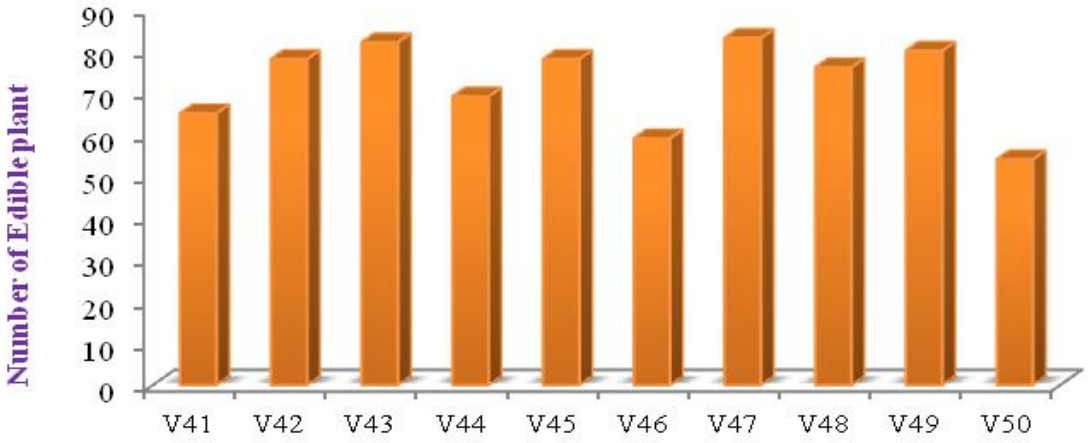

Figure 5: Analysis of wild edible plant found in selected villages in Salekasa tehsil

Name of selected villages: Darrekasa (V41), Baajiyadand (V42), Bijepar (V43), Daldalkuhi (V44), Durgutola (V45), Jamakudoh (V46), ManagadV(47), Pipariya (V48), Toyagondi (V49), Sategaon (V50).

CONCLUSIONS

The data we have presented here showed that used of 85 NTFPs as wild edible plants are still important activities in all the selected areas. The majority of the wild edible plants mentioned were species commonly found in the surroundings of villages. Today's traditional diet is very different from the past. The consumption of wild edible plants is an addition or a complement to a diet of cultivated food plants, while the quantity of indigenous traditional knowledge varies slightly among the studied localities.

In recent generation has lost the traditional knowledge necessary to identify, gather and process these species. An emphasis on the sustainable harvesting of wild edible plants will help increase and maintain the region

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biodiversity. There is a need for systematic incorporation of information on current use of wild food resources in any programme dealing with sustained for security and rural developed for the benefit of the local people.

Over- exploitation of these species is likely to damage the forest ecosystem. In view of these, the forests must be saved and these species should be sustained as such. The scientists have to come up for judicious selection of edible species from the wilderness for their large scale cultivation based on assessment of their proximate principles, nutrient status and medicinal properties to address the issue of food security for the future generations.

Table 1: An account of Edible wild plants documented from forest dwellers settled in study area

Sr. No.	Plant species	Family	Habit	Local name	Edible parts
1	*Acacia catechu*	Mimosaceae	Trees	Khair	Stem bark
2	*Achyranthes aspera*	Amaranthaceae	Herbs	Kutri,Chilati	Seeds
3	*Aegle marmelos*	Rutaceae	Trees	Bel	Ripe Fruits
4	Agaricus sp.	Agaricaceae	Fungi	Yeru satya	Fruiting body
5	*Alangium salvifolium*	Alangiaceae	Trees	Akawal	Ripe Fruits
6	*Aloe vera*	Liliaceae	Herbs	Korphad	Leafy twig
7	*Alternanthera sessile*	Amaranthaceae	Herbs	Galighosh	Leafy twig
8	*Amorphophallus campanulatus*	Araceae	Herbs	Suran	Rhizome
9	*Annona reticulata*	Annonaceae	Trees	Ramfal	Ripe Fruits
10	*Annona squamosa*	Annonaceae	Trees	Sitaphal	Ripe Fruits
11	*Azadirachta indica*	Meliaceae	Trees	Kadunimb	Ripe Fruits, Young leaves
12	*Bauhinia purpurea*	Caesalpiniaceae	Trees	Kanchanvrush	Flowers, Ripe Fruits
13	*Boerhavia repens var. diffusa*	Nyctaginaceae	Herbs	Khaparkuti	Leaves
14	*Buchanania cochinchinensis*	Anacardiaceae	Trees	Charoli	Ripe Fruits, Seeds
15	*Careya arborea*	Lecythidaceae	Trees	Kumbhi	Ripe fruit
16	*Carissa carandus*	Apocynaceae	Shrubs	Karvanda	Unripe Fruits
17	*Cassia fistula*	Caesalpiniaceae	Trees	Bahawa	Flowers
18	*Cassia tora*	Caesalpiniaceae	Herbs	Tarota	Young leaves
19	*Coccinia grandis*	Cucurbitacae	Climbers	Jungali kundru	Unripe fruits
20	*Colocasia esculenta*	Araceae	Herbs	Dhopa, Chamkura	Leaves
21	*Commelina benghalensis*	Commelinaceae	Herbs	Kena	Leafy twig
22	*Cordia dichotoma*	Boraginacea	Trees	Shelwat, Bhokar	Ripe & Unripe Fruits
23	*Cordia gharaf*	Boraginacea	Trees	Shelwat, Gondani	Ripe & Unripe Fruits
24	*Curcuma longa*	Zingiberaceae	Herbs	Halad	Rhizome
25	*Cymbopogon nardus*	Poaceae	Herbs	Gawatichaha	Leaves
26	*Dendrocalamus strictus*	Poaceae	Shrubs	Bamboo	Young stem
27	*Dioscorea alata*	Dioscoreaceae	Climbers	Matalu	Tubers
28	*Dioscorea bulbifera*	Dioscoreaceae	Climbers	Matalu	Tubers
29	*Diospyros melanoxylon*	Ebenaceae	Trees	Tendu patta	Ripe fruits
30	*Embilca officinalis*	Euphorbiaceae	Trees	Awala	Ripe & Unripe Fruits
31	*Ficus racemosa*	Moraceae	Trees	Umber	Ripe fruits
32	*Grewia asiatica*	Tiliaceae	Shrubs	Phaalsa	Ripe fruits
33	*Holarrhena pubescens*	Apocynaceae	Trees	Pandharakuda	Flowers
34	*Lantana camara*	Verbenaceae	Shrubs	Ghaneri	Ripe fruits
35	*Limonia acidissima*	Rutaceae	Trees	Kawath	Ripe fruits
36	*Lygodium flexuosum*	Polypodiaceae	Herbs	Jatashankar	Leaves

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37	*Madhuca longifolia*	Sapotaceae	Trees	Mahua	Ripe Fruits, Flower
38	*Mallotus philippensis*	Euphorbiaceae	Trees	Shendi	Ripe fruits
39	*Mangifera indica*	Anacardiaceae	Trees	Aam	Ripe & Unripe Fruits
40	*Marsilea quadrifolia*	Marsileaceae	Herbs	Marsiliea sp.	Leaves
41	*Maytenus senegalensis*	Celastraceae	Shrubs	Bharati	Young inflorescences
42	*Momordica dioica*	Cucurbitacae	Climbers	Katwel	Unripe fruits
43	*Moringa oleifera*	Moringaceae	Trees	Shevaga	Unripe fruits
44	*Musa paradisiaca*	Musaceae	Shrub	Kela	Ripe fruits
45	*Nymphaea pubescens*	Nymphaeceae	Herbs	Kamal	Ripe Fruits, Flower, Rhizome
46	*Ocimum tenuiflorum*	Lamiaceae	Herbs	Tulas	Leaves
47	*Olax psittacorum*	Olacacea	Shrubs	Hartfari	Young leaves
48	*Oroxylum indicum*	Bignoniaceae	Trees	Tetu	Flower & Unripe fruit
49	*Phoenix sylvestris*	Palmae	Trees	Sindi	Ripe fruits
50	*Pithecellobium dulce*	Mimosaceae	Trees	Chichbili	Ripe fruits
51	*Semecarpus anacardium*	Anacardiaceae	Trees	Bhelau, Bibba	Ripe fruits
52	*Syzygium cumini*	Myrtaceae	Trees	Jambhul	Ripe fruits
53	*Tamarindus indica*	Caesalpiniaceae	Trees	Chinch	Ripe & Unripe Fruits
54	*Terminalia bellerica*	Combretaceae	Trees	Behada	Seeds
55	Termitomyces sp.	Trichlomataceae		Bhombodi	Fruting body
56	*Theriophonum indicum*	Araceae	Herbs	Undirkani	Leaves
57	*Trapa natans*	Trapaceae	Herbs	Shingada	Ripe fruits
58	*Ziziphus caracutta*	Rhamnaceae	Shrubs	Katbor	Ripe fruits
59	*Ziziphus mauritiana*	Rhamnaceae	Shrubs	Ber	Ripe fruits
60	*Ziziphus oenoplea*	Rhamnaceae	Shrubs	Aeroni	Ripe fruits
61	*Morus alba*	Moraceae	Shrub	-	Ripe fruits
62	*Portulaca oleracea*	Portulacaceae	Herbs	-	Above ground parts
63	*Bombax ceiba*	Bombaceae	Trees	Katesavar	Tubers
64	*Cajamus scarabaeoides*	Fabaceae	Climbers	Rantur	Young pods and seed
65	*Allmania nodiflora*	Amaranthaceae	Herbs	Dhan Bhaji, Mal Kukkur	Leaf
66	*Alternanthera paronychioides*	Amaranthaceae	Herbs	Patur Bhaji	Leaf
67	*Antidesma acidum*	Euphorbiaceae	Shrubs	Surpela	Unripe & ripe fruit
68	*Argyreia nervosa*	Convolvulaceae	Climbers	Baswrael, Widhara	Leaf
69	*Borassus flabellifer*	Arecaceae	Trees	Taad	Ripe Fruits
70	*Bridelia retusa*	Euphorbiaceae	Trees	Kasai, Kassi	Ripe Fruits
71	*Centella asiatica*	Apiaceae	Herbs	Bramhi	Leaf
72	*Cheilocostus speciosus*	Costaceae	Herb	Dukar kanda	Corm
73	*Chenopodium album*	Chenopodiaceae	Herb	Batwa	Leaf
74	*Chlorophytum sp.*	Liliaceae	Herb	Lodanga bhaji	Leaf, Root
75	*Corchorus capsularis*	Tiliaceae	Herbs	Fotakani	Leaf
76	*Dioscorea pentaphylla*	Dioscoreaceae	Climber	Padmati	Bulb
77	*Glinus oppositifolius*	Molluginaceae	Herbs	Kadubhaji	Leaf
78	*Holoptelea integrifolia*	Ulmaceae	Tree	Yensadad	Seeds
79	*Merremia hederacea*	Convolvulaceae	Climber	Diwati	Seeds
80	*Oxalis corniculata*	Oxalidaceae	Herbs	Chihoda Bhaji	Leaf
81	*Pergularia daemia*	Asclepiadaceae	Climber	Utaran, Hacher	Ripe fruits

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82	*Phoenix acaulis*	Arecaceae	Shrub	Bhui Shindi	Underground Petiole
83	*Scripus grossus*	Cyperaceae	Herb	Kachar Kaandaa	Root
84	*Smilax zeylanica*	Smilacaceae	Climber	Sherdire	Tendril
85	*Tamilnadia uliginosa*	Rubiaceae	Tree	Kala Fendra	Fruit

Table 2. An analysis of the wild plant parts used regarding the number of species

Sr. No.	Plant parts use	Number of species in concern
Vegetative plant Parts (Underground)		
1	Roots	1
2	Rhizome	2
3	Tubers	3
4	Root	2
5	Bulb	1
6	Corn	1
7	Underground petiole	1
Vegetative plant parts (Aerial)		
1	Leaves	16
2	Young leaves	3
3	Leafy shoot	6
4	Above ground part	1
5	Young stem	1
6	Tendril	1
Reproductive plant parts		
1	Flower	6
2	Unriped fruits	11
3	Ripe fruits	30
4	Fruiting body	2
5	Young inflorescences	1
6	Young pod & Seeds	1

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A RECORD OF GIANT ROOST OF PTEROPUS GIGANTIUS (BRUNNICH, 1782) IN BAGHNADI DISTRICT RAJNANDGAON CHHATTISGARH

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ABSTRACT
According to IUCN Red List classified this species as Least Concerned but mention this species is alarmingly declined. Gondia district along the Chhattisgarh border is enriched with dense vegetation, harbors flora and fauna. The Studies were carried out indicates the populations dramatically declined. The present paper is a first record of Indian flying fox in Baghnadi (Chhattisgarh) near Gondia district of eastern Maharashtra. The observation disclosed that the roosting site is protected and found no special threat to this site and it is naturally conserved.

Keywords: Indian Flying Fox, roosting site, Population, Conservation, Baghnadi,

INTRODUCTION
Bats are the second most specious group of mammals, after rodents. They play an essential role as forest pollinators and seed dispersers. Molur (2007), Venkatesan (2007), Andavan et al., (2008), Ali (2010), Acharya (2008), Santosh et al., (2006), Bhandarkar & Paliwal (2013a, b; 2014) and Chakravarthy (2007) have documented status of fruit bats in India. *Pteropus giganteus* is a colonial species, which roosts in large trees like *Ficus bengalensis*, *Eucalyptus globulus*, *Mangifera indica* and *Tamarindus indica* (Vendan, 2003). Few ecological studies of fruit bats have been carried out in the Indian subcontinent, but are now more crucial with the accelerating rate of habitat destruction (Wilson & Engbring, 1992). Moreover, knowledge about their distribution, nesting and roosting habits is rudimentary (Pierson & Rainey, 1992). Hence, recognizing roost sites and protecting such areas are important for the conservation of *P. giganteus* populations

MATERIAL AND METHOD
Study Site: The present observation was carried out near National Highway 6, Baghnadi (Chhattisgarh) near eastern Maharashtra. Baghnadi village (Chhattisgarh) is situated near Bagh River originated from Shirpur Dam Maharashtra. The roost of bats is situated at **$21^0$04'18.4" N, 80^0 26'57.9 E** in the Forest Office and Nursary,

Methodology: To elucidate the population size of the Indian flying foxes in Baghnadi roosting site, bats were counted in month of Jan and May 2016 and 2017. The population was counted prior to evening flight. Direct roost count method was followed to estimate the population size of the colony (Barlow, 1999). It was easy to count all the bats prior to evening flight. Most of the observations were done with the naked eyes. Some time binoculars were also used to spot out the bats.

RESULT AND DISCUSSION
In the present observation the 2440 bats were entangled to the branches of *Ficus religiosa, Tamarindus indica, Albizia lebbeck, Hardwickia binata*. The bats were present on the trees in different proportion. 1250 bats on *Tamarindus indica* 550 bats on *Ficus religiosa*, 230 bats on *Syzygium cumini*, 155 bats on *Albizia lebbeck* and 255 bats were also entangled some other similar trees in scattered manner. There are total 07 tree in the dense vegetation was occupied by bats as roost. In the preliminary observation bats disturbed some time from the loud sound by visitors while playing and cooking activities. According to some anecdotal information as well as Mr. Madanlal Deshmukh, warden, of forest department, Chandrabhan Bagde, official of department also stated that the population of this bat was more than three thousand in this site before three to four year ago. In the recent years, cutting of giant trees and unaware about the biodiversity conservation and increase of global temperature are most important cause of declining the population of these fruit bats. The record of acute mass death due to extreme heat wave in the year 2009 therefore the population suddenly falls down. In the May 11, 2009 many Indian flying foxes found dead in some sites of Eastern Maharashtra due to extreme heat wave (Bhandarkar and Paliwal, 2013*a*). In the present investigation the population size is similar in both the year. The site is suitable for their habitation may be due to healthy atmosphere surrounding the roost, nearby jungle, far away from the less human disturbances and increase of immigration may strengthened the colony. The immigration of the organism may be habitat disturbance from many adjacent places. But the many of bats were found dead entangled to the electric wire. Electrocution is one of major problem for declination of population in this area. It is categorized as Least Concern species under the Red List of threatened species of IUCN but its population is declining alarmingly due to habitat degradation (IUCN, 2011). This species is assumed to be locally threatened

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by cutting down of roosting trees because of road expansion or other purposes. The species is also hunted in several locations for meat and for medicine (Molur *et al.* 2008).

The population trend was increasing in this site in comparison to the various sites in Bhandara district (Bhandarkar and Paliwal, 2013*b*). Due this site is naturally conserved, it must be properly managed and conserve for future. The ban on activities by panic tourist like cooking, playing and lauding is recommended. Bats and small invertebrates have been given conservation significance in many countries in the world. However, in this region they are given the least conservation priorities and hardly any studies have been conducted for status assessment and conservation of bat population in this region. The time has come for the conservation of all animal groups, including the flying fox for maintaining ecological balance and conservation of biodiversity. The conservation of bats is possible through the current generation if aware about the importance and need for conservation of bats (Mahanto et al., 2012). Ecologically fruit bats are highly important species as they are one of the best pollinators and seed dispersers in tropical forests throughout the world (Marshall, 1983). This helps in maintaining forest diversity as well as forest regeneration (Cox et al., 1992). Despite the importance of this fruit bat species, virtually no baseline population data or status monitoring exists for any of the flying foxes along with the *Pteropus giganteus*. Data base information came out from study can be useful for policy makers for planning, better conservation-management programmes. At the same future researcher will get the chance to compare these set of data with their studies (Ali, 2010).

Acknowledgments: I am thankful to Kapoor Binzlekar, Mr. Madanlal Deshmukh, and Chandrabhan Bagde, officials of forest department of Baghnadi. I would like to offer my thanks to volunteers of SENSE and Aranyayatri Wildlife Foundation.

Roosting site at Baghnadi on Ficus religiosa

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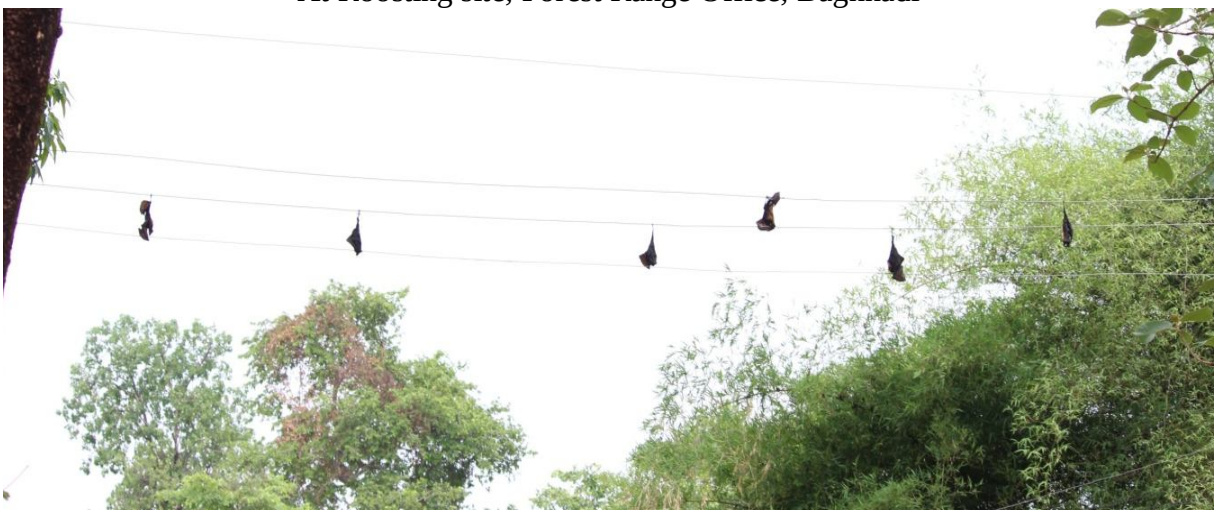
At Roosting site, Forest Range Office, Baghnadi



Bats found Electrocuted near Roosting site, Forest Range Office, Baghnadi

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A FOSSIL DICOT WOOD, *ERYTHROXYLON DECCANENSE* SP. NOV FROM THE DECCAN INTERTRAPPEAN BEDS OF MAHURZARI, NAGPUR, INDIA

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ABSTRACT
The fossil wood were collected from Mahurzari.The dicot wood Erythroxylon deccanense described here shows greater affinities with the family Erythroxylaceae. Vessels mostly in multiple of 2 to 4, as well as solitary .The intervascular pit pairs are alternate, bordered and quaternary.Presence of Paratracheal vascicentric parenchyma. The medullary rays are homogenous. Fibers are septate and storied. Interfiber pits are simple and alternate. Tyloses are present.

Keyword : Deccan Intertrappean bed, Dicot Wood.

INTRODUCTION

The Specimen under investigation is a silicified piece of wood. It was collected from Deccan Intertrappean bed of Mahurzari, which is about 14 to 15 km north-west of Nagpur. From this locality, several fossil woods were reported that include namely, ***Burseraceoxylon baradense and Chitaleyoxylon decanense*** **(Sheikh 1971),** ***Shoreoxylon Mahurzarii*** **(Paradkar 1972),** ***Aristotelioxylon Mahurzarii*** **(Kolhe 1980)** and ***Erythroxylon Mahurzarii (Kapgate 1982).*** In addition to these, one fossil wood is being investigated in this chapter.

MATERIAL AND METHOD

The fossil wood under investigation is dicotyledonous in nature. It measures 7cm in length and 1.5cm in diameter. The colour of wood is black and rough in texture. To make the surface even, the wood was thoroughly ground. It was then etched with Hydrofluoric acid and washed under tape water.With the help of peel technique, peels were taken out along transverse, tangential and radial planes of wood and slides were prepared. Further these slides were observed under microscope for detailed study and camera lucida sketches were drawn.

DESCRIPTION

The specimen described here is a small decorticated petrified wood. The primary tissue shows ill preservation. The secondary wood is diffuse porous. Growth rings are absent. It consists of vessels, wood rays, wood fibers and wood parenchyma.

Vessels

Vessels are mostly multiple of 2 to 4, as well as solitary also. In transverse plane solitary vessels are circular to subcircular in shape, having diameter varying between 99µm and 266µm.The vessel frequency is high and 10 to 15 per square mm. The vessel member length varies from 666µm to 833µm Perforations plates are simple and obliquely placed. (Text Figs. 2, 5) The intervascular pit pairs are alternate, bordered and quaternary.They measure 266µm in diameter. (Text Figs. 2, 4; Plate : I, Fig. 4.) Pit pores are generally thick walled, alternate and circular to oval in shape, with diameter varying between 16µm to 33µm. Few vessels shows depositions or tyloses.

Wood ray

Wood rays are mostly biseriate to multiseriate. (Plate I, Fig. 2; Text Fig. 6) The medullary rays are homogenous in composition, consisting of Procument cells. Each medullary ray is 933µm long and 66µm broad being normally 7 to 9 cells high. (Plate I, Figs. 5 & 6.) The medullary ray frequency is 18 to 20 per square mm. Procumbent cells are measured in R.L.S. plane is 133µm to 166µm long and 66µm to 99µm in diameter. Medullary rays are closely placed and generally separated from vessels by 2 to 6 series of fibers.

Wood fiber

Fibers are abundant forming the ground mass of wood. They are closely arranged without any intercellular space (Plate : I, Figs. 3 & 4) fibers are septate and storied. (Text Fig. 2) They are 1199µm in height and 133µm in diameter pits are seen on some of the fiber walls. Interfiber pits are simple and alternate.

Wood parenchyma

Parenchyma is predominetly paratracheal, vascicentric. It consist of one layer of cells around the vessels (Plate I, Fig. 1, Text Fig. 7.) cells of parenchyma are rounded to flattened.

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DISCUSSION

With the help of the keys given by Metcalfe and Chalk (1950), The outstanding anatomical details of the present wood shows following characters which are used to identify it.

- Wood diffuse porous.
- Vessels in multiples.
- Parenchyma present.
- Parenchyma paratracheal.
- Xylem ray multiseriate.
- Perforation plate simple.
- Intervascular pit pairs alternate.
- Arrangement of parenchyma vascicentric.
- Wood homogenous.
- Vessel frequency is high.
- Fiber septate and storied.
- Interfibers pits are bordered.
- Tyloses are present.

Taking into consideration the above characters, The present wood was compared with earlier reported fossil wood from this locality.

***Chitaleyoxylon decanense* (Sheikh 1971),** had some similarities with present wood like Vessels in multiples, Intervascular pores are circular to oval, Parenchyma paratracheal, Xylem rays usually multiseriate, Fibers storied. But vary greatly in respect of vessels number, diameter and frequency as well as differ in having growth rings and Fibers aseptate with intercellular space.

***Burseraceoxylon baradense* (Sheikh 1971),** shows similar characters like Vascicentric parenchyma, Intervascular pit pairs alternate. But differ in having Solitary vessel, Aseptate fibers and Uni to biseriate rays. Likewise, ***Shoreoxylon Mahurzarii* (Paradkar 1972),** resembles few characters alike, in having Vessels solitary and in multiple of 2 to 3, Medullary ray multiseriate. But difference in having predominately sparce parenchyma, Intervascular pits contigous bordered, hexagonal, Fibers aseptate and Tyloses absent.

***Aristotelioxylon Mahurzarii* (Kolhe 1980),** in this fossil wood, few characters like Parenchyma paratracheal vascicentric, Medullary ray homogenous (4 to 6 series), Fiber septate and storied are similar in present wood. But vary in many characters like Vessels solitary, Perforation plate simple as well as sclariform and Intervascular pit pairs are bordered and opposite.

Similarly, ***Erythroxylon Mahurzarii* (Kapgate 1982),** resembles few characters alike, in having vessels are solitary and in multiple of 2 to 3, Perforation plate simple and obliquely placed, Intervascular pit pairs alternate bordered hexagonal and contiguous, Parenchyma paratracheal vascicentric, Wood ray composed of both homogenous as well as hetrogenous in nature. But the difference in having Septate and storied fibers.

Thus, no close affinities were observed between the earlier reported fossil wood with the present one.

Comparisions with the modern (living) families have shown that the fossil has some similarities with families like ***Dipterocarpaceae, Capparidaceae, Schisandraceac*** *and* ***Erythroxylaceae.*** **(Metchalf and Chalk 1950)**

The family ***Dipterocarpaceae,*** agreeing in certain general characters like Vessels solitary and in multiple of 2 to 3, Perforations simple, Intervascular pitting alternate, Xylem parenchyma including both type paratracheal and apotracheal, Rays 4 to 8 cells in height, Uni to multiseriate and Homogenous as well as heterogeneous in nature. But vary greatly in having Fibers with simple or bordered pits, typically thick to very thick walls and Absence of tyloses.

The family ***Capparidaceae,*** resembles the present wood in having Simple perforations, Alternate intervascular pitting, Paratracheal parenchyma, and Homogenous nature of medullary rays. But Varying in very small sized vessels, diameter, frequency and occur in cluster or long radial multiples. The family ***Schisandraceac,*** resembles greatly the present wood as the vessel frequency of both is 1 to 15 per square mm, Fibers with

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bordered pits and Tyloses are present. But also found difference in having Solitary vessels, Perforation plate scalariform and Intervascular pitting scalariform to opposite.

Thus, the fossil is not a member of above three family. But shows greater affinities with the family ***Erythroxylaceae,*** like Vessels are in multiples, Perforation simple, Intervascular pitting alternate, Parenchyma predominately vasicentric paratracheal and Ray with homogenous as well as heterogenous in nature.The only difference encountered is in respect of Fibers. which in Erythroxylaceae, Fibers are aseptate and non storied. While in the studied species there exist, Septate and storied fibers.

Family ***Erythroxylaceae,*** is characterized by four genera namely ***E. mannii Olive, E. cuneatum Kurz, E. monogynum Roxb and E.burmanicum Griff.*** Though the present fossil shows similar character with the family Erythroxylaceae as cited above, however it differ from the above four genera by certain distinguishing characters

E. mannii Olive, resembles in having Simple perforations, Alternate pitting and Presence of tyloses with studied one. But disagreeing in respect of Vessel diameter, Vessel frequency and Vessel member length.

In ***E. cuneatum Kurz and E. monogynum Roxb,*** Parenchyma intermediate type between apotracheal to paratracheal. In ***E.burmanicum Griff,*** Fibers thick walled and Heimsch (1938) states that the fibrous element consist of tracheids, which is absent in studied fossil wood.

From the above discussion, it can be concluded that though the studied fossil wood shows a number of similar characters with the family Erythroxylaceae, it vary greatly from the present living genera.

Thus it is clear that the studied fossil wood might have been an extinct genera of the family ***Erythroxylaceae.*** Hence, it is named as ***Erythroxylon deccanense*** sp. nov**.** The generic name is given after the family Erythroxylaceae to which the extinct fossil wood is assigned where as the specific name is after the Deccan intertrappean beds.

DIAGNOSIS

Erythroxylon deccanense sp. nov

Vessels mostly in multiple of 2 to 4, as well as solitary also.Solitary vessels circular to subcircular in shape,having diameter varying between 99µm and 266µm.The vessel frequency high and 10 to 15 per square mm. The vessel member length varies from 666µm to 833µm. The intervascular pit pairs alternate, bordered and quaternary. They measure 266µm in diameter.Paratracheal vascicentric parenchyma. The medullary rays are homogenous in composition, consisting of Procument cells.

Each medullary ray is 933µm long and 66µm broad being normally 7 to 9 cells high. The medullary ray frequency is 18 to 20 per square mm. Fibers are septate and storied. They are 1199 µm in height and 133µm in diameter. Interfiber pits are simple and alternate. Tyloses are present.

Holotype **:** APS. / Wood -1. Department of Botany, Institute of Science, Nagpur.

Locality **:** Mahurzari, Nagpur.

Horizon **:** Deccan Intertrappean Series of India.

Age **:** ? Upper Cretaceous.

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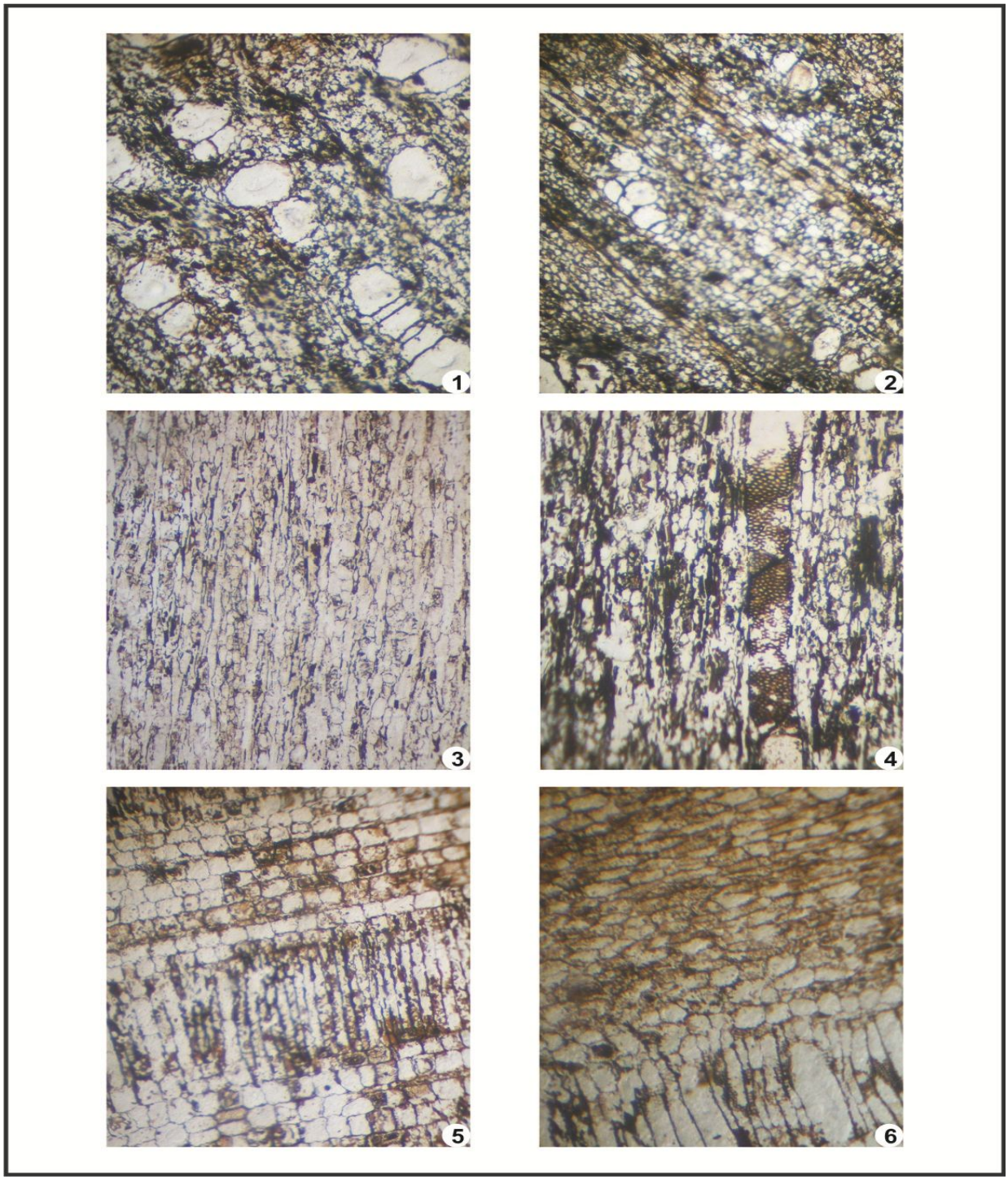
PLATE-I



Erythroxylon deccanense sp. nov

EXPLANATION OF PLATE-I, FIGS. 1 To 6

Figs. 1 & 2 : T.S of wood showing scattered vessels, rays and fibers. 50X

Fig. 3 : T.L.S. of wood showing medullary rays and septate fibers. 50X

Fig. 4 : T.L.S. of wood showing intervessel pitting. 100X

Fig. 5 : R.L.S. of wood shows vessels cut medullary ray at 90 degree. 100X

Fig. 6 : R.L.S. of wood shows homogenous medullary ray. 100X

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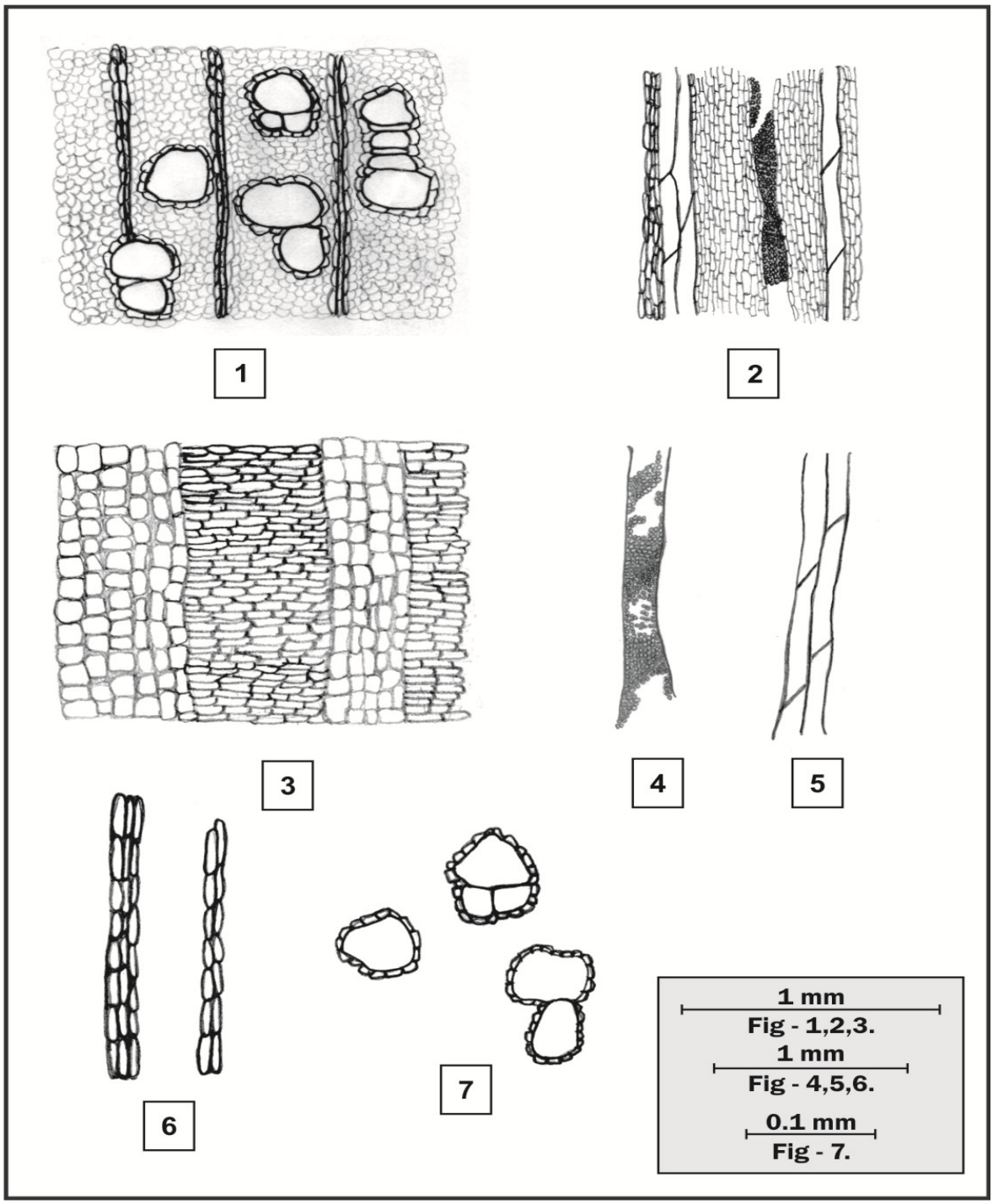
TEXT FIGS. - 1 TO 7



Erythroxylon deccanense sp. nov

EXPLANATION OF TEXT FIGS. 1 TO 7

Fig. 1 : T.S of wood showing scattered vessels and rays.

Fig. 2 : T.L.S. of wood showing medullary rays, fibers and perforation plate.

Fig. 3 : R.L.S. of wood showing homogenous medullary ray.

Fig. 4 : Intervessel pitting magnified.

Fig. 5 : Simple, obliquely placed perforation plate.

Fig. 6 : Multiseriate wood rays.

Fig. 7 : Vessels surrounded by paratracheal vasicentric parenchyma.

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CONVENIENT SYNTHESIS OF SOME α-AROYL KETENE DITHIOACETALS WITH ITS PHYSICAL STUDY

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ABSTRACT
Convenient synthesis of different α- aroyl ketene dithioacetals (4) by using substituted acetophenones (1) and its acoustical study

Keywords: α-aroyl ketene dithioacetals ,acetophenone, carbon disulfide, methyl iodide, sodium tert.butoxide, Pyknometer, Ubbelohde viscometer.

INTRODUCTION
The Ketene dithioacetals are versatile synthons in organic chemistry. Large amount of work, since the last decade, has given rise to new view in their chemistry. The main aim of this is having two objectives , first is to focus the new perspectives in the chemistry of functional ketene dithioacetals, and second, to provide an internal link between ketene dithioacetal groups and a different functional groups which brought out many new facts that will help in future designs. A ketene is an organic compound of the form R'R''C=C=O. This term is also called ethenone, the simplest ketene, where R' and R'' are hydrogens. The reactions of ketene dithioacetals always governed by alkylthio functionality have been found to be useful.

Classification of ketene dithioacetals can be done on the basis of their substitution patterns at the α-position of the ketene dithioacetal functionality1-3. For instance, α-oxo ketene dithioacetals, which bear a carbonyl group at the α-C atom, are versatile intermediates in organic synthesis with diverse applications, especially serving as 1,3-electrophilic three-carbon synthones have been reported4-7. Based on the structural features, the α-C of ketene dithioacetals is reactive towards electrophiles a useful tool for the building of diverse ketene dithioacetal scaffolds and other useful building blocks8-9. These arylketones are well known for their use as a construction blocks for the synthesis of various pharmacologically important compounds10-11. Functionalized α-aminated-diarylketones were used as an intermediate for synthesis of various natural products and biologically useful compound. As these α-aroylketene dithioacetals are useful three carbon synthones extensively employed for the synthesis of a wide variety of heterocyclic compounds and also in several aromatic ring annulation reactions. These are α,β-unsaturated carbonyl compounds with two electron-donating alkyl sulafanyl groups on one end and an electron-withdrawing aroyl group at the other end of the double bond, i.e., they are"push-pull" alkenes. Depending on the nucleophile and the reaction conditions either 1,2- or1,4-nucleophilc additions on are possible12-13.

Since alkylsulfanyl groups are good leaving groups, subsequent to the attack of a nucleophile, one of the alkylsulfanyl groups of the intermediate leave to regenerate the conjugated system. Being polarized alkenes these also react with bi-functional molecules having nucleophilic and electrophilic centers to furnish cyclic compounds14-15. Generally, the reaction centers in α-oxo ketene dithioacetals could be the carbonyl group, the double bond, or sulfur atoms, and deprotonation can occur at several sites, which really depend upon the structure of the α-oxo ketene dithioacetals16-17.

MATERIAL AND METHODS
IR spectra were recorded on a Shimadzu FTIR using KBr discs. 1H NMR spectra were recorded in DMSO-d6 at 400 MHz using TMS as an internal standard. Mass spectra were recorded on Shimadzu GC-MS using electrospray ionization technique. The elemental analysis was carried out on Flash EA-1112, 50/60 Hz, CHNS analyzer. The progress of the reaction was monitored by TLC.

GENERAL PROCEDURE
In a clean conical flask take substituted acetophenone (10 mmole) then add THF as solvent then add sod.tert.butoxide as strong base (2 mole equi.to acetophenone) stirr at 00 C.then add CS2 (10 mmole) at the end add CH3I (20 mmole) .Stirr this mixture strictly at 00 C for 5-8 hours and then pour mixture in ice cold water.

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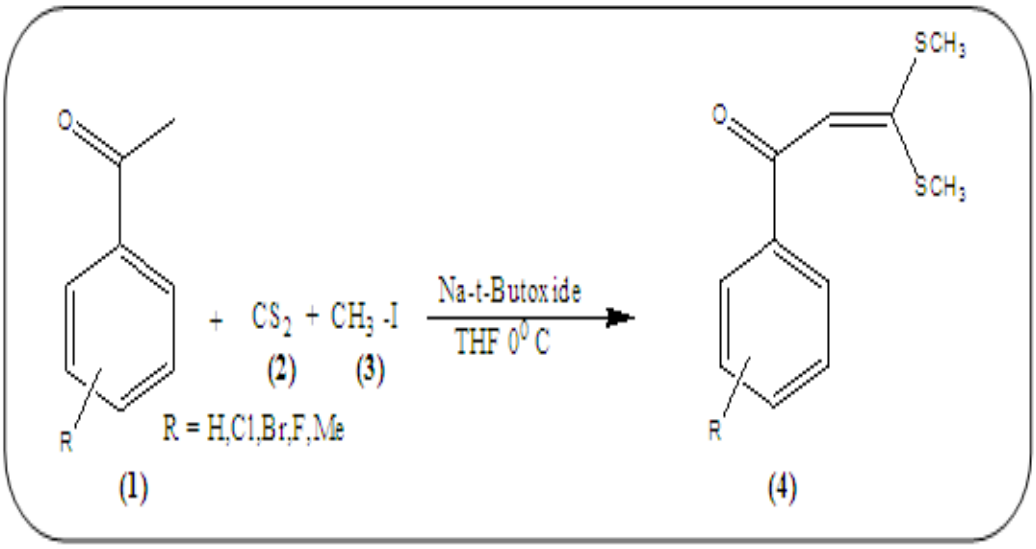


Scheme 1: Synthesis of α-aroyl ketene dithioacetal

RESULTS AND DISCUSSION

The different and substituted α-aroyl ketene dithioacetals were prepared means simply one pot synthesis by using simple and cheap techniques with its acoustical study reported this synthesis. The all products given in table below synthesized under very low temperature on stirring for about 5-9 hours by using basic conditions due to sodium tertiary butoxide. The base used 2 mole equivalent to the weight of substituted acetophenones.

The densities and viscosities of solutions of different concentration were measured at room temperature by using pycnometer, an Ubbelohde suspended level viscometer and single frequency ultrasonic interferometer operating at 2 MHz.

Table: 1

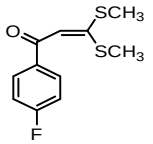
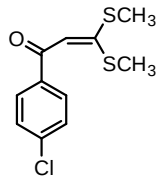
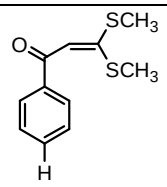
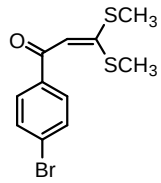
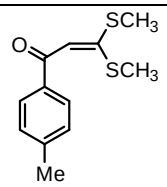
Sr. No.	Product	Reaction Time (hr.)	Melting Point (^{0}C)	Yield (%)
1.		5.5	112	74
2.		6.3	101.4	69
3.		5.3	106.3	79
4.		4.5	88.1	71
5.		5.2	110.9	59

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Table 2: The density (ρ) and viscosity (η) of α- aroyl ketene dithioacetals in DMF

Concentration (M)	Density (ρ) g. cm^{-3}	Viscosity η x 10^3 poise
Compound (1.1)	**Dimethyl Formamide**	
0.1	0.9458	6.8528
0.2	0.9569	6.5879
0.3	0.9496	6.4781
0.4	0.9525	6.7433
0.5	0.9537	6.1985
Compound (1.2)	**Dimethyl Formamide**	
0.1	0.9356	7.3258
0.2	0.9328	7.1425
0.3	0.9363	7.6957
0.4	0.9402	7.7842
0.5	0.9438	7.9857
Compound (1.3)	**Dimethyl Formamide**	
0.1	0.9587	6.9478
0.2	0.9569	6.4781
0.3	0.9489	6.3287
0.4	0.9503	6.7412
0.5	0.9551	6.9674
Compound (1.4)	**Dimethyl Formamide**	
0.1	0.9418	8.3587
0.2	0.9435	7.9827
0.3	0.9532	8.0878
0.4	0.9497	7.8436
0.5	0.9443	8.7845
Compound (1.5)	**Dimethyl Formamide**	
0.1	0.9346	6.2749
0.2	0.9361	6.4726
0.3	0.9338	6.9748
0.4	0.9399	6.5103
0.5	0.9457	6.3876

SPECTRAL DATA

1)1-(4-fluorophenyl)-3-3bis(methylthio) prop-2-en-1-one:
Brown Solid, IR (KBr): 3058, 2920 ,1620, 1239, 1157, 520 cm^{-1}; ^{1}H NMR(DMSO) : 7.34(d, 1H), 7.28(d, 1H), 6.85(s, 1H), 2.48(s, 6H) ; ^{13}C NMR (DMSO) :188.2,165.4,132.2, 115.4,107.8,18.1 ; Mass (m/z): 243.3($m^{+\cdot}$), 146.1; $C_{11}H_{11}FOS_2$ C-54.52, H-4.58, F-7.84, O-6.60, S- 26.46.

2) 1-(4-chlorophenyl)-3-3 bis (methylthio) prop-2-en-1-one:
Grey Solid, IR (KBr): 3047, 2985 ,1616, 1469, 1230, 783, 478, 401 cm^{-1}; ^{1}H NMR(DMSO) : 7.66(d, 1H), 7.44(d, 1H), 6.56(s, 1H), 2.31(s, 6H) ; ^{13}C NMR (DMSO) :186.9,170.4,140.1, 108.3,17.1 ; Mass (m/z): 259.1($m^{+\cdot}$), 260.6(m+2) ; $C_{11}H_{11}ClOS_2$ C-51.05, H-4.28, Cl-13.70,O-6.18, S- 24.78.

3) 3-3 bis(methylthio)-1-phenylprop-2-en-1-one:
Red Solid, IR (KBr): 3012, 2916 ,1696, 1473, 779, 590, 513 cm^{-1}; ^{1}H NMR(DMSO) : 7.75(d, 1H), 7.31(t, 1H) 7.42(t, 1H), 6.45(s, 1H), 2.18(s, 6H) ; ^{13}C NMR (DMSO) : 187.5,171.1,131.8,122.6,107.4,17.8 ; Mass (m/z): 223.1($m^{+\cdot}$) ; $C_{11}H_{12}OS_2$ C-58.89, H-5.39, O-7.13, S- 28.59.

4) 1-(4-bromophenyl)-3-3 bis(methylthio) prop-2-en-1-one:
Reddish brown Solid, IR (KBr): 3067, 2923 ,1677, 1238, 547, 462 cm^{-1}; ^{1}H NMR(DMSO) :7.59(d, 1H), 7.41(d, 1H), 6.29(s, 1H), 2.33(s, 6H) ; ^{13}C NMR (DMSO) :188.4,172.2,131.7, 127.9,16.9 ; Mass (m/z):303.3.5($m^{+\cdot}$), 305.2(m+2) ; $C_{11}H_{11}BrOS_2$ C-43.57, H-3.66, Br-26.35,O-5.28, S- 21.15.

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5) 3-3 bis(methylthio)-1-p-tolylprop-2-en-1-one:
Yellow Solid, IR (KBr): 3024, 2912 ,1688, 1238, 775, 585, 474 cm^{-1}; ^{1}H NMR(DMSO) : 7.54(d, 1H), 7.18(d, 1H), 6.44(s, 1H), 2.32(s, 6H), 2.28(s, 3H) ; ^{13}C NMR (DMSO) : 188.4, 170.9, 141.2, 128.4, 107.9, 17.8 ; Mass (m/z): 237.8($m^{+\cdot}$) ; $C_{12}H_{14}OS_2$ C-60.46, H-5.92, O-6.71, S- 26.90.

CONCLUSIONS

In summary, a superior base mediated simple, harmless approach has been developed by using simple on pot synthesis. Instead of methyl iodide, we can use dimethyl sulphate also. To workout above mixture into distilled water is also very easy. Acoustical properties such as viscosity and density study shows good results. In short we have developed easy and cheap method for synthesis of substituted ketene dithioacetals and their physicochemical study.

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DIVERSITY OF ZOOPLANKTON OF PUJARITOLA LAKE OF GONDIA DISTRICT (M.S)

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ABSTRACT
Zooplankton diversity reflects the quality of water hence constitutes the important ecological parameter to assess it. These are not only useful as bioindicators, but are also helpful for ameliorating polluted waters. Zooplankton community is cosmopolitan in nature and they live in all freshwater habitats of the world. Zooplankton is the transitional link between phytoplankton and fish. They are good indicators of the changes in water quality because they are strongly affected by environmental conditions & respond quickly to changes in water quality. Hence qualitative and quantitative studies of zooplankton are of great importance. In the present paper qualitative and quantitative studies of zooplanktons in Pujaritola lake of Gondia district were carried out during June 2015 to May 2016. Using microscopic studies of zooplankton, this investigation revealed that 11 genera belonging to five major groups i.e. Cladocera (two genera), Copepoda (three genera), Ostracoda (one genus), Protozoa (two genera) and Rotifera (three genera) were present.

Key words: Pujaritola lake, Zooplankton diversity, Gondia district,

INTRODUCTION
Zooplankton are microscopic, free floating organisms occurred in all natural water bodies. They are a major form of energy source between phytoplankton and other aquatic animals According to Dadhick and Saxena (1999) the zooplankton plays an integral role and serves as bio- indicators. Zooplanktons comprise the food source of organisms at elevated trophic levels (Gajbhiye, 2002). They occupy an transitional place in the aquatic food web (Altaff, 2004). It is a well suitable device for understanding water pollution status (Contreras *et al*., 2009). Due to their huge density, shorter lifespan, drifting nature, high species diversity and different tolerance to the stress, they are being used as indicator organisms for the physical, chemical and biological processes in the aquatic ecosystem.

A number of studies has been carried out on the condition of ecology and freshwater bodies in various parts of India (Smitha *et al*, 2007) but in some parts of Vidarbha region (M.S), the ecological studies of freshwater bodies especially zooplankton studies is very scanty. So the present study was undertaken to investigate the zooplankton diversity in Pujaritola lake through different months and season during the period June 2015 to May 2016 in order to assess the species composition, population density and seasonal fluctuation of this faunal group.

MATERIALS AND METHODS

STUDY AREA
Pujaritola is a village in Tirora taluka in Gondia District of Maharashtra state, India. It is situated 32 KM towards west from District head quarters Gondia. It is surrounded by Tumsar taluka towards west, Khairlanji taluka towards North, Gondia taluka towards East. Pujaritola is located latitudes 21.23 North and longitudes 80.43 East.

COLLECTION OF SAMPLE
Water samples were collected from lake every month during June 2015 to May 2016 in the morning between 6 AM to 7 AM. For collection of zooplanktons sample 25 litres of surface water passed through standard plankton net of bolting silk No. 25. The collected samples were preserved in 4% formalin solution and stored in 250 ml bottles.

The naming of zooplankton was made by using standard keys of Dhanapathi (2000) and Altaff (2004).The quantitative analysis of planktonic organisms was carried out using Sedgwick Rafter's plankton counting chamber.

OBSERVATION
As shown in Table 1 for month wise population density (No./lit) of unlike zooplankton groups from June 2015 to May 2016.

Cladocera: In this study two species out of 110 species recorded in India (Patil *et al*, 1989) were recorded. They play key role in food chain and energy transformation (Uttangi, 2001). The Cladoceran population showed minimum in monsoon, i.e. in June 40/lit and maximum in winter, i.e. in December 184/lit. This

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variation in population was due to favourable temperature and availability of food, while in monsoon the factors like temperature, turbidity, and transparency play an important role in controlling the diversity and density of Cladocera (Edmondson, 1965).

Copepods: In the present investigation, they were found to be maximum during summer, i.e. 130 in April and minimum during winter, 90/lit in October. They serve as food to several fishes and play a major role in ecological pyramids. Similar trend was observed in Renukalake, Himachal Pradesh (Chauhan, 1993).

Ostracods: In the present investigation one species of ostracods were recorded. Maximum ostracods population was recorded in summer, 89/lit in March month while minimum in monsoon, i.e. 23/lit in July. They occur in all kinds of freshwater and marine environments. The abundance of these provides a good food for aquatic organisms. Similar observations were also made in Fort Lake of Belgaum, Karnataka (Sunkad *et al*, 2004).

Protozoa: Two species had been reported from the Pujaritola lake where density was maximum in winter, i.e. 167/lit in December, while it was minimum in monsoon, i.e. 14/lit in June. They are both herbivores and consumers in the decomposer link of the food chain. They also control bacteria populations and biomass to some extent (Alcamo *et al*, 2009).

Rotifers: The rotifers are being considered as the most important soft bodied invertebrates (Hutchinson, 1991). The dominance of rotifers was reported in several water bodies. In this study population density of rotifers was maximum in winter, 280/lit in December and minimum in monsoon, 35/lit in June.

RESULTS AND DISCUSSION

Zooplanktons are fine indicators of changes in water quality, because they are strongly affected by environmental conditions and responds quickly to changes in environmental quality. Hence, qualitative and quantitative studies of zooplanktons are of great importance. The monthly and seasonal variations of zooplankton are tabulated (Table 1).

In the present investigation, total 11 species of zooplanktons were recorded. Two species belonging to Cladocerans were recorded as *Alona pulchella* and *Ceriodaphnia cornuta*. Three species of Copepods were recorded as *Cyclops strenuus, Diaptomus pallidus* and *Heliodiaptomus viduus*. Belonging to Ostracods one species *Cypris subglobosa* were recorded. Two species of Protozoa were found as follows; *Vorticella, Paramecium*. In Rotifera three species such as *Asplanchna*, *Brachionus durgae* and *Keratella valga* were recorded.

The physiochemical parameters such as temperature, light, pH, organic and inorganic constituents and the interrelationship with their organisms play an important role in determining the nature and pattern of fluctuation of population densities of zooplanktons. Maximum species richness was observed during winter season and minimum was during monsoon. The maximum species richness was observed in group Rotifera and minimum in group Ostracods. The total number of zooplanktons was recorded maximum in the month of December and minimum number observed in month of June (Table 1).

Table 1: Monthly population density (No./ lit) of different zooplanktons.

Month	Monsoon Season				Winter Season				Summer Season				Total
Groups	Jun	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	
Cladocera	40	108	120	110	127	162	184	108	87	98	56	44	1244
Copepoda	72	66	93	100	90	88	90	89	103	124	130	115	1160
Ostracods	23	12	55	32	46	35	08	24	70	89	75	60	529
Protozoa	14	36	49	105	149	135	167	132	113	95	90	62	1446
Rotifers	35	54	48	187	219	246	280	266	126	106	99	80	1746

CONCLUSION

The zooplankton investigation showed that, the total zooplankton density was more in winter season due to low temperature, favourable for phytoplanktonic growth as an abundance of food.

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ETHNIC WEALTH OF TRIBES DWELING IN DEORI TALUKA, DISTRICT GONDIA (MS)

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ABSTRACT
Deori is a tribal taluka belonging to Gondia district of Maharashtra state, covers a total geographical area of 1,21355 hectors. Amongst which 5,4456 hectors is forest area and 45694 hectors is reserve forest. The region is rich in biodiversity and the tribes residing here still practices herbal remedies for treating various ailments. The present paper enumerates the status and traditional uses of several plant species by the ethnic and rural people of Deori taluka, and an attempt is made of verify the efficacy of claims with actual beneficiaries.

Keywords: Deori taluka, Tribes, Ethnic

INTRODUCTION
Traditional medical practice has been recognized by the World Health Organization as a building block of primary Health care in tribal communities. A large number of ethno-medicinal information remains endemic to certain regions or people due to lack of communication (Mishra *et al*, 2008). Over 550 tribal communities are covered under 227 ethnic groups residing in about 5000 villages of India in different forest and vegetation types. Indigenous traditional knowledge is an integral part of the culture and history of a local community. It is evolved through years of regular experimentation on the day to day life and available resources surrounded by the community. This knowledge is handed over to generations through word of mouth and is extensively used for the treatment of various chronic and common diseases.

Gondia district is a tribal district comprising of 5,431sq.km of area and 08 talukas surrounded by 54,456 sq. km of forest area. People residing near forest areas still practices folk lore practices for treating various diseases. The folk culture is still vital in this region (Joseph *et al*, 2011). The tribes like Gond, Halbe, Dhiver still largely depend on their traditional system of medicines. They use numerous herbs for treating various ailments. They obtain raw material (plant parts or plant species) from the forest. Many species of these regions have revolutionized the allopathic systems of medicine, but with time the situation has reversed due to deforestation and uprooting the plants for fulfilling the requirements and craze for herbal globalization, the medicinal plants are under threat with the increased risk of loosing genetic diversity (Joseph 2011 and Balkrishna 2009). This could result in eradicating indigenous and traditional knowledge about methods of curing diseases from a particular plant species. Hence there is an urgent need to have a specific programme on medicinal plants; Research and Development programme for in-situ and ex-situ conservation, establish Germ plasm Bank, Documentation of traditional knowledge for database and development of Agro-cultivation techniques etc. for these regions.

ABOUT STUDY AREA
Geographically Maharashtra is located in the centre of North and South of India and is the third largest state with a geographical area of 307690 sq.kms and lies between 16°56' to 80°09'E longitude. Gondia district is situated in extreme eastern side of Maharashtra state, covering an area of about 5,431km square lying between North latitude of 20.39 and 21.38 and East longitudes of 89.27 to 82.42. Gondia district is a region to the south of Godavari river and the region is inhibited by arborigines. This region was ruled by Gond King and the rich dense forest reflects the culture of Gond people. The tribes used to collect lak (sealing wax) and gum from the forest. Gondia district is divided into two subdivisions Gondia and Deori. Almost half of the district has good forest cover with mountainous terrain, different grades of soil extreme climatic condition on one side and many rivers and rich biodiversity on the other side. Navegaonband National park and Nagzira wild life sanctuary adds beauty to the district.

The district has 8 talukas with temperature variations of very hot summers (48°C) and cold winters (10°C) with relative humidity of 62%, annual rainfall of about1200 mm/year. The study area Deori is subdivision surrounded by rich forest wealth. Deori taluka covers a total geographical area of 1,21,355 hectares amongst which 5445 hectares is forest area and 45,694 hectare area is reserved forest. People residing here still practices folk remedies for treating various ailments.

RESEARCH DESIGN AND METHODOLOGY
1. The traditional knowledge about the plants for treating the common diseases was collected from peoples, especially traditional healers and village medicine-men.
2. Monthly visit and interviews of local and tribal peoples of villages were carried out to assess the information regarding the wild medicinal plants and some of the threatened plants used for ethno-medicinal purpose.

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3. And their documentation was done to preserve their knowledge for future generation.
4. The collected plants were identified taxonomically using literature (Rendle, 1986) and the status of ethno-medicinal plants was compared with Red data book and other literature.
5. Voucher specimen collected from different sites is preserved as per suggested method.
6. Confirmation of the specimen was made with the help of floristic literature available.

In this way the data was generated by Ethno-botanical survey conducted with a view to gather information on medicinal plants used by the ethnic people of Deori taluka to treat various ailments. For a proper study, the sites were selected considering the population and density of flora. The data obtained includes list of medicinal plants with their correct botanical name, vernacular name, family, and plant part used is enlisted below.

According to the traditional healers some of the plant species which were threatened were compared with the Red Data Book and the other literature (Ugemuge, 1986 and Chaudhary, 2008) and the threatened plant were also recorded.

Table: List of Ethano-medicinal plants with their indigenous uses

Sr. No	Botanical Name with Family	Local Name	Part used	Name of Disease/Uses
1	*Adhtodavasica* Acanthaceae	Adulsa	Leaves, roots, flowers and	Cough and cold
2	*Mangiferaindica* Anacardiaceae	Amba	Leaves, barks, fruits and Seeds	Diarrhea, Dysentery
3	*Phyllanthusemblica* Phyllanthaceae	Awala Leaves	fruits and seeds	Vitamin deficiency
4	*Curcuma longa* Zingiberaceae	Haldi	Rhizomes	Anti-bacterial, Wound healing
5	*Aeglemarmelos* Rutaceae	Bel	Leaves, root and fruits	Antidysentery, diabetes
6	*Punicagranatum* Punicaceae	Darimb	Fruits and bark	Anti-dysentery, anemia
7	*Madhucaindica* Sapotaceae	Moha	Bark, heart-wood, fruits and seeds	Wounds, diabetes
8	*Tectonagrandis* Verbenaceae	Sagwan	Leaves and barks	Snake bite
9	*Buteamonosperma* Fabaceae	Palas	Barks, leaves, fruits, seeds and gums	Diabetes
10	*Ficusbenghalensis* Moraceae	Vad	Bark, leaves, fruits, seeds and latex	Anti-diabetic, wound
11	*Azadirachtaindica* Meliaceae	Kadunimd	Bark, leaves, flowers and seeds	Antibacterial
12	*Zizyphusjujaba* Rhamnaceae	Bor	Fruits	Vitamine-B
13	*Psidiumguajava* Myrtaceae	Jam	Leaves, fruits and root	Anti-diarrhea
14	*Terminaliaarjuna* Combretaceae	Arjun	Bark	Diuretic, Cardio tonic
15	*Ricinuscommunis* Euphorbiaceae	Yerandi	Leaves and seeds	Anti-swelling
16	*Acacia nilotica* Fabaceae	Babul	Pods, leaves, bark and	Dental use
17	*Ficusracemosa* Moraceae	Umbar	Fruits	Anti-helmentic

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18	*Pongamiapinnata* Fabaceae	Karanj	Leaves, flowers, seeds and	Wound healing
19	*Cynodondactylon.* Poaceae	Harari	Leaves	Astringent
20	*Alstoniascholaris* Apocynaceae	Saptparni	Leaves	Snake bite
21	*Pithecellobiumdulce* Fabaceae	Vilayati chinch	Fruits	Anti-oxidant
22	*Vitexnegundo* Verbenaceae	Nirgudi	Flowers and roots	Anti-inflammatory, Bone fracture
23	*Tridaxprocumbems* Asteraceae	Kambar modi	Leaves	Kraking foot
24	*Vincarosea* Apocynaceae	Sadafuli	Leaves and flowers	Leukemia
25	*Calotropisprocera* Asclepidaceae	Rui	Whole plant	Cough
26	*Hibiscus cannabinus* Malvaceae	Ambadi	Leaves and fruits	Sunstroke
27	*Allium sativum* Liliaceae	Lasun	Bulbs	Cough
28	*Ocimum sanctum* Lamiaceae	Tulas	Whole plant	Fever
29	*Terminaliabellirica* Combretaceae	Behada	Bark and fruits	Vomiting, skin diseases
30	*Momordicacharantia* Cucurbitaceae	Karella	Fruits and seeds	Diabetes, blood purifier and antihelminthic
31	*Aloe vera* Liliaceae	Korphad	Leaves	Abortifacient
32	*Andrographispaniculat a* Acanthaceae	Kalmegh	Leaves and whole plant	For digestion, Liver function, Whooping cough and Leprosy
33	*Bacopamonnieri* Scrophulariaceae	Brahmi	Root, leaf (whole plant)	Cataract, epilipsia, astringent
34	*Commelinaerecta* Commelinaceae	Kanseera	Leaf	Rheumatic, burn,sweelings, injuries
35	*Asparagus racemosus* Asparagaceae	Kurilo	Tuberous root	Diabetes, jaundice, urinary disorder
36	*Aconitum ferox* Ranunculaceae	Bikh, Bish	Tuberous roots	Cough, asthma, leprosy, fever snakebite, skin diseases
37	*Astilbe rivularis* Saxifragaceae	Buriokahti	Leaves/ roots/ Rhizome	Diarrhea, dysentery, blood purifier
38	*Adhatoda vasica* Acanthaceae	Asuru	Bark, root, leaf and flower	It is good insecticide, leaves & root expectorant & antispasmodic. It is used as remedy for asthma, cough, fever, gonorrhea leprosy, Phthisis
39	*Azadirachta indica* Meliaceae	Nimpati	Roots, bark, leaves, flower, fruits, seed &gum juice	As an anti-septic, treatment of small fox, as tooth brush, prophylactic for mouth & teeth, used as febrifuge
40	*Allium wallichi*	Ban Lasun	Leaves	Seasoning spices

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	Liliaceae			
41	*Aloe barbadensis* Liliaceae	Ghiukumari	leaves and flower	Used on burns, purgative, efficacious in treatment of leucoderma
42	*Alstonia scholaris* Apocynaceae	Chatiwan	Bark, latex and flower	Bark as tonic, in fever, skin disease in treatment of leucoderma.
43	*Amomum subulatum* Zingiberaceae	Elaichi	Seed	Stomachic, heart and liver tonic
44	*Bauhinia vahlii* Caesalpiniaceae	Verla	Seeds, bark and leaves	Seeds used as tonic, aphrodisiac, leaves demulcent, bark is useful in skin disease, diarrhea
45	*Bauhinia variegate* Caesalpiniaceae	Koirala	Flower / fruits	Flower juice is taken to cure dysentery, diarrhea & stomach pain. The flower buds are taken for skin disease & ulcer. Fruits are used for blood purification.
46	*Bauhinia purpurea* Caesalpiniaceae	Tanki	Flower, Roots and Bark	The astringent bark is used to control diarrhoea. The flower are laxative and root is carminative The bark root and flowers are also useful as maturant for boils and abscesses. Used against animal bite.
47	*Bombax ceiba* Bombasaceae	Simal	Root	Used for curing diarrhea & dysentery
48	*Calotropis gigantean* Asclepiadaceae	Ankh	Latex	Used in sprain & swelling
49	*Carica papaya* Caricaceae	Mewa	Leaf	The digestive enzyme papain is extracted from the milky sap.
50	*Cassia fistula* Caesalpiniaceae	Raj briksha	Fruits, leaves	The fruits are used for asthma, diabetes and eczema. Leaves used for treating skin diseases
51	*Cassia sp.* Caesalpiniaceae	Methizar	Leaf & root	The leaf powder is given to relieve indigestion & stomach pain. The root paste is used for ringworm
52	*Citrus indica* Rutaceae	Chaksi	Fruits	Stomach problems
53	*Costus speciosus* Zingiberaceae	Bet laure	Root	Useful in fever, bronchitis, anemia, rheumatism and diabetic
54	*Calendula officinalis* Compositae	Calendula	Flower, Leaves	It is antiseptic and antifungal, contains hormones and vitamin A. It is diaphoretic, stimulant, antispasmodic and small pox.It is also used in

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				healing wounds, ulcers, burns.
55	*Dolichos uniflorus* Papilionaceae	Gahat	Seeds	Seeds cure Measels, Chicken pox, tumors, asthma.
56	*Dioscerea bulbifora* Diascoriaceae	Gittha	Tuber	Aphrodisiac, stomachic, improves appetite
57	*Dichroa febrifuga Saxifragaceae*	Basak	Roots& Leaves	Fever, malaria
58	*Euphorbia royleana* Euphorbiaceae	Siwri	Latex	The latex is used to cure cuts & stop bleeding; It is also used to relieve earache, cough & asthma.
59	*Ferula narther* Umbelliferae	Hing	Gum	Gum used in asthma, cough, hysteria & epilepsy.
60	*Foeniculum vulgare* Umbelliferae	Sounp	Leaves, tender shoots, fruit	It is used as flavouring agent of foods, curries and salad. Seeds are good in digestion, removes stomach pain regulates menstruation, improves apposite, breast milk production

DISCUSSION AND CONCLUSION

Ethno-botany is multidisciplinary science defined as the interaction between plants and people (Chaudhary, 2008) which record the history and current state of human kind even while foretelling the future (7). The World Health Organization has already recognised the contributions of traditional health care in tribal communities.

The present study focuses mainly on plants species reported by the local people in and around the study area for their medicinal uses. The present investigation reveals about 50 medicinal plants collected from different sites used to treat various diseases (Table no 1). It was observed that some of the species like *Andrographis paniculata, Azadirachta indica, Butea monosperma, Syzygium cumini, Momordica charantia, Trigonella foenum-graecum, Aegel marmelos,Costus ignus, catheranthus roseus,Coccinia* were commonly used to treat deadly disease diabetes. Rest of the plants species were effectively used to treat various other diseases.

All the species collected contains valuable phyto-constituents which are useful to cure various human ailments. The survey data also shows that various plant parts like 30% leaves, 15% fruits, 13% roots/rhizomes, 10% of buds, flowers, 7% seeds, 5% of gum and latex were used in different preparation to treat diseases. It is therefore concluded that the people of the area possess good knowledge of herbal drugs but as the people are in progressive exposure to modernization their knowledge of traditional use of plants may be lost in due course. So it is important to study and record the uses of plants by the tribes and sub-tribes for future studies. Further such type of studies may provide information to biochemists and pharmacologists in screening and assessing phyto-constituents for the treatment of various diseases.

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EFFECT OF METAL-LIGAND COMPLEX ON GERMINATION OF CAPSICUM PLANT

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ABSTRACT
Present research studied the Synthesis of complexes of chalcone with metal and $FeCl_3$, $MgCl_2$ the effect of ligand metal ion complex on germination, survival and seedling height which clearly reveals that the ligand (Chalcone) shows a significant result over percentage of germination, survival, seedling height, shoot length, root length, root/shoot ratio and width of young leaf. The average values of these parameters have been used to make a conclusion about plant growth regulating activity of ligand and its complexes. The complexes have been characterized by analytical and IR.

Keywords: Metal-ligand complex, Plant growth regulators, Germination, Capsicum plant.

1. INTRODUCTION

Capsicum (kaepsikem also known as peppers) is a genus of flowering plant in the nightshade family Solanaceae. Its species are native to the Americas, where they have been cultivated for thousands of years. Following the Columbian Exchange it has become cultivated worldwide, and it has also become a key element in many cuisines. In addition to use as spices and food vegetables, *Capsicum* species have also been used as medicines and lachrymatory agents. The fruit of *Capsicum* plants have a variety of names depending on place and type. The piquant (spicy) varieties are commonly called chili peppers or simply "chilis". The large, mild form is called "red (bell) pepper", "green (bell) pepper", or just "bell pepperr" (depending on color) in North America and United Kingdom and typically "capsicum" in New Zealand, Australia, Singapore and India. The fruit is called "paprika" in some other countries (although paprika can also refer to the powdered spice made from various capsicums).

Greshon el al.[1 to 3] reported that the activity of metal chelate is considerably increased as compared to that of antifungal and antibacterial activities of complexs show that they are more active as compared to free ligand and involved [4,5] Zielinski et. al.[6] showed that, Lanthanide ion could substitute the calcium ion to produce active enzyme system. Some bivalent metal ions have been reported to be uses of lanthanide necessitate concentrating on the study of lanthanides and ligand for studying the germination pattern. Plant growth regulating activity is tested with wheat and cucumbers by Darnall et. al.[7,8] The complex of transition metal with bis-alkyl thiourea are prepared and their herbicidal and Chalcone Synthesis Promoters in Petunia Are Active in Pigmented and Unpigmented Cell Types.[9]

In present research, we have developed new metal-ligand complex which help germination, survival, seedling height, shoot length, root length, root/shoot ratio and Efficient for the synthesize of chalcone shows antifungal and antibacterial applications.

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EXPERIMENTAL SECTION

Reaction scheme: synthesis of chalcone by known method

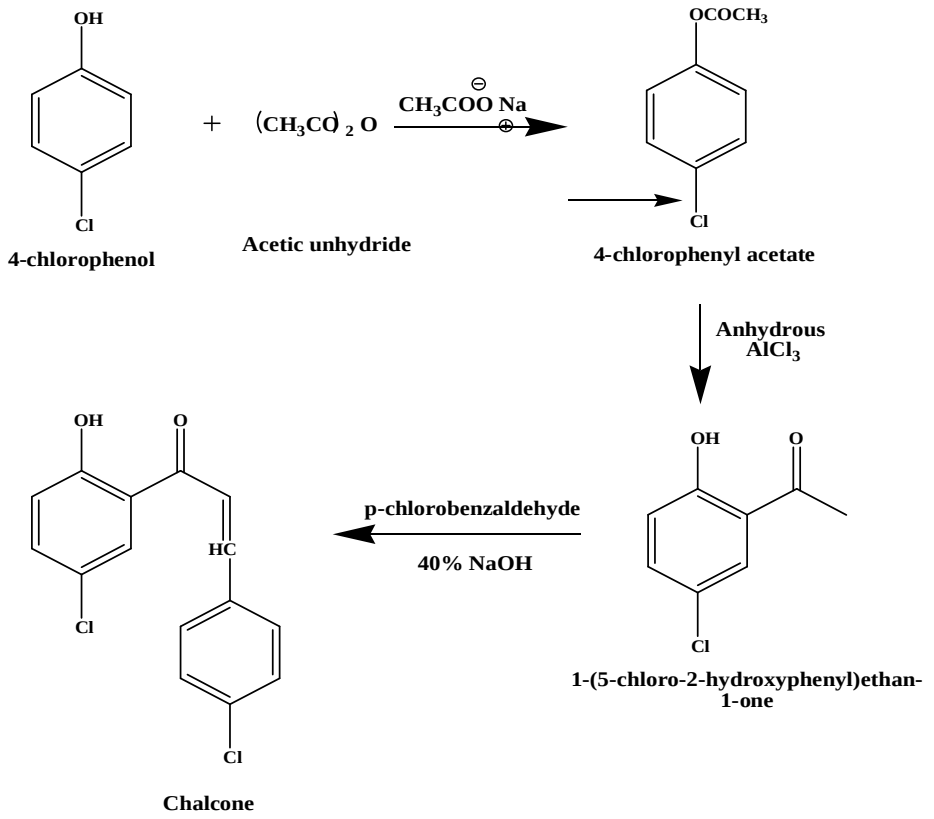

Fig - 1: Synthetic for the preparation of chalcone

2.1; Step I: Preparation of p-chloro phenyl acetate from chlrophenol

In Round Bottom flask equipped with 7.5 ml of 4-chlorophenol and 6 ml of acetic anhydride and one gm of fused acetic acid, then this mixture reflux the reaction mixture for about one hour and after completion of reaction add ice cold water, Separate the oily layer by separating funnel and then distilled oily compound, The progress of reaction was monitored by TLC. The yield of given compound is 7ml Boiling point-180^{0}C.

2.2; Step II: Preparation of 2-Hydroxy-5-chloroacetophenone from p-chloro phenyl acetate

In Kjeldal's flask equipped with 5ml of p-chlorophenyl acetate with three times more anhydrous $AlCl_3$ in Kjeldal's flask. Then reaction mixture is heated in oil bath and maintains the temperature at about 120^{0}C to 160 ^{0}C for about 30 minutes.This temperature is maintained for about one and half hours. After the completion of reaction add 20 ml 10% HCl in Kjeldal's flask and collect the reaction mixture in beaker .Then add the acetic acid is in precipited ,boils the mixture and separates it by separating funnel. Then reaction mixture is poured in ice. The progress of reaction was monitored by TLC .The yield of this compound is 5gm.Melting point-60^{0}C.

2.3; Step III : Preparation of chalcone from 2- hydroxy 5-chloro acetophenone

In 50 ml beaker take 5 gm of 2-hydroxy 5-chloro acetophenone and 1.5 ml p-chlorobenzaldehyde dissolved in ethyl alcohol and then add 40% NaOH drop by drop with constant stirring, yellow viscous mass is obtained. Then mixture is kept overnight and yellow precipitate obtained. The yield of the precipitate is 4gm. The progress of reaction was monitored by TLC.Melting point-70^{0}C.

2.4; spectral analysis

FTIR - In the IR spectra of chalcone asymmetric and symmetric stretching vibrations of the aromatic C-H bonds are seen at 3110-3070 cm^{-1}and C-H stretching band of the =C-H group is observed at 3040-3010 cm^{-1}. The bands at 1620-1580 cm^{-1}are assigned to the vibrations of the aromatic ring. The carbonyl stretching vibrations for the enones (=C-C=O) can be found between 1685 cm^{-1}.Ketone group that is in conjugation showed a peak at 1640 cm^{-1}, the double bond peak appeared around 1580 cm^{-1}.

2.5; Preparation of Metal-Ligand complex

Metal ions: The solutions of metal ion in the form of $FeCl_3$ and $MgCl_2$ of 0.1 concentrations were prepared using distilled water and the seeds were soaked in both metal solvents.

Ligand: The organic compound was prepared were dissolved in proper solvent and capsicum seed are soaked.

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Metal ion + Ligand: The mixture of $FeCl_3$ and organic compound (chalcone) and $MgCl_2$ were dissolved in the distilled water and seeds are soaked.

Media: For the germination of the capsicum seeds, two types of the Medias are used.

1) Soil media (media A) 2) soilless media (media B)

Soil media (A) comprises of soil and vermi compost at the ratio (4:1) Soilless media (B) comprises of fertigated cocopeat and vermi compost at the ratio (4:1) both these medias sterilized with copper oxychloride a contact fungicide, to prevent the attack of soil borne pathogens which are harmful for the development of the plant.

3. RESULT AND DISCUSSION

In present investigation shows that effect of ligand, complex and metal ion increases on percentage seed germination, root length shoot length (root/ shoot ratio) has been studied and also study of chlorophyll.

3.1 Root Length, Shoot Length and Root/ Shoot Ratio

Germination starts when the seed shows emergence phase of grow which begins, with penetration of embryo from the seed coat and end with development of root and shoot system. The elongation of shoot axis follows emergence of radical. The rate and extent of elongation is subjected to a variety of controls, including nutrition, hormones and environmental factors. Though the root and shoot development start within a fraction of time but the further developments may vary according to the nutrients required for the development of root and shoot independently because of this root and shoot length differ from each other.

Table: 1 is clearly indicates that percentage germination in metal ion Mg is highest followed by metal ion Fe and subsequently in complex Fe, complex Mg, Ligand and control water (d/w). Similarly the root length and shoot length (seedling height) shows a significant development of root/ shoot length of metal ion Mg. over all the treatment followed by ligand, complex Fe, complex Mg. Metal ion Fe and control (d/w) respectively. The root / shoot ratio in all the treatment is according to the literature values shows that effect of metal ion, ligand, complexes and control (d/w) on germination, survival and seedling height clearly reveals and metal ion Mg. shows a significant better performance over the all treatment and parameters are considered, while finding out the result.

In general order in the entire parameters performance wise metal ion Mg. stood first followed by ligand complex Mg. control water (d/w), metal ion Fe and complex Fe. The germination and growth parameters are studied in soil and soilless Media's soilless Medias show better performance as against soil media in all the treatments.

Table 1 – Effect of Ligand, Metal ion and complexes on capsicum plant,Test system in soil and soilless medias

Parameter	Effects of												General Order of plant
	Water or		Ligand		Complex Fe		Complex Mg		Metal ion Fe		Metal ion Mg		
	Media (A)	Media (B)	Media (A)	Media (B)	Media (A)	Media (B)	Media (A)	Media (B)	Media (A)	Media (B)	Media (A)	Media (B)	
%Germination	80 %	90%	90%	90%	85%	100 %	85%	100 %	90%	100 %	100 %	100 %	Metal Ion Mg> Ligand> Complex Mg> d/w Metal ion Fe> Complex Fe
%Seedling height(cm)	9.0	8.5	10.5	9.5	10.5	9.5	10.0	9.0	10.0	9.0	10.0	10.5	
Root length(cm)	3.5	3.5	4.5	4.0	3.0	4.5	3.5	4.0	3.0	4.0	4.0	4.5	
Shoot length (cm)	5.5	5.0	6.0	5.5	7.5	5.0	6.5	5.0	7.0	5.0	6.0	6.0	
Shoot/Root Ratio	1.57	1.42	1.33	1.37	2.50	1.11	1.85	1.25	2.33	1.25	1.50	1.33	

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Table - 2 : Measurement of optical density for capsicum plant system in soil and soilless media.

Sr.No.	Leaves Of plant with treatment of following	Optical Density					
		480nm		645nm		663nm	
		Media)A(	Media (B)	Media)A(	Media)B(	Media)A(	Media) B(
1	Water or control	1.220	1.152	0.760	0.665	0.980	0.695
2	Ligand	1.490	1.164	0.805	0.688	1.105	0.709
3	complex Fe	2.031	1.277	0.862	0.720	1.305	0.800
4	complex Mg	2.051	1.290	0.868	0.770	1.341	0.895
5	Metal ion fe(III)	1.644	1.256	0.855	0.703	1.260	0.740
6	metal Ion Mg(II)	2.132	1.419	1.075	0.831	1.533	0.897

3.2 CHLOROPHYLL CONTENT

The analysis performed for finding out the total chlorophyll in green leaves of the plant capsicum (Table 2) clearly shows that absorption of plant leaves is higher at 480nm in all the treatments. This table also clearly indicates that the amount of chlorophyll is more in metal ion Mg. Followed by complex mg. complex Fe. Metal ion Fe, ligand as compared to control in both media (A) and media (B) in all the optical density. The absorption of chlorophyll leaves shows higher at 480nm followed by 663nm and then at 645nm.

4. CONCLUSION

Successfully Synthesis of complexes of chalcone with metal $FeCl_3$ and $MgCl_2$, the result are shows that the effect of ligand metal ion complex on germination, survival and seedling height clearly reveals that the ligand (Chalcone) shows a significant better performance over all the system and the analysis clearly indicates that the metal ion Mg is having highest chlorophyll contents than the remaining treatment followed by complex Mg, complex Fe, metal ion Fe, ligand and control (d/w) respectively.

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CEREALS AND THEIR NUTRITIONAL VALUE FOR HEALTH BENEFITS

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ABSTRACT
In the world, more than 70% farmlands devoted for the cultivation of cereal grains. Cereals are belonging to a group of cultivated plants from the grass (e.g. Corn, wheat, barley, oat, millet, rice, sorghum, teff, Triticale and rye) bulk constitute of the daily diet. The grains are very important nutrients food because of starch, fibers, carbohydrates, fats, proteins vitamins minerals water and also good source vitamin B, especially B1, B2, niacin, Vitamin E, Calcium Iron, and Phosphorus.

Keywords: Corn; Wheat; Barley; Oat; Millet; Rice; Sorghum; Triticale; Rye

INTRODUCTION
Nutrition may be defined as the science of food and its relationship to health. It is concerned primarily with the part played by nutrients in body growth, development and maintenance. The word nutrient or "food factor" is used for specific dietary constituents such as proteins, vitamins and minerals. Dietetics is the practical application of the principles of nutrition; it includes the planning of meals for the well and the sick. Good nutrition means "maintaining a nutritional status that enables us to grow well and enjoy good health."

Food science has been an important area of science for many years, and one of the most interesting developments came in the late 19th century, when researchers bred wheat and rye together, which are two of the most important cereal/grain staple foods in the world, It should provide about 40% of daily food, perfectly if cereals are grown in organic environment and there are not genetically modified. Cereals are the base of healthy diet. The most popular products from cereals are: flour, groats, oil and syrup. Due to the cultivation method we can divide cereals into: Spring cereals annual plants, which the entire life cycle takes, place in a period of growing, Winter crops annual plants, which to start the cycle all developmental need of the period of low temperatures occurring in winter.

CORN
Corn is the most important grain crop in South Africa and is produced throughout the country under diverse environments. Corns are annual plant which comes from Mexico a height of 2.5m. It's part of utility is a flask with seeds. Nowadays, we usually eat cornflakes, groats, flour, popcorn and very popular corn oil. The Corn grains contain 60-70% of starch, quite a lot of roughage, proteins, and vitamins from the group B and also vitamins: D, E, K and provitamin A. The corn grains are a source of Omega -3 acids. The corn is a perfect source of minerals, ex: Corn on cob, sweet corn, maize meal, corn flour, corn oil, popcorn, cornflakes. Corns are good source of calcium, magnesium, iron, copper, manganese, phosphorus, Potassium, sodium, iodine, zinc and selenium.

Corn can boil the fresh roasting water and filter it by mixing sugar candy and drinking it, the irritation of the urine, kidney weakness is removed. It is packed with abundant fiber, so eating it stays in the stomach is good. It eliminates the possibility of constipation, haemorrhoids and colon cancer. Many grains of magnesium, iron, copper and phosphorus are found in yellow granules, which make bones strong. These nutrients keep chances of breakdown of bones in the old age and the kidneys do normal functioning. Antioxidant is found in the corn, which makes the skin look young for a long time. Apart from eating this continuously, add oil to it which contains linoleic acid. Apart from this, granulated starch is also used for skin rash and itching so that the skin becomes very soft. Due to lack of iron, there is anaemia disease, so it should be consumed to remove it, because it contains vitamin B and folic acid, which leads to anaemia. Corn is also helpful in removing heart disease as it contains vitamin C, carotenoids and bioflavonoid. It prevents cholesterol levels from growing and also increases blood flow in the body.

WHEAT
Wheat is also called as Gehun and Karnak. Wheat is the main cereals grain in winter season in India. Wheat is a cereal grain, 1.5m high which the biggest growing is in Europe, East Asia, India, and Americas and in Australia. It is mainly processed into flour and used in baking, confectionery, food products such as atta, maida, suji & rawa and pasta production and culinary products. It is also used in industrial products like milling bread, polymer & resin, cosmetic papers & pharmaceuticals. People produce also semolina, cereal. It's used in the

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manufacture of starch, malt brewing and dry gluten. It contains a lot of starch and other carbohydrate, 11% of protein, 2% of fat, 13% of fiber, 1% of mineral (iron, phosphorus, potassium, magnesium, calcium, zinc, manganese) and also high amount of vitamins of B group and vitamin PP. Wheat germs are rich in vitamin E and enzymes.

BARLEY

Barley is a versatile and oldest consumed cereals grain in the world with rich nutrients. Barley is naturally high in maltose that serve as the basis for both malt syrup, sweetener Barley is also used as ingredient for the production of beer, alcoholic beverages, and from the burnt grain is obtained surrogate of coffee. It contains: 70% of carbohydrate, 11% protein, 10% fiber, 2% fats and minerals (sodium, potassium, and phosphorus), vitamin B and antioxidants, heart health and diabetes protection. In young, delicate blades, use for the juice production, is 2 times more magnesium, 5 times more iron, 25 times more potassium and 37 times more calcium than wheat! Young shoots also contain a high content of beta carotene, vitamins B1, B2, B3, B. Barley is used for skin care, boosting immunity, and preventing disorders such as osteoporosis, gallstones, and diabetes. i.e Pearl barley, barley water, whiskey.

TRITICALE

Triticale is a cereal grain created by plant breeders. In 1970, the first commercial variety of triticale went on sale and triticale bread, flour and breakfast cereals. It contains 13% protein, but lower in lysine and niacin. Triticale protein has higher lysine content than wheat. Triticale is good source of phosphorus and magnesium and also very good source of manganese. It also contains B-group vitamins, most notably thiamin and folate. Plant geneticists hoped that a cross fertilisation of wheat and rye would produce a cereal with superior yield. In its natural state does not occur. Is mainly used as feed for cattle, pigs, sheep and birds. It contains 12.2% protein, about 55% carbohydrate (eg starch), 1.4% fat.

Triticale have some health benefits include its ability to improve digestive efficiency, boost heart health, increase healing and metabolic rate, improve energy levels, protect infants in the womb, prevents and manages diabetes, increase circulation, protect against asthma, reduce various skin conditions, and contribute to strong bones.

OATS

Oats are a whole-grain cereal, known scientifically as *Avena sativa i.e.* Oatmeal, pinhead oats, rolled oats for porridge and muesli, and oatmeal biscuits. They are mainly grown in North America and Europe. They are a very good source of fiber, especially beta-glucan; it is useful for lower the cholesterol and Protect LDL Cholesterol from Damage. Oats contains high value of vitamins, minerals and antioxidants. Oats has a very high nutritional value because of the fact to hold up to twice more fat than other cereals. These are mostly polyunsaturated fatty acids, which in addition to providing energy have a beneficial effect on the body. Oats have a well-balanced nutritional composition, and one serving (30 grams) of oats contains 117 calories. By weight, raw oats are 66% carbohydrates, 17% protein, 7% fat and 11% fiber. Oats is an important nutrient, protein-rich (high biological value, because it contains 41% of valuable amino acids), calcium, magnesium, silicon, potassium, iron, zinc and vitamins B, PP, K, E. It is rich in low starch polysaccharides, forming the so-called. Oats contains more soluble fiber i.e beta-glucan and it's very essential in the daily human diet. Oats Can Improve Blood Sugar Control and Finely Ground Oats May Help With Skin Care.

MILLET

Millet is tiny "grain" is gluten-free and packed with vitamins and minerals. In fact, while it's often called a grain because of its grain-like consistency, millet is actually a seed. Millet may not be the most common type of seed crop that you're expecting on your table, but in fact, this group of variable small-seeded grasses is cultivated throughout the world, both for livestock feed and human consumption. Millet is important because of its uniquely high content of nutrients, including impressive starch levels, B- vitamin, calcium, iron, potassium, zinc, magnesium, and fats. Wheat originating in Asia is one of the oldest cultivated plants, which produced millet and flour and less gruel and small bread. Cereal can be also used for the production of starch and sugar. It also has a wide application in animal nutrition, especially birds such as poultry or exotic birds. The main components of millet grain are approximately 59% carbohydrates, protein 10 to 18% and fat from 3.6 to 4.8%. They also contain vitamins B3, A, PP, as well as mineral salts: magnesium, potassium, phosphorus, silicon, iron, copper and do not contain gluten.

Furthermore, there are significant levels of protein and dietary fiber in millet as well, which contribute to even more health benefits include Prevents Diabetes, Prevents Cancer, effective in reducing blood pressure and helps to protect against heart disease and also helps to optimize kidney, liver, & immune system.

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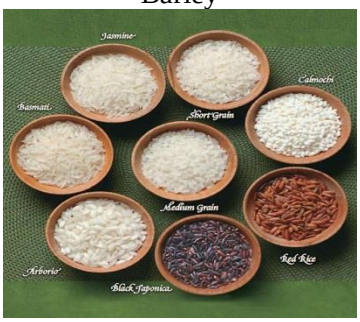
Corn


Barley

Oats


Millets



Rice


Sorghum


Wheat

Rye


Triticale

Figure 1: Cereals

RICE

Rice is a popular cereal and most widely cultivated in the world, worldwide, especially in Asia. Rice has the highest value of proteins. which is the basis for food 1/3 of the population of the Earth i.e. Ground rice, rice flour, rice wine, rice cakes, Rice Krispies, rice paper. Its blades are thick and plurality, its grows to 1,5 m height of 1,5 m It is grown in hot climates are warm and the entire length of the globe. Dining area are grains that are eaten cooked as a separate dish or used in the preparation of soups, main courses and desserts. With grains also produces rice flour and alcoholic beverages (beer, rice, sake, arak). To prepare the rice for consumption it is subjected to a process of "grinding" in which the grain is separated from the shell. At this stage, the resulting product is a brown rice, brown. In order to obtain white rice is subjected to polishing, where the shell is removed. White rice is the most commonly eaten type, but brown rice is becoming more common as a healthier alternative. As a good source of several healthy minerals and antioxidants, brown rice may help prevent heart disease. On the other hand, high consumption of white rice (especially sticky rice) has been associated with increased risk of type 2 diabetes.

SORGHUM

Sorghum, an ancient cereal grain that's a staple crop in India and throughout Africa, has long been considered a safe grain alternative for people with celiac disease and gluten insensitivity. Certain sorghum varieties are more easily digestible than others, and American farmers have started to cultivate varieties that they call "food-grade" sorghum- the grain has historically been grown only for livestock feed in the United States. In general, sorghum flour can be used as a wheat replacement in breads, pastas, cereals, and baked goods, with a bit of experimentation to mimic the springy quality of gluten.

Today outside Africa are grown mainly in the Mediterranean and Central America. Fruit- cocci are not rich source of nutrients. Contain up to 70% of carbohydrates (mainly starch), and 18% protein (with significant share of two amino acids: lysine and tryptophan), about 5% fat, vitamins (mainly groups B), minerals, especially magnesium, calcium and iron. It does not contain gluten. Corn is processed groats, flakes and flour, which makes the pancakes, pasta. The leaves are used as fodder for cattle, and sorghum seed is made liquor very similar to beer. Sorghum daily consumption to reduce the risk of colon and skin cancer more than other

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grains and those other properties can promote cardiovascular health, improve digestive health, beneficial for maintaining healthy bone and lower cholesterol.

RYE

It is one of the most important cereal grains (in economic aspect) that look like wheat but it is world healthiest food. It is grown as an annual plant in sandy or loam soil. Rye is mostly a cereal winter crops, less spring grains. It is characterized by high resistance to frost and small requirements of soil and heat. Rye is used as feed for farm animals and as the ingredient of bread. Rye is a very good source of manganese and a good source of dietary fiber, phosphorus, copper, pantothenic acid and magnesium. It also contains lignan phytonutrients. Rye contains 9, 5% protein and 1, 6% fat and has a high content of carbohydrates, which represent 72- 78% of the weight, occurring mostly in the form of starch. It also contains fiber, and compared with other cereals such as wheat has a large amount of minerals - potassium, calcium, zinc, copper, manganese, and iron. It also contains vitamins B1, B2, PP, and E.

Healthy benefits of rye are helps to prevent gallstones & ulcers, control diabetes, boosts metabolic performance and it's also beneficial for maintaining healthy hearts.

CONCLUSION

All varieties of cereal grains are very important nutritional food and it deals with the basic nutrients which include Corn, Wheat, Barley, Oat, Millet, Rice, Sorghum, Triticale & Rye and its practical application of how the nutritional value of cereals and percentage of nutrition presents in the cereals in all the cereals which is important contains or rich source of nutrients and its health benefits.

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NEW GREEN WAY TO SYNTHESIZE COUMARIN SUBSTITUTED CHROMONE WITH REFERENCE TO THEIR ANTI-BACTERIAL EFFICACY AND STUDIES THEIR FLUORESCENCE PROPERTIES

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ABSTRACT
The present review developed new method for synthesized coumarin substituted chromone, are important building block in organic chemistry which is used as valuable synthetic intermediates in the preparation of new biological relevant heterocyclic system have been synthesized by using effective and efficient synthetic pathway. The synthesized derivatives have been characterized by FTIR,^{1}HNMR,UV and Mass spectrometry for their structural elucidation. These coumarin substituted were evaluated for their antibacterial activity against different pathogenic bacteria such as salmonella typhi, Protenus vulgaris, Staphylococcus aureus, klebsiella pnemoniae, E.schrichia, shigella flexneri, Also studied their fluorescence properties.

Keyword: Methyl acetoacetate, Coumarin substituted chromone, Antibacterial properties, and fluorescence properties.

1. INTRODUCTION
Heterocycles play an important role in the design and discovery of new physiological active compounds [1].Chromone (1) (4H-chromen-4-one, 4H-1-benzopyran-4-one) is an important class of oxygen-containing heterocyclic compounds with a benzo annelated g-pyrone ring and they are part of the flavonoid family (Fig.1).The chromone and related compounds are widespread in the plant kingdom from algae to conifers. Chromone have found to be active in a number of plant cycles, including growth regulation, indole acetic acid oxidation and dormancy inhibition as well as exhibiting cytokines-type behavior and stimulating oxygen uptake in plant tissue [2].

Chromone derivatives are abundant in nature and exhibit a wide range of pharmacological activity like anti-bacterial, anti-fungal [3,4], anti-cancer [5], anti-oxidant [6], anti-HIV [7], anti-ulcers [8],immune stimulators [9], biocidal [10], wound healing [11], anti inflammatory[12], and immune-stimulatory [13]. Many chromone derivatives are also photoactive and can be used easily in various photo induced reactions affording diverse heterocyclic compounds [14]. Chromone derivatives are also active at benzodiazepine receptors [15] and on lipoxygenase and cyclooxygenase [16].

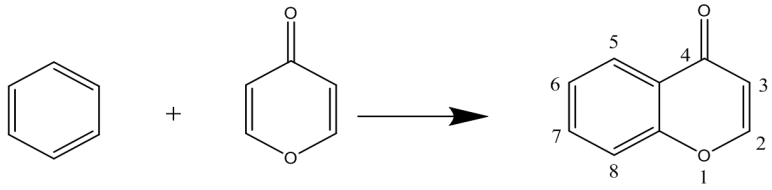

Fig.1: Chemical structure of chromone

Derivatives of chromone (1-benzopyran-4(4*H*)-one,**1**) and coumarin (benzo-*α*-pyrone,**2**) exhibit a wide spectrum of biological activity, including spasmolytic, antiarrhythmic, cardiothonic, antiviral, and anticancer properties[17].Some coumarin congeners have alkylating properties. Psoralens the compounds isolated from *Rutacea,Umbelliferae*, and *Leguminosae*-constitute the only class of agents known to induce interstrand cross links (ICSs) upon photolysis[18].In this class of naturally occurring aromatic compounds, a furan ring is fused with the coumarin moiety[19].As an important group of organic heterocycles, coumarin derivatives have been found to possess versatile pharmacological/biological activities, which can display anticancer [20-21], anti-HIV [22], antiviral [23], antimicrobial [24], anti-inflammatory [25], and antioxidant [26] activities.

Coumarin fluorescent probes or labels have extensive and diverse applications, as they exhibit extended spectral range and high emission quantum yields [27].coumarin-based fluorescent chemodosimeter with salicylaldehyde functionality were used as a binding site for selective detection of cyanide anions over other anions in water at biological pH. Coumarin core moieties have wide biological application, in particular for the imaging of living cells [28].

There are only a few reports in the literature on synthesis and biological application of coumarin substituted chromone derivative. In this research, we have developed new ecofriendly synthetic pathway for the synthesis of coumarin substituted chromone which can be utilized for evaluation of their biological applications.

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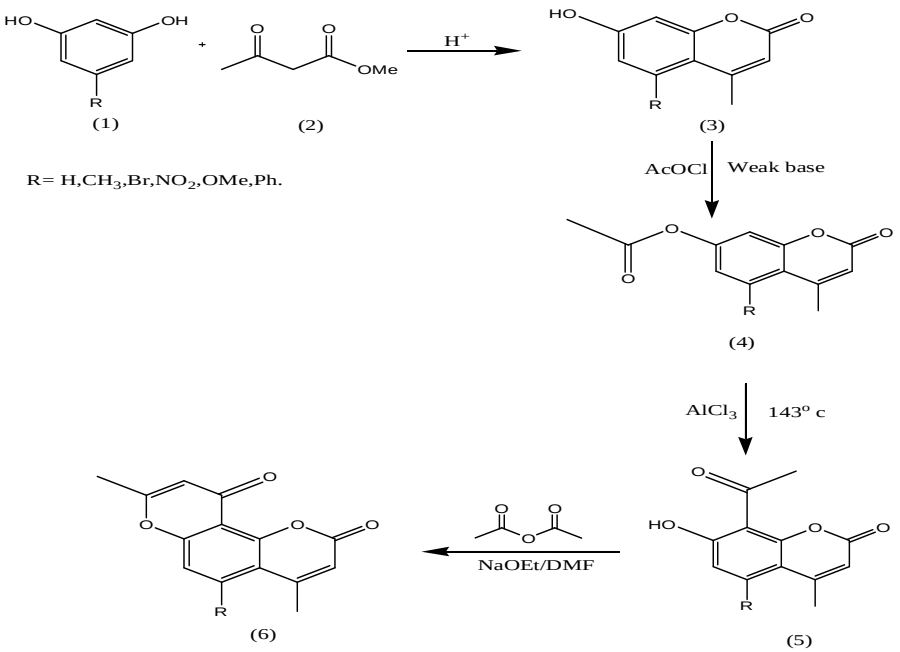

Fig. 2: Synthetic for the preparation of coumarin substituted chromone

2. EXPERIMENTAL

2.1 Raw materials and chemicals

Resorcinol (98%), acetic anhydride (99%) was procured from Sigma Aldrich and used as received. Methyl acetoacetate (98%), TLC plates (silica gel 60 F 254) and Acetyl chloride (98%) was received form Merck chemicals. Acetone (98%) and H_2SO_4 (98%) was provided by Fisher scientific chemicals. Dimethylforamide (S.D.fine chemicals), NaOH (Ranchem), $AlCl_3$ (Loba chemie)

2.2 Synthesis of 7-hydroxy -4 -methyl- 2-h-chromen-2-one by pechmann condensation

A 100 ml Erlenmeyer conical flask equipped over magnetic stirrer was charge with resorcinol (2g/mol) containing Methyl acetoacetate as solvent 2.36 g/mol. The reaction mass was cooled down up to 10^0C and concentrated H_2SO_4 (4ml) was added slowly to the reaction mass with constant stirring. Afterword, the reaction was continuing over the period of 10 hr in anhydrous condition. The progress of reaction was monitored by TLC. On completion of reaction, the reaction mass was poured over crushed ice resulted in the formation of white amorphous solid. The formed solid was filtered, washed with water, dried and crystallized from ethanol. The yield of product was found to be 90%.Melting point-190 ^{0}C.

2.3 Synthesis of 4-methyl-2-oxo-2h-chromon-7-yl acetate by acetylation

A 100 ml Erlenmeyer conical flask equipped over magnetic stirrer was charge with 7-hydroxy -4 -methyl- 2-H-Chromen-2-one (1g/mol), NaOH (1g/mol) and acetyl chloride (1.5 g/mol). The reaction mass stirred gently over the time of 2hr, the progress of reaction was monitored by TLC. On completion of reaction, the reaction mass was poured over crushed ice resulted in the formation of brown amorphous solid. The formed solid was filtered, washed with water, dried and crystallized from ethanol. The yield of product was found to be 85%. Melting point 140^0C.

2.4 Synthesis of 8-acetyl-7-hydroxy-4-methyl-2h-chromen-2-one by fries rearrangement

100 ml round bottom flask equipped with reflux condenser thermocouple charge with 4-methyl-2-oxo-2H-chromon-7-yl acetate(1g) **,**in solvent (1g) $AlCl_3$, reflux for 2 hour in oil bath and maintained the temperature 135 to 145^0C then add 1% HCl for 12 hour. The progress of reaction was monitored by TLC at room temperature. on completion of reaction, the reaction mass was poured over crushed ice resulted in the formation of black crystalline solid. The formed solid dried and crystallized from ethanol. The yield of product was found to be 78%. Melting point-200^0C.

2.5 Synthesis of (4, 8-dimethyl–2h, 10h-pyranol (2-3-f) chromene-2, 10-dione)

100 ml Erlenmeyer conical flask equipped place over magnetic stirrer, and charge with 8-acetyl-7-hydroxy-4-methyl-2H-chromen-2-one (1g) in NaOEt (1g), acetyl chloride (1.5 ml), dry acetone (10 ml) as solvent also add 40% 7 ml KOH in reaction mixture, reaction mixture gently starting stirring for 8 Hour and The progress of reaction was monitored by TLC.On completion of reaction, the reaction mass was poured over crushed ice resulted in the formation of brown amorphous solid, dried and crystallized from ethanol. The yield of product was found to be 75%.Melting point –180^0C.

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3. ANALYTICS

FT-IR analysis

The FT-IR analysis was conducted on Shimadzo (8400 s, Japan) instrument using the ATR technique and the spectrum was obtained in the wavelength range of 4000–600 cm-[1].

Thin layer chromatography (TLC)

Merck silica gel 60 F254. Detection under UV light at 254 nm and 366 nm without dipping Reagent

[1]H-NMR-Spectroscopy

BRUKER AVANCE II 400 the spectra were calibrated according to the solvent signals: 7.26 ppm for CDCl3, 2.50 ppm for DMSO-d6.354 Peak characterization: s = singlet, d = doublet, t =triplet, dd=double of doublets, td = triplet of doublets, dt = doublet of triplets, q = quartet, m=multiplet

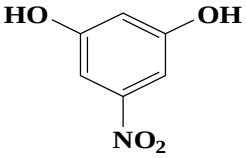
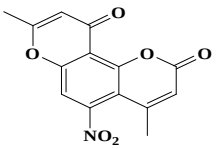
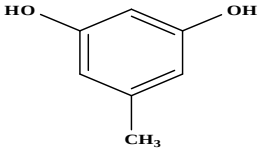
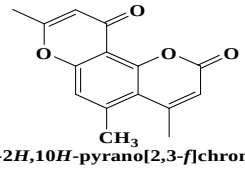
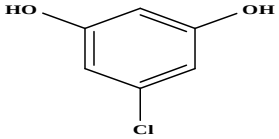
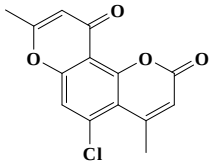
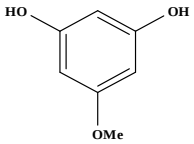
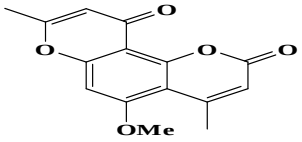
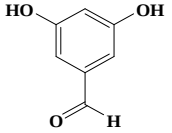
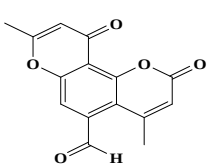
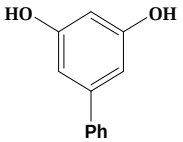
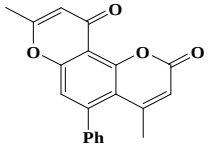
UV-VIS analysis

Instrument Cary 60 ,instrument version 2.00,X mode Nanometer, Y mode Abs ,UV-Vis scan rate (nm/min) 24000.00,Ave.Time (sec) 0.0125,Beam Mode-Dual Beam

Mass analysis

GC 689 N/MSD 5973 (Agilent) or Finnigan MAT 95-XP (Thermo Electron)

Table 1: Structures and physical properties of the synthesized compounds

Sr. No.	Entry	Product	Molecular weight [1]	Yield [2]
1.	 5-nitrobenzene-1,3-diol	 4,8-dimethyl-5-nitro-2*H*,10*H*-pyrano[2,3-*f*]chromene-2,10-dione	287.22	60%
2.	 5-methylbenzene-1,3-diol	 4,5,8-trimethyl-2*H*,10*H*-pyrano[2,3-*f*]chromene-2,10-dione	256.25	65%
3.	 5-chlorobenzene-1,3-diol	 5-chloro-4,8-dimethyl-2*H*,10*H*-pyrano[2,3-*f*]chromene-2,10-dione	276.67	40%
4.	 5-methoxybenzene-1,3-diol	 5-methoxy-4,8-dimethyl-2*H*,10*H*-pyrano[2,3-*f*]chromene-2,10-dione	272.25	50%
5.	 3,5-dihydroxybenzaldehyde	 4,8-dimethyl-2,10-dioxo-2*H*,10*H*-pyrano[2,3-*f*]chromene-5-carbaldehyde	270.23	60%
6.	 5-phenylbenzene-1,3-diol	 5-phenyl-4,8-dimethyl-2*H*,10*H*-pyrano[2,3-*f*]chromene-2,10-dione	318.32	45%

1. molecular weight of isolated product
2. yield of isolated product

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4. EVALUATION OF ANTIBACTERIAL PROPERTIES

Synthesized coumarin substituted chromone were screened for their antibacterial activities against pathogenic bacteria such as *salmonella typhi, Proteus vulgaris, Staphylococcus aureas, klebsiella pnemoniae, E.schrichia, shigella flexneri* by using agar-agar well diffusion method. The test compound were dissolved in dimethyl sulphoxide at a concentration of 100 ug/ml using Ciprofloxin (20ug) us standard drug. All the inoculated plates were incubated at 37^0C and the result were evaluated after 24 hour of incubation.

5. FLUORESCENCE PROPERTIES

The fluorescence spectra were recorded on F-7000 FL spectrofluorometer in ethanol at a concentration of 1mg mL^{-1}Calculation of the quantum yield

$\Phi x = \Phi s[As/Ax][Rs/Rx][D/Ds]$

Φ = Fluorescence quantum yield

Subscripts x and s denotes test and standard respectively

R = refractive index of the solvent

D = area under the corrected, extrapolated emission spectra [29].

6. RESULT AND DISCUSSION

6.1 Synthesis of coumarin substituted chromone derivatives

The reaction sequence for title compound synthesis of novel molecule with good yields and developed of new synthetic green strategies with efficient desirable for the synthesis of coumarin substituted chromone.

6.2 Spectral analyses

FT-IR-spectral analysis

The FTIR spectrum Fig shows characteristics absorption stretching frequency correspond to the 1708 cm^{-1} for υ(c=o) coumarin moiety. The fundamental absorption stretch occur at 1569 cm^{-1} belong to υ (c=c) group is shifted to 50-60 cm^{-1} lower wave number region. Generally it is occur at 1660 to 1600 cm but conjugation moves c=c stretch to lower frequency. The most prominent band at 1253 to 1049 cm^{-1} is due to υ (-c-o) stretching of Ester. Ether show strong band in region 1133-1068 cm^{-1} due to stretching in –C-O-O.

^{1}H NMR-spectral analysis

^{1}H NMR spectral analysis as shown in fig1. The doublet at 7.04 and 7.82 (d, *J* = 7.82, 7.04 Hz, 2H), correspond to the aromatic hydrogen. The singlet observes at 6.34 and 6.27 (s,1H) due to alkenes hydrogen the absorption shifted towards higher chemical shift due to high electronegative carbonyl oxygen atom. The chemical shift at 2.43 (s, 3H), and 2.29 (s,3H); appear due to methyl C-H group.

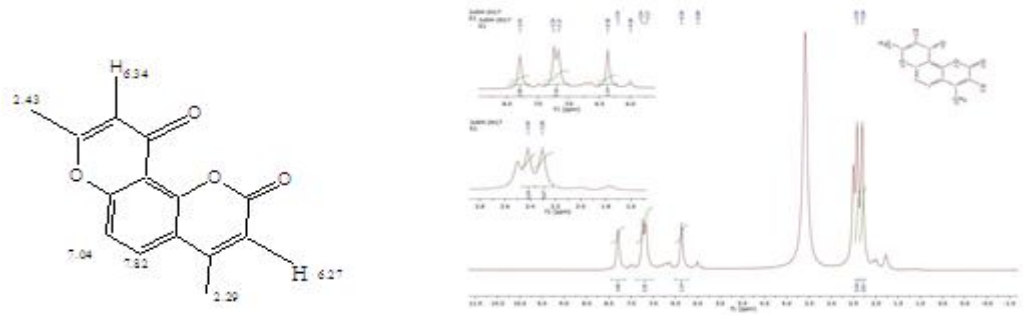

Fig. 1: ^{1}H NMR spectrum of compound

UV-spectral analysis

The absorbance versus wavelength was measured by UV-visible spectrometer for new synthesis coumarin substituted chromone. The graph reveals that synthesized compound a wider transparency range extending into entire visible and absorbance takes place in the UV range 210nm to 325nm.And the cut off wavelength (X cm-off) within the range between 340 to 210 nm in methyl acetoacetate with λ-max was found to be 285nm.This absorbance maximum is to be assigned to $\pi \rightarrow \pi^*$, $n \rightarrow \pi^*$ transition and may be attributed to the excitation in the aromatic ring and C= O group.

Mass- spectral analysis

Calculated-$[C_{14}H_{10}O_4]^+$- 242.22 ; Found-$[C_{14}H_{10}O_4]^+$-242.06.

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6.3 Antimicrobial activity

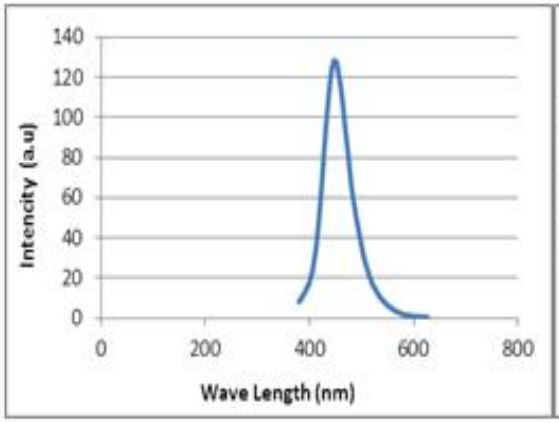
After incubation for 24 hr, samples were analyzed for zone of inhabitation. It was observed that coumarin substituted chromone derivative shows pronoused antibacterial activity in case of gram negative bacteria (*salmonella typhi, Proteus vulgaris, klebsiella pnemoniae, E.schrichia, shigella flexneri*) because it thick, cross link And the gram positive *(Staphylococcus aureus)* less pronoused because of thin cell membrane. Chemically Coumarin substituted chromone are heterocyclic compounds with the benzo-c-pyrone framework. Molecules containing the chromone or benzopyranone ring have a wide range of antibacterial activities.[30] Therefore the vast range of biological effects associated with this scaffold has resulted in the chromone ring system being considered as a privileged structure.[31]

Zone of Inhibition

Salmonellatyphi-16mm (std-27mm), *proteusvulgaris*-24mm (std-29mm), *klesiella pnemonide*-16mm (std-27mm), *E-Coli*-23mm (std-28mm), *shigella flexnari*-09mm (std- 29 mm), *Staphylococcus auseus*-23 mm (std-31mm) [Activity index –std][Zone of inhibition-mm]

6.4 Fluorescent Properties

The studies of fluorescence were performed in ethanol at a concentration of 1.0×10-5 mol/L and the fluorescence quantum yields (Table1) of compounds (1-6) were determined via comparison method. Fluorescence spectra were obtained at their respective maximum excitation wavelength. Coumarin substituted chromone derivatives substituted an electron-donating group were known to exhibit strong fluorescence. the electron donating groups substituted on coumarin will increase the intermolecular electron transfer and thus enhance the fluorescence of coumarin derivatives. The coumarins are extremely variable in structure, due to the various types of substituents in their basic structure, which can influence their optical properties. The electron donating substituent group 1-6 exhibited longer emission wavelength ranging from 378 to 449 nm, where benzocoumarin part served as strong donor to constitute a strong push-pull system to exhibit high fluorescent intensities [32-33]. The fluorescence spectral data of compound [A] and 1-6 are summarized in fig. 1, 2 and 3, 4.



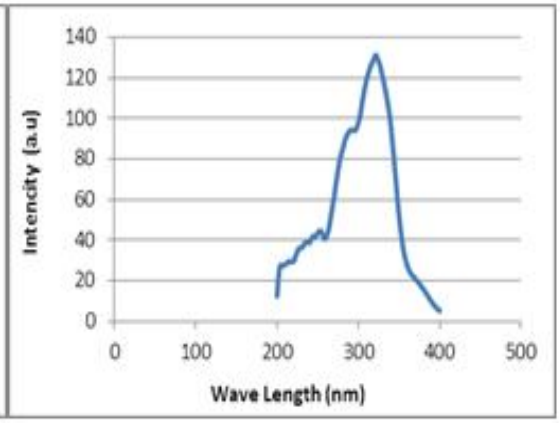
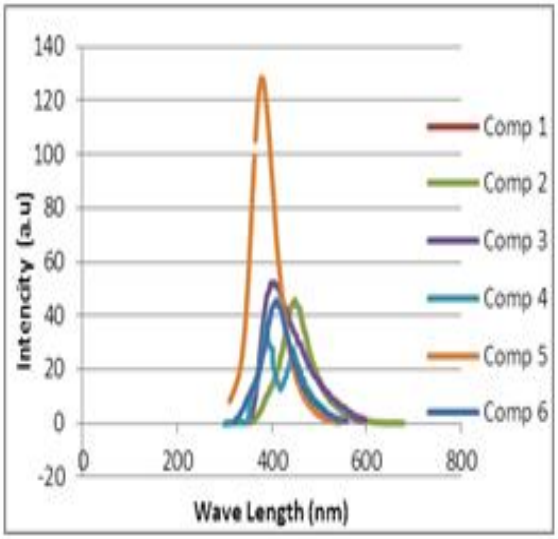


Fig. 1 : Excitation spectra of compound [A] Fig. 2 : Fluorescence emission of compound [A]



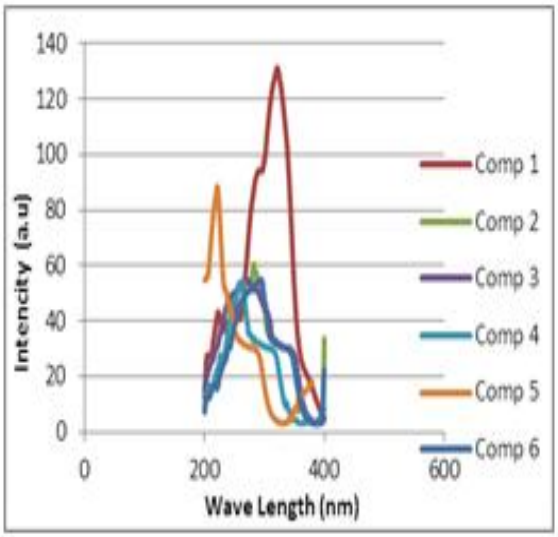


Fig. 3: Excitation spectra of compound 1-6 **Fig.4: Fluorescence emission of compound 1-6**

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Table 1: Electronic absorption (UV λ Max), emission (Em λ Max) and Stoke shifts of compounds (1-6)

No.	Excitation (nm)	Emission (nm)	Stoke shifts (nm)
1	295	449	68
2	282	449	104
3	273	402	102
4	264	386	146
5	221	378	82
6	295	410	71

7. CONCLUSION

In this study we have efficiently synthesized series of Coumarin substituted chromone and structure were confirmed by spectral data performed by IR, NMR, and UV-visible absorption data reflect the extent of electron delocalization. Compound so obtained were further evaluated for their antibacterial activity which show some significant results in case of Gram- negative *(salmonella typhi, Proteus vulgaris, klebsiella pnemoniae, E-coli, shigella flexneri)* bacteria pronoused compared with Gram-positive *(Staphylococcus aureus)* bacteria activity and *proteus vulgaris, E-Coli* which show great activity against synthesized compound as compared to *Salmonella typhi klesiella pnemonide ,shigella* flexnari and gram negative *Staphylococcus auseus* bacteria. The fluorescence properties of the synthesized compounds were studied in ethanol. The results obtained were interesting that the compounds show fluorescent in ethanol with good quantum yield and show high activity

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TRIFOLIUM TOMENTOSUM L., (SECT. *FRAGIFERA*) A NEW ADDITION TO FLORA OF MAHARASHTRA STATE FROM BHANDARA DISTRICT, INDIA

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ABSTRACT
The present paper deals with the taxonomic representation of Trifolium tomentosum L., (Section- Fragifera; Family - Fabaceae) as a new addition to the flora of Maharashtra state from Bhandara district (M. S.), India which is the new type locality for central India.

Keywords: Trifolium tomentosum, new report, Bhandara district, Maharashtra state, India.

INTRODUCTION
Trifolium L., the clover genus, is one of the largest and important genera in Fabaceae family with about 250-300 species having wide distribution in temperate and subtropical regions of both hemispheres (Bisby *et al*., 1994,). The Mediterranean region is very rich in *Trifolium* species (Zohary & Heler, 1984, Baker & Williams, 1987, Lane *et al*., 1997), especially in Turkey where it is widely spread and represented by 103 species (Zohary, 1970). It shows adaption to different agro-ecological regions (Gillet *et al*., 2001; Ellison *et al*., 2006). It is found up as 6000 m in the Himalaya Range (Baker and Williams, 1987).

Genus *Trifolium* L., Sp. Pl. (164. 1753) of family Fabaceae is distinguished from its two: closely allied genera viz. *Medicago* Linn., Sp. Pl. (778.1753) and *Trigonella* Linn., Sp. Pl. (776.1753) by its digitately 3-foliolate leaflets, flowers in distinct heads and pods concealed or scarcely exceeding the calyx against the pinnately 3-foliolate leaflets, flowers in racemes and distinctly exserted pods.

It is represented by l2 species in India as – *Trifolium alexandrium, T. campestre, T. dubium, T. fragiferum, T. hybridum, T. pretense, T. repens, T. resupinatum, T. tomentosum and etc.* Hooker (1876) recorded only 3 species from India and the remaining in the present century. Out of these only two species - *Trifolium alexandrium* L. and *T. repens* L., are enlisted in the flora of Maharashtra state (Almeida MR (1998) & flora of Maharashtra state (Dicotyledons, Vol. II: (Combretaceae to Ceratophyllaceae), Botanical Survey of India; (2001)). This communication give descriptive information on recently collected species *Trifolium tomentosum* L., (Section- *Fragifera*; Family - Fabaceae) as a new addition to Maharashtra state flora and new type locality from the Bhandara district (MS), India which is the new type locality for central India.

During extensive floristic exploration of Bhandara district (Maharashtra state), India, the authors collected an interesting specimen from Pandharabodi village vicinity near to Bhandara city. After its critical microscopic observation and compared with the available relevant references it is identified as *Trifolium tomentosum* L., (Section- *Fragifera*; Family - Fabaceae) which is illustrated as a new addition to the flora of Maharashtra state while report of this species from Bhandara district is the new type locality for the species in central India.

TAXONOMIC TREATMENT OF *TRIFOLIUM TOMENTOSUM* L.
***Trifolium tomentosum* Linn**. Sp. pl. 771. 1753; Hossain in Notes Roy., Bot. Gard. Edinb. 23: 453. l96l; Bhellum & Magotra, A cata. Fl. Pl. Doda, Kishtwar and Ramban Districts, Kash. Himal. 69. 2012. Babu, Ind. For. 95(2):102.1969. Raizada, Suppl. Fl. Upper Gang. Plain 60. 1976. Sharma, Geobios new reports 5:53. 1986; Punj. plants 31,1990.7. *T. fragiferum* sensu Sharma & Kachroo, Fl. Jammu l: 135. 1981 non. Linn.

A diffuse, glabrous, annual herb; stem subterete, decumbent below, ascending upwards; lower leaves long petioled, Leaflets digitately 3-foliolate, l -2 x l-l.5cm, obovate, rounded-truncate-emarginate, acutely denticulate-dentate; stipule l2-l5mm long, with scarious lower halves and adnate to the petiole, ovate-lanceolate; heads axillary, pedunculate, globose, 5-8mm across; peduncles 1-2 cm long, shorter than their subtending leaves, recurved in fruiting; flowers subsessile; calyx 2-3mm long, densely hairy at the back, accrescent and globose in fruit, with1I mm long inwardly bent and hidden upper calyx teeth; corolla purplish 4-5mm long, macroscent, the standard obovate notched; style glabrous; pod ovoid-ellipsoid, 2-seeded, shorter than the inflated fruiting calyx.

Flowering and Fruiting: January to April.

Occurrence: Rare, Uncommon.

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Specimens collected from:- Maharashtra state: Bhandara district, Pandharabodi village open wet area, latitudes 20^0 39' and 21^0 38' North and longitudes 79^0 27' and 80^0 42' East, 17/ 03/2017, J. V. Gadpayale -0104 (Isotype: PGT Department of Botany, Rashtrasant Tukdoji Maharaj University Herbarium, Nagpur, Maharashtra and Department of Botany, S. N. Mor College of Art, Commerce & Smt. G. D. Saraf Science College, Tumsar (M.S.), India- 441 912.

Distribution: Native of Europe naturalized elsewhere.

Critical note: The occurrence of this taxon in India was first reported by Babu in 1969 from Dehra Dun (U.P.) and subsequently from upper Gangetic plains by Raizada and from Punjab by Sharma in 1986. H.S. Kirn Sid B.K. Kapahi have done the revisionary work on Trifolium species of Jammu & Kashmir area where they critically innumerate the characters of T. tomentosum which are wrongly identified by the early taxonomic workers as B.M. Sharma from Talab Tilo and Ajay Swami from Udhampur city. It differs from *T. fragiferum* L. in its annual habit, peduncles shorter than the subtending leaves (l-2 cm in length), recurved in fruit, and globose heads against perennial habit, peduncles erect, exceeding the subtending leaves (10-15 cm long), while from *T. resupinatum* Linn., in having peduncles shorter than the subtending leaves, globose heads and globose inflated fruiting calyx with inwardly recurved upper teeth against peduncles longer than the subtending leaves, star shaped heads and pyriform inflated fruiting calyx with distinctly exserted and divergent upper teeth.

FIGURE 1.

Photograph of *Trifolium tomentosum* L.

A. Plant with fruiting in Habitat.

B. Inflorescence.

C. Root nodules on root system.

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REPORT OF A NEW FOSSIL DICOTYLEDONOUS SEED *Singhpurospermum deccanii* gen et, sp. nov. FROM THE DECCAN INTERTRAPPEAN BEDS OF SINGHPUR, MADHYA PRADESH, INDIA

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ABSTRACT
*A fossilized Dicotyledonous Seed is reported from the Hills of Singhpur, Madhya Pradesh, India. Small ovoid unitegmic seed is measuring **3.8 mm × 2 mm in size**. Seed cavity oval in shape and shows broad seed coat which measures **90 µm** in thickness differentiated into outer single layered epidermis, middle, and inner layer, embryo well preserved with two cotyledons measuring **1.2 mm** length & **0.2mm** breadth in size. Endospermic tissues are seen. This fossil seed is found at very famous locality of Madhya Pradesh, Singhapur. So it named as **Singhpurospermum deccanii** et sp. nov.*

Keywords:Deccan,Intertrappean, Dicotyledonous Seed,

INTRODUCTION
The present investigation deals with a study of fossil dicotyledonous seed from the Deccan Intertrappean Beds of Singhpur, Madhya Pradesh, India. So far few seeds have been reported from the different fossliferous localities of Deccan Intertrappean beds of India. They are ***Clusiocarpus arillatus*** (Kumar, 1984), ***Clusiocarpus indicum*** (Wazalwar 1990), ***Unonaspermum corneri*** (Bonde, 1993) from Nawargaon, ***Deccanosperma allirata, Ramakonospermus chitaleynsis, Mahabalespermum minutum*** (Juneja, 1993) from Ramakona locality, ***Ramakonospermus singhpurii*** (Bhowal, 2003).In addition to these seeds monocotyledonous **phoenicoid seed** is reported from Pisdura, Maharashtra by Ambawani and Dutta (2005). So the present report of new dicot seed from Singhpur is noteworthy contribution to the knowledge of fossil seeds.

MATERIAL & METHOD
The present seed was exposed on fossil chert in longitudinal view. Serial peel sections were taken without grinding the material. Peels were mounted in Canada balsam and studied. Camera Lucida sketches were drawn for its detailed study.

DESCRIPTION
The seed shows unitegmic seed coat and large embryo (Plate I. Figs. 1, 2, 3; Text Figs.1, 2, 4). It is ovoid in shape measuring **3.8 mm** in length and **2 mm** in breadth showing stalk like structure at the base with a slit which might be representing micropyle. The seed coat is unitegmic having outer integument only. The embryo is very large and occupies the maximum space of the seed cavity (Plate I. Figs. 1, 2; Text Figs.1, 2). The seed coat is well preserved but not differentiated into testa & tegmen, tegmen is ill preserved consisting of testa only. It is broad at the upper region (Plate I. Figs. 1, 2, 3, 4; Text Figs.3). Testa is differentiated into two distinct zones (Plate I, Fig.4; Text Figs.3).

Outer zone -This is **20 µm** in width**,** outermost limiting layer made up of thin walled epidermal cells. **Inner Zone -**This inner zone is made up of 4 - 5 celled regions. The cells are thick walled, penta & hexagonal in shape. The width varies from **60 µm to 62.85 µm.** The lower part of the inner zone consist of a 2 to 4 cells, which also very well arranged, the width of the region varies between **5 to 7 µm**. These cells at some places appear crushed; there is no differentiated tegmen. The embryo is well differentiated into three parts, two cotyledons, long hypocotylar region and narrow radical (Plate I Figs.1, 2; Text Fig.4). Embryo occupies the maximum space of seed cavity. In between wall of the seed and embryo there is a space around, in this region some thin walled cells are seen. The two cotyledons are present in the seed. The cotyledons are flat and measures ***1.2 mm** length & **0.2 mm** breadth.* As compared to cotyledons and hypocotyl, the radical is narrow. Suspensor is not seen. Surrounding the embryo there are thin walled parenchymatous cells which represents the tissue of endosperm.

DISCUSSION & COMPARISON
On the basis of above description seed has certain peculiar characters, which are considered for the identification of seed like seed is small in size, ovoid in shape measures about **3.8 mm × 2 mm.** Seed coat unitegmic showing presence of testa only. Testa shows outer epidermis, middle zone made up of 4 - 5 celled regions. The lower part of middle zone shows well arranged elongated, cells, some are crushed, Split seen in the seed coat region forming micropyle. Endosperm is preserved. Embryo is well preserved, it has two cotyledons. Suspensor is not present.

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All these characters are of great help in the identification of seeds and find its affinities with seeds of living families.

According to Eams (1961) there is a greater reduction of suspensor in angiospermic embryo. In the present fossil seed also, suspensor is completely absent.The most important characters helpful in the identification of seed are unitegmic seed coat. Testa is differentiated into unspecialized squarish parenchymatous epidermal layer; middle layer of the testa is also not specialized made up of pent-hexagonal cells.

The studied fossil exhibits certain characters of exotestal seed like the testa have no mechanical tissue as their inner tissues are generally crushed by endosperm or embryo (Corner, 1976).The fossil seed shows embryo with two cotyledons, hypocotylar region, narrow radical and absence of suspensor. These characters confirm that the seed under investigation is an angiospermic and dicotyledonous in nature which is derived from anatropous ovule. Seed is exarllate. Embryo is large with little endosperm.

After going through the available literature, the standard books of taxonomy and embryology by Rendle (1956); Maheshwary (1950); Hutchinson (1959); Eams (1961); Fahn (1974) were used, and most useful among all by Corner (1976), was of great help in resolving the problem of systematic position of the seed.

Corner (1976) has mentioned 105 families having unitegmic seeds, we have considered some families showing unitegmic seeds with anatropous ovule like *Apocynaceae, Alangiaceae, Bignoniaceae, Boraginaceae, Companulaceae, Compositeae, Loganiaceae, Martyniaceae, Pedaliaceae, Pittosporaceae, Sapotaceae, Solanaceae, Verbenaceae, and Convolvulaceae etc.*

Out of these fossil seed shares most of the characters of Pedaliaceae, Martyniaceae, and convolvulaceae. In Pedaliaceae, ovules are anatropous, seeds are unitegmic, seed exotestal, exarllate, testa shows presence of palisade, endosperm cellular and embryo is straight. But,they are quite different from the present seed in minute details like outer integument in seeds of Pedaliaceae is of thick walled lignified cells which are thin walled and parenchymatous in fossil seed. The seeds of Martyniaceae, also have anatropous ovule, unitegmic seed coat, exarllate seed, endosperm cellular and embryo straight like in fossil seed. But in family Martyniaceae testa is reduced to a sub gelatinous pellicle of large thin walled or sclerotic cells which are not seen (Corner, 1976) in fossil seed. Thus fossil seed differs from the seeds of Martyniaceae. The fossil seed resembles the family Convolvulaceae (Corner, 1976) which is widely distributed in tropical and subtropical regions (Hutchinson, 1959, Rendle, 1938) in bearing anatropous ovule with unitegmic seed coat, exarillate seed but the seeds of Convolvulaceae show mesophyll tissue the seed coat and hence it does not correlate with this family.

From the above it is clear that fossil seed does not show close resemblance with any family but it shows some resemblances with seeds of family **Martyniaceae** with minute differences.

The fossil seed under investigation is also compared with earlier reported fossil seeds. The previously reported seed ***Clusiocarpus arillatus*** (Kumar, 1984) and ***Clusicioarpus indicum*** (wazalwar, 1990) differs in having aril. When compared with ***Ramkonospemum chitaleyensis*** (Juneje, 1993) present fossil shows dissimilarities in not having bitegmic seed, embryo in former is curved and convolute which is straight in present specimen. ***Deccanosperma arillata*** (Juneja, 1993) differs in having arillate and bitegmic seed. ***Mahabalespermum minutum*** (Juneja, 1993), ***Ramakonospermum singhpurii*** (Bhowal, 2003) differs from present seed in possessing bitegmic seed.In ***Unonaspermum corneri*** (Bonde, 1993) is also different from present seed in possessing bitegmic ellipsoidal seed with ruminate seed coat .Ambwani and Debi Dutta (2006) have reported ***Phonecoid seed*** from dinosaurian coprolite at Pisdura in Chandrapur district. It cannot be compared with present seed, as it is monocotyledonous.

Thus it is the record of unitegmic seed from the Deccan Intertrappean beds of Singhpur. As it is different from all other seeds previously reported seeds and also do not show resemblance with the seeds of any species of living families, hence named as ***Singhpurospermum deccanii*** gen et, sp.nov.

Holotype: M.P.N./ S1 Department of Botany, Institute Science, Nagpur

Locality : Singhpur, M.P. India

Horizon : Deccan Intertrappean series of Central India.

Age : Upper Cretaceous.

Explanation of Plate I, Figs.(1 to 4), Figs.1 to 2: showing complete seed with embryo,Fig. 3: showing well developed embryo, Fig.4: showing seed coat.

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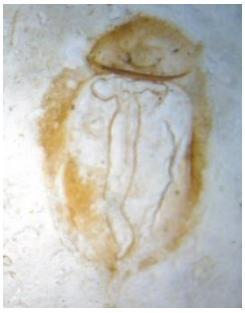


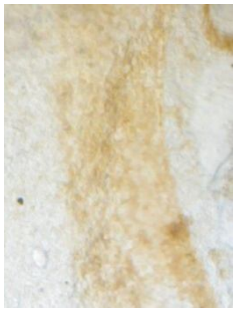



Fig. 1 Fig. 2 Fig. 3 Fig.4

Explanation of Text Figures 1 to 4, Text Figs. 1-2: showing well developed embryo in the seed, showing complete structure of seed with seed coat and embryo, Text Fig. 3: showing cellular details of seed coat cells well preserved hexagonal and pentagonal cells. Text Figs.4: showing a Dicot embryo with two lobes.

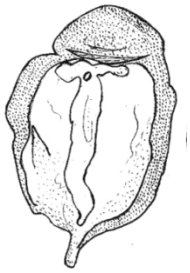
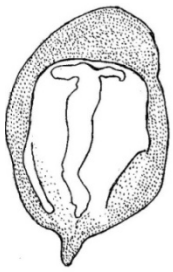
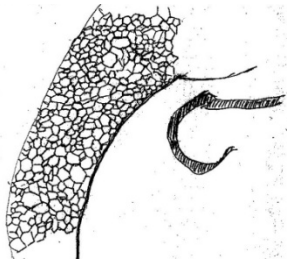
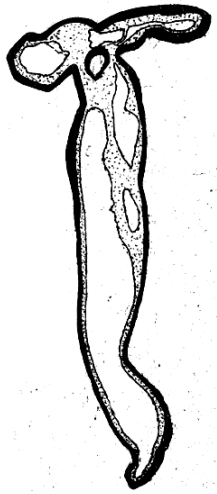




Fig. 1 Fig. 2 Fig. 3



0.1 mm
Fig. 1, 2

1 mm
Fig. 3, 4

Fig. 4

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QSAR AS COMPUTATIONAL METHOD: MODERN TOOL OF DRUG DESIGN

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ABSTRACT
The application of quantitative structure–activity relationships (QSARs) has significantly revolutionised the whole process of drug discovery. QSAR models eases out the calculation of physicochemical properties (e.g., lipophobicity), the prediction of biological activity (or toxicity) of the potential drug molecule. It also predicts very well the absorption, distribution, metabolism, and excretion (ADME). QSAR has the most significant application in the preclinical stages of the drug discovery as this stage involves tedious work with high cost of experimentation. QSAR narrow downs and filter large chemical databases, and select suitable drug candidates. This article presents some current challenges and applications for the discovery and optimization of drug candidates based on QSAR methodology.

Keywords: QSAR, Drug design, New chemical entities (NCEs), ADME.

INTRODUCTION
Discovery and development of a new drug is an expensive and time consuming process. The therapeutic effects and hazards of the discovered drugs to health are assessed by *in-vivo* tests and by various experimental techniques. However, involvement of animal models raises ethical questions. Therefore, alternative methods are being developed to for drug testing. *In-silico* methods offers alternative path due to their lower cost. They offer significant contribution to the identification and development of effective drugs from new chemical entities (NCEs). The computational tools are principally used for

- Conformational analysis of molecular structure (e.g., molecular dynamics)
- Characterization of drug–target interactions (e.g., molecular docking); and
- Assessment and optimization of drug activity using quantitative structure-activity relationships (QSARs).

QSAR methods are useful evaluating physicochemical features, physico-chemical properties and biological effects which govern a biological response in drug design. As a result, QSAR has emerged as low-cost tool filtering out novel "hits" and for "lead" optimization which is important process of drug discovery and development. The foundation of modern QSAR was laid by Prof. Corwin Hansch and co-workers during the early 1960s[1]. Since then, various QSAR models have come into existence for understanding of biological and physicochemical properties of NCEs and their evaluation. This emergence of QSAR for design and development of new drugs is evident by the cascade of publications and QSAR-based software. The aim of this article is to signify the application of QSAR in drug design.

PRECLINICAL PHASES: FROM NEW CHEMICAL ENTITIES (NCES) TO DRUG CANDIDATES
To ensure the therapeutic effect and the safety of the new chemical entities (NCEs), the benefits (therapeutic effects) and the risk (toxic effects) of the NCEs are evaluated, respectively, during the preclinical and the clinical phases of development[2,3]. For a particular disease state once the target has been validated, relevant data is gathered in the preclinical drug development in order to propose a drug candidate for clinical test. Using *in-silico, in-vitro methods* and animal models, the pharmacological profile and the acute toxicity of the drug candidate are assessed during the preclinical stage. Figure 1 present the three-stage procedure allowing the selection of the most effective NCEs (the drug candidates).

Stage 1: Hit idetification
This stage aims to identify "hit" compounds from diverse libraries (corporate, commercial, etc.) and/or by medical observations for a given target (receptor, enzyme, etc.). Various techniques like high-throughput screening (HTS) and *in-silico* evaluations are used to screen NCEs with suitable pharmacodynamic (PD) activity. The PD properties of a given molecular entity are defined as the physiological and biochemical effects of the entity on the body.

Stage 2: Lead identification
This stage is a key milestone of the drug candidate discovery process. The pharmacokinetic (PK) properties govern the bioavailability of the NCEs and, therefore, the correct delivery of the drug to its target site. The PK properties are represented by the processes of absorption, distribution, metabolism, and elimination (ADME) under-gone by the NCEs in the organism. During this stage, "hit" molecules presenting good ADME and physicochemical properties are identified and taken further as lead compounds.

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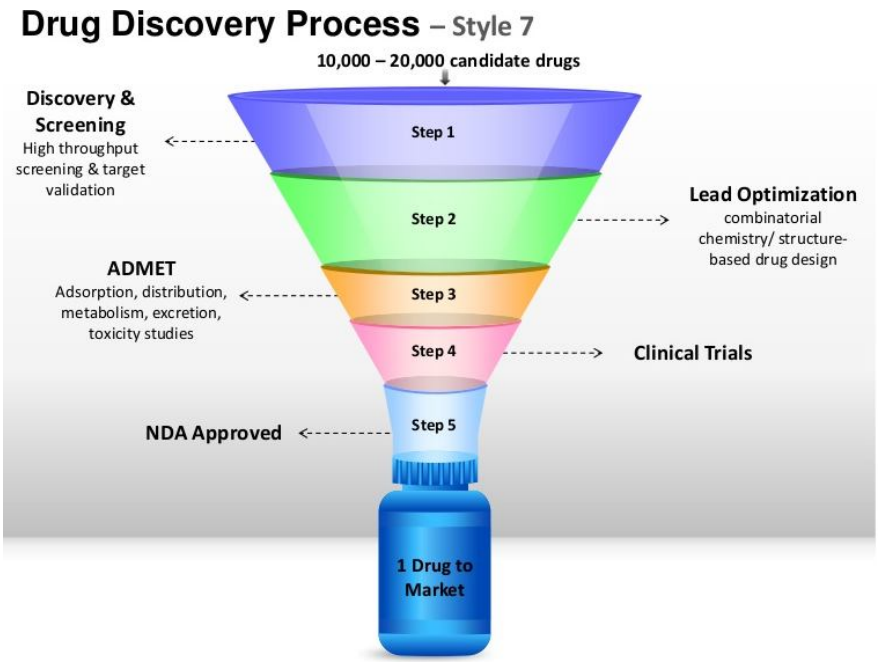

Figure 1: Strategy for a validated pharmaceutical target. Drug candidates are selected following various stages of development: (1) the selection of "hit" compounds, (2) the optimization of "lead" compounds, and (3-5) the choice of the drug candidates

Stage 3: Lead Optimization

This stage involves the evaluation of various properties of lead analogs in order to propose the drug candidates. Accordingly, lead's molecular scaffold is modified to generate lead analogs. Then the drug candidates are selected based on the chemical structures with the optimal potency, solubility, and ADME profile. QSAR and molecular docking have a major role to play in selecting strategies for lead finding and optimization. Once the preclinical phase is complete, the selected drug candidates can be subjected to phases I, II, and III of clinical development.

DRUG DISCOVERY PROCESS: A TIME CONSUMING PROCESS

Simple rules of thumb, such as the "rule of 5" (also known as Lipinski's rules can be used to filter molecules which are likely to be only weakly bio available. However, experimental evaluation can be time consuming, expensive, or be subject to ethical barriers. In this context, QSAR methods analyses allow the identification of the structural and physicochemical features modulating the activities of compounds.

Thus QSAR method by passes the cumbersome process of laboratory work of optimizing the drug candidate directly gives the potential drug molecules for the preclinical analysis. Figure 2 represents the time involved in the drug discovery process and impact of QSAR in drug design.

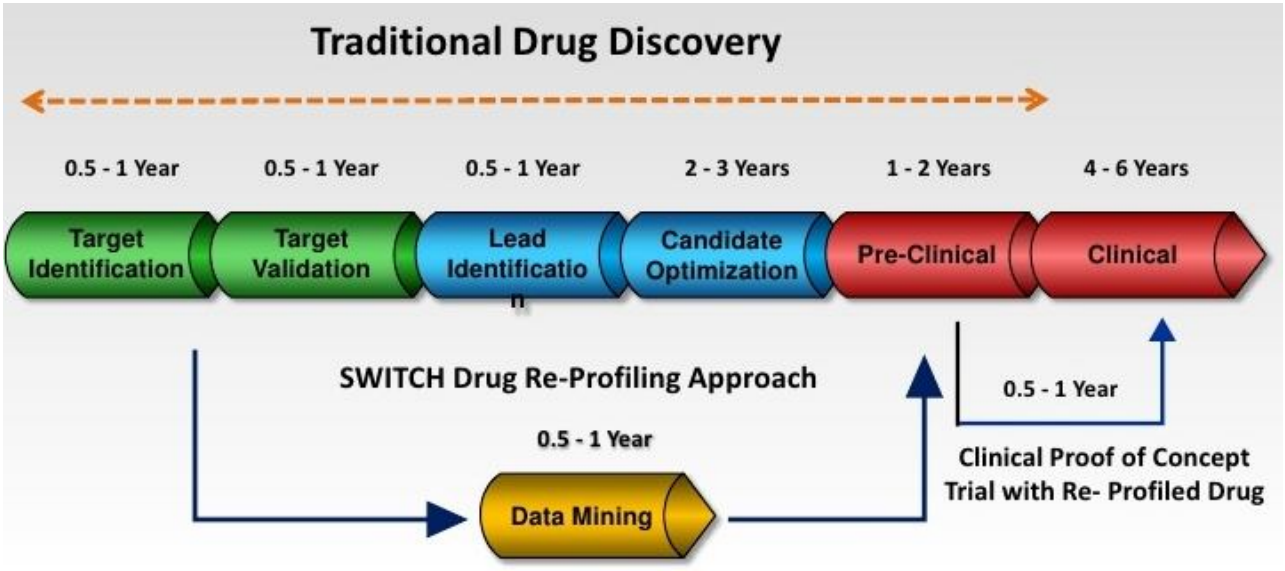

Fig2: Impact of QSAR methodology in drug design and discovery process.

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REASONS FOR FAILURE IN DRUG CANDIDATE DEVELOPMENT

The development of a typical drug may cost up to one billion US dollars and 10-15 years of time. Even though after applying stringent procedure and substantial financial investment of drug development tested in the preclinical phase, out of 5000 molecules, only one reaches the market[4]. Kennedy et al.[5] have studied the factors which cause failures during clinical assessments (Figure 3). Insufficient pharmacokinetic properties (39%), lack of efficacy (30%), toxicity in animals (11%), and adverse effects to man (10%) are the major reasons to explain the exit of molecules in pharmaceutical research. Poor ADME properties are major cause of failure during drug development[6,7].

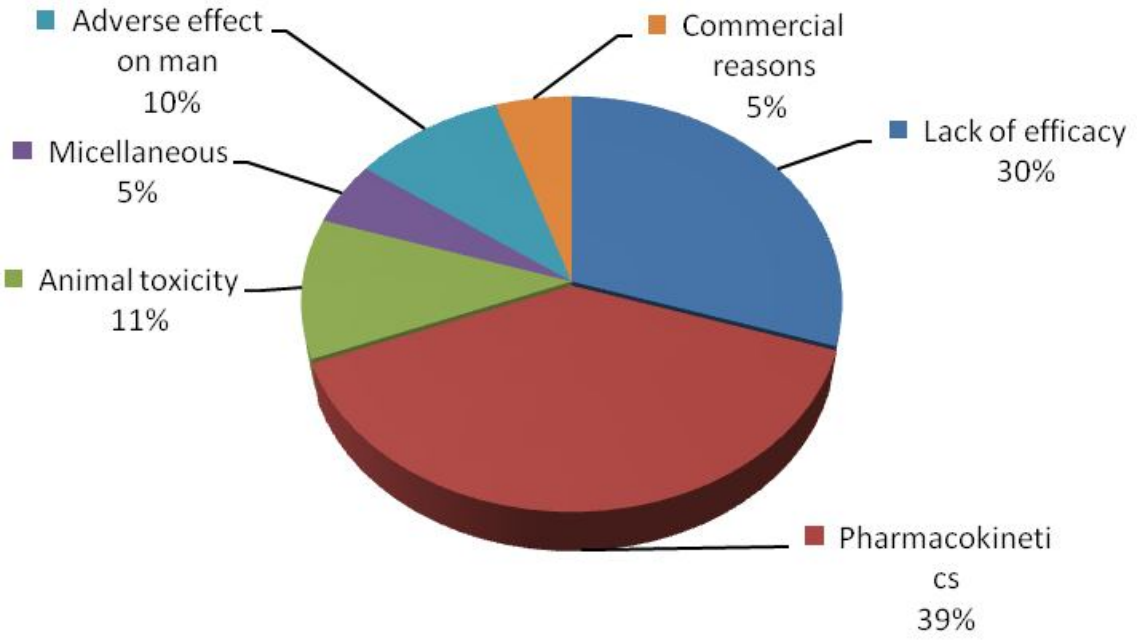


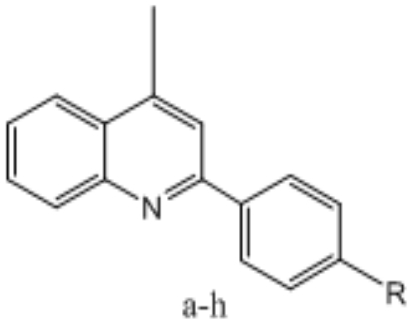
Figure 3: Reasons for the failure of the development of NCEs in clinical development[5]

To address ADME and potency during the early phase of drug discovery and development, numerous computational tools, have been proposed[8–10].These tools vary from very trivial "rules of thumb," e.g., Lipinski's rule of 5[11] to more complex and multivariate QSAR models, which includes the use of models based on neural networks[12,13].

QSAR PROCESS

DEVELOPMENT OF TRAINING AND TEST SET

The first step in deriving a QSAR model is to gather and select the molecules with activity data to include in the training set and test set. The resulting information can be downloaded in different formats (e.g., SMILES, sdf file, txt file). Using the QSAR methods, Chourasia et al[14] designed and evaluated a series of 4-methyl-2-(p-substitutedphenyl) quinoline derivatives as potential antifungal agents. The general structure of the synthesized quinoline derivatives is shown in figure 4.



R= -H,-CH_3,-OCH_3,-OH,-NO_2,-Cl,-Br,-COOH

Fig 4: Structure of the synthesized test set quinoline derivatives

Various physicochemical descriptors like constitutional, molecular, steric, and electronic were calculated by the Datawarrier[15] Software .The descriptors used to develop the model are listed and described in the Table 2.

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Table 2. Descriptors used for the training and test set

S. No.	Descriptor used	Symbol
1	Total Molweight in g/mol; natural abundance	**TMW**
2	cLogP; P; conc(octanol) /conc(water)	**cLogP**
3	Total surface area(from polar and non-polar SAS Approximation)	**TSA**
4	Druglikeness	**Drug**
5	Lipophilic Ligand Efficiancy (LLE)	**LLE**
6	Ligand Efficiency Lipophilic Price(LELP)	**LELP**
7	Molecular shape Index	**MSI**
8	Rotatable Bond Count	**RBC**

REGRESSION ANALYSIS

Using the calculated descriptors multiple linear regressions were performed using the software SPSS[16] by stepwise method. The best model derived from the regression analysis was used to predict the biological activity of the synthesised compounds. No outliers have been determined and the equations were derived using the entire training data set (n=30). The summary of the model generated is given in the Table 3.

Table 3. Summary of the QSAR model generated by the regression analysis

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	0.762	0.580	0.420	0.9830729	2.296

Predictors: (Constant), Rotatable_Bonds, Total_Surface_Area, Druglikeness, Shape_Index, Total_Molweight, LLE, cLogP, LELP

Dependent Variable: Reported activity

VALIDATION TEST

The equations 1 and 2 are generated by the model. The equations, then, were used to calculate the unknown activities of the test set compounds.

QSAR model for A. Niger

Biological activity (ZOI) = (18.354)+ (-0.007* **TMW**)+ (4.359***cLogP**)+(0.132* **TSA**)+ (0.315*Drug)+ (2.963***MSI**)+ (-0.419***RBC**) -------- eq. (1)

QSAR model for C. Albicans

Biological activity (ZOI) = (18.354)+ (-0.007* **TMW**)+ (4.359***cLogP**)+(0.132***TSA**)+ (0.315*Drug)+ (2.963* **MSI**)+ (-0.419***RBC**) --------- eq. (2)

Using the equations, the predicted antifungal activities of the synthesized test set quinoline compounds were calculated. This gave the predicted antifungal activity of the test set compound with unknown activity. Had conventional method of synthesis and determination of the antifungal activity being applied, it would cost money and time for the same pocess.

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IN-VITRO ANTIMICROBIAL ACTIVITY

Once the QSAR predicted activity of the test set quinoline compounds are determined, the model has to be validated by comparing the predicted activities with the experimental ones. For this standard method were applied and the *in-vitro* antifungal activities of the synthesized test set quinoline compounds were determined. Figure 5 gives a comparative account of the predicted and experimental activities.

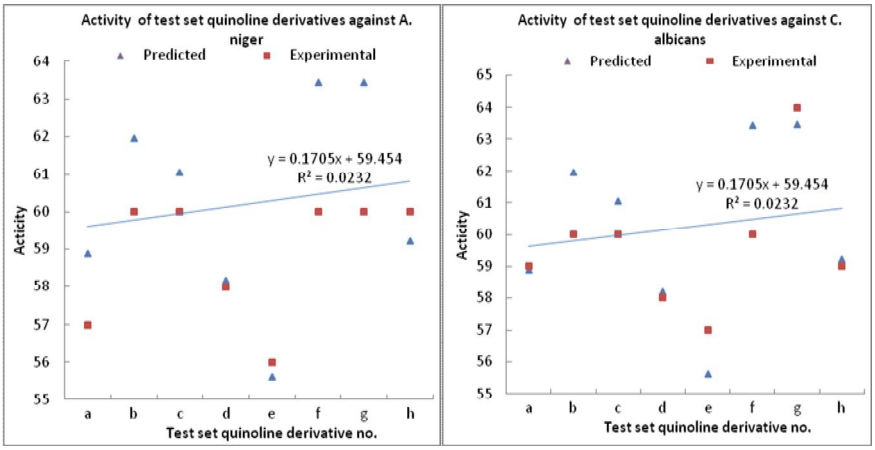

Fig. 5: Comparison of predicted and experimental antifungal activities of the synthesized test set quinoline compounds

A set of 8 quinoline compounds were developed and a comparative study of the predicted and experimental activities was made. It is clear from the graph that the *in-vitro* antifungal activities are close the predicted activities. This itself validates the generated QSAR model

RESULT AND DISCUSSION

The predicted and experimental antifungal activity for the synthesized test set quinoline compounds have been found in good agreement. A low value of R^2 suggest that the descriptor used for the model are significant and show little co-relation with one another. This validated the generated QSAR model and hence it can be used to predict the antifungal activities of the other quinoline derivatives with unknown biological activity.

CONCLUSION

The generated QSAR model in this case offers an alternative quick and economic path for the pre-clinical phase i.e. target validation, lead identification and lead optimization in the drug discovery process.

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MECHANISM OF ENERGY TRANSFER FROM CE3+ IONS TO DY3+ IONS IN OXIDE BASED PHOSPHORS

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ABSTRACT
Rare earth doped (Ce3+ ions and Dy3+ ions) Y2SiO5 and Sr2CeO4have been prepared by precipitation method.Tunable color emission between Ce3+ - Dy3+ due to co-operative energy transfer is observed in prepared sample under near UV excitation. X-ray diffraction pattern are taken for phase purity and to calculate crystalline size and lattice parameter of prepared sample. Detail photoluminescence properties of prepared sample have been studied to understand the effect of co-doping on absorption and emission spectra. Increase or decrease in intensity of emission spectra has been explained by analyzing energy level diagram. The efficient energy transfer phenomena are explored in Ce3+ - Dy3+ co- doped Y2SiO5 and Sr2CeO4 phosphors.

Keyword: Y2SiO5 and Sr2CeO4, PL, ET between Ce3+ and Dy3+.

1. INTRODUCTION

Today white LEDs are fabricated by UV- LED chips coated with white light emitting single phase phosphor or RGB tri color phosphors, owing to the invisible emission of the UV-LED chip. And to give proper energy dispersion in the visible region co-doping activators are added in single phased white light emitting phosphors such as Eu2+-Mn2+ at Ba3MgSi2O8 and SrZn2(PO4)2 etc.[1-3].For this purpose a tunable color emission should takes place in oxide based phosphors. In present work we introduced Y2SiO5 and Sr2CeO4phosphors with doping and co-doping of rare earth (RE) ions were tunable color emission takes place between Ce3+ - Dy3+ due to co-operative energy transfer[4].This co-operative energy transfer attributed to large overlap between in Ce3+ ions emission band with excited level of Dy3+ ions due to crystal – field splitting of 4f – 5d band in different crystals[5].Here detail study of photoluminescence (PL) properties of prepared samples have been given and the efficient energy transfer phenomena is explored in Ce3+ - Dy3+ co- doped Y2SiO5and Dy3+ ionsdoped Sr2CeO4 phosphors. Since emission of Dy3+ doped in hosts is mainly located in blue and yellow under the excitation of UV light (from 340-400 nm) and luminescence in multiple wave bands of Dy3+ makes it be a potential candidate of the phosphor for w-LED applications. The main objective of this work is to observe the crystal structure and co-operative energy transfer between Ce3+ - Dy3+ ions by analyzing photoluminescence spectra of Y2SiO5 and Sr2CeO4 nanocrystalline phosphor with doping and codoping RE ions for solid state lighting. With this view, the prepared powder has been characterized by, X-ray diffraction and photoluminescence spectroscopy.The mechanism of energy transfer from Ce3+ to Dy3+ was determined to be a dipole–dipole interaction in BaZn2(PO4)2 phosphors when prepared via a high temperature solid state reaction route[6,7]. This types of energy transfer also observed in polycrystalline CaSO4 prepared by co-precipitation method and in YAl3(BO3)4 (YAB) phosphors prepared by solid-state reaction method[8].

2. EXPERIMENT

The starting raw materials used for the synthesis of rare earth doped Sr2CeO4 and Y2SiO5 phosphor by precipitation method are Y2O3(99.99%), Dy2O3(99.99%), Ce(NO3)3 (99.99%) , SiO2(99.99%),Sr(NO3)2 (99.99%), and Oxalic acid.precipitation method are ammonia. To prepare Sr2CeO4, we dissolved rare earth and Sr(NO3)2 in Dy2O3 dilute HNO3 (AR) to make nitrate solution and heated till transparent solution is obtain at 900C near by half hour with continuous stirring. To make this nitrate solution we use stoichiometric ratio of starting material.

Then oxalic acid (dehydrated) was dissolved in double distilled water and heated for 15-20 minute, with continuous stirring till transparent solution is obtained. The solution of oxalic acid was aided drop by drop in above mixture. Mixture was well stirred till the precipitatewas obtained. Here oxalic acid to metal nitrate is kept in the ratio of 3:1. Then few drops of ammonia solution are added in above precipitate till to maintain PH value below 5. Obtain precipitated was filtered out using double filter paper with washing by distilled water several times and then it kept at 900C on hot plate for half an hour for drying. The dry precipitate was annealed at 8000 C for 2hr, to obtain single phase and to remove organic impurities. Similar method is adopted to prepare rare earth doped Y2SiO 5 phosphor.

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3. RESULTS & DISCUSSION 3.1 XRD RESULTS

Fig.(1) shows XRD pattern of Y2SiO5, Y2SiO5:Ce3+ (1 mol%) ,Dy3+ (1 mol%) prepared by precipitation method, aftersintering at 9000C, which conformed by comparing with the diffraction data with JCPDS card no. 21-1456. These results show that the pure phase of Y2SiO5 is obtained which crystallizes in the monoclinic X1 –type. The average grain size of the particles of powder samples were calculated using Scherrer's equation. The average grain size of the Y2SiO5 with small concentration of RE is 50 nmand Fig. (2) shows XRD pattern of Sr2CeO4 and Sr2CeO4:Dy3+=1m% prepared by precipitation method, after sintering at 8000C for 4h. The structure of Sr2CeO4 is well matched with triclinic XRD pattern, which agrees by comparing with previous research works of B. Walter Ratna Kumar et al. [9] and Jiang et al. [10], the peaks completely match with the joint committee on powder diffraction standard (JCPDS) card No.22-1422[11].

We see that by doping small percentage of RE, positions of all peak and their total numbers remain unchanged in both samples, thus doping of RE in very small fraction doesn't change the pure phase. All diffraction patterns were obtained using CuKáradiation (ë= 1.5406 A°), at general setting of 45 kV and 40 mA. Measurements were made from 2è= 10° to 90° with steps of 0.017° keeping scan step time=25.196 second.The average grain size of the particles of powder samples were 98 nm, calculated using Scherrer's equation

$$D = \frac{0.9\,\lambda}{\beta \cos\theta} \quad \text{.....(1)}$$

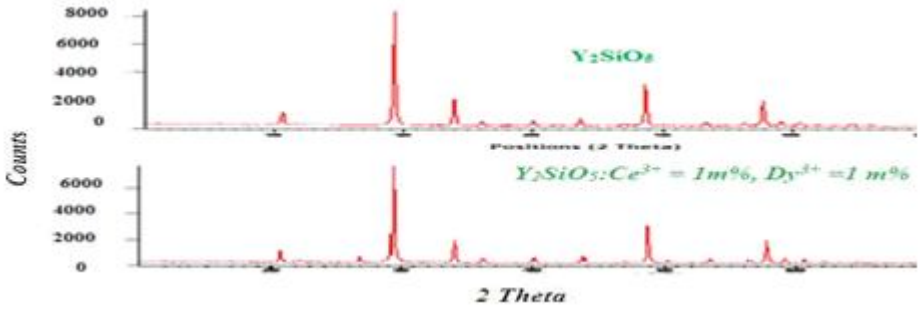

Fig.1: XRD pattern of Y_2SiO_5 and Y_2SiO_5:Ce^{3+} (1mol%), Dy^{3+}(1mol%) prepared by Precipitation method.

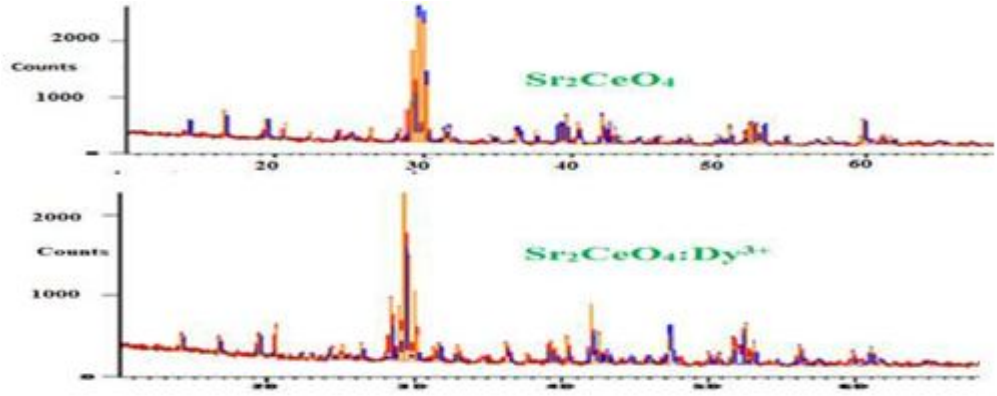

Fig.2: XRD pattern of $Sr_2CeO_4$and Sr_2CeO_4:Dy^{3+}=1m% at 800^{0}C prepared by Precipitation method after sintering for 2 hr.

Where â represents the full width at half maximum (FWHM) of XRD lines, ëis X- ray wavelength and è is diffracting angle. The computer program POWD (an Interactive Powder Diffraction Data Interpretation and Indexing Program, Version 2.2) was used to calculate lattice and volume of unit cell for both sample are as shown in table (1).

Sr. No.	Sample	Lattice Parameter			Volume of unit cell (nm3)			Crystal structure
	a (nm)	b (nm)	c (nm)	(degree)		(degree)		(degree)
1	*Sr2CeO4*	88	97.5	103	90	98	90	875139.5	Monoclinic
2	*Y2SiO5*	41	46	60	88	77	102	110062	Triclinic

Table.1: Lattice parameter, unit cell volume and crystal structure of Sr2CeO4 and Y2SiO5 powder.

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3.2 PL Results of $Y_2SiO_5:Dy^{3+}/Ce^{3+}$ (Dy^{3+}= 1 mol%)

Emission spectra of $Y_2SiO_5:Dy^{3+}$, (Dy^{3+} = 1 mol%) with different concentration of Ce^{3+} ions under exciting wavelength 364 nm are as shown in fig.(3). From fig.(3) we see that The PL emission intensity of $Y_2SiO_5:Dy^{3+}$, (Dy^{3+} = 1 mol%) sample is found to be affected by Ce^{3+} doping concentration. Optimum intensity was obtained at a doping concentration of 1mol% of Ce^{3+} to yttrium, after that we reported the luminescence quenching for $Y_2SiO_5:Dy^{3+}$. This quenching process is attributed to the energy migration among the activator cerium ions which bring excitation energy to the nearby quenching centers (traps), when different concentration of Ce^{3+} ions are added in $Y_2SiO_5:Dy^{3+}$= 1 mol%. The variation in PL emission intensity of $Y_2SiO_5:Dy^{3+}$=1mol % with different concentration of Ce^{3+} ions under NUV excitation are shown in fig. (4):

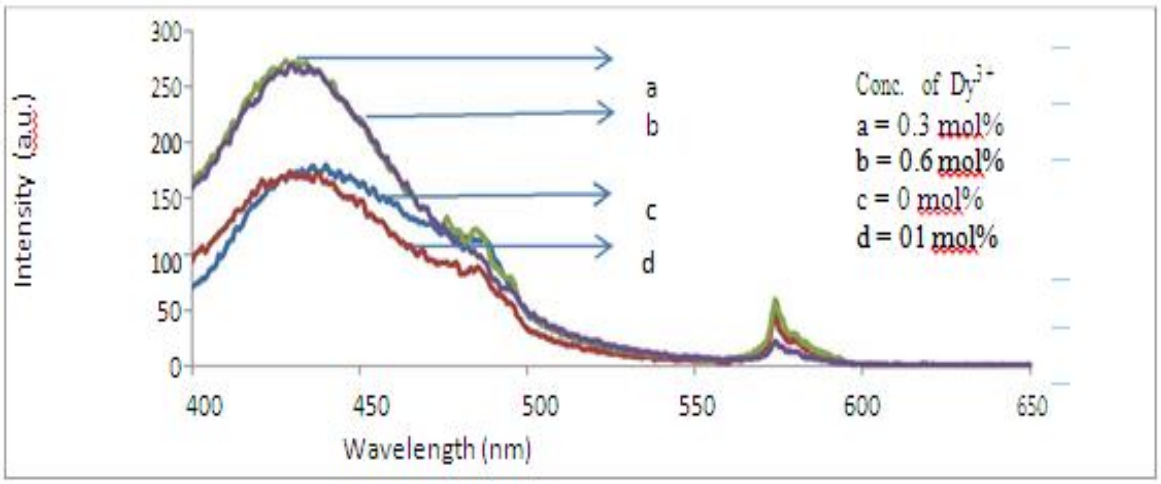

Fig.3: Emission spectra of $Y_2SiO_5:Dy^{3+}$=1mol % with different concentration of Ce^{3+}under 364 nm

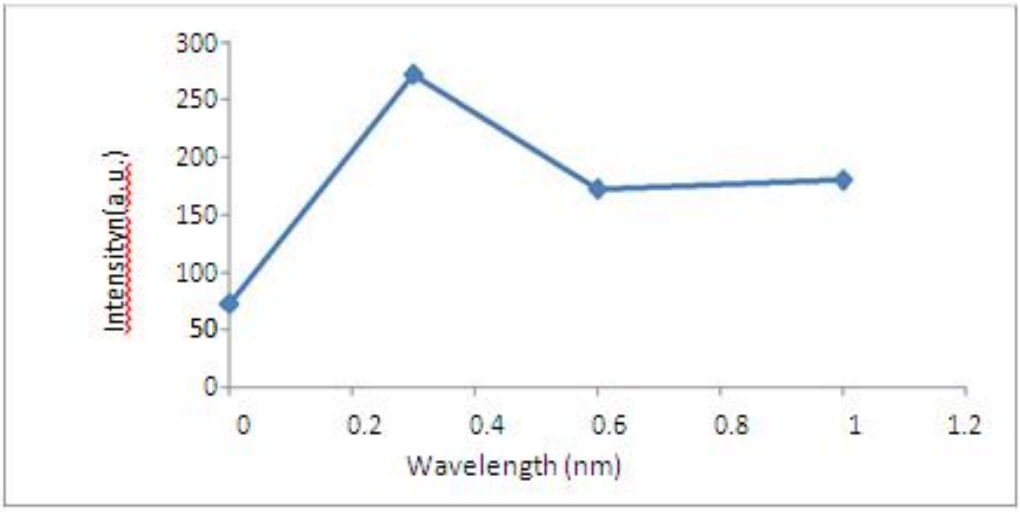

Fig.4: The variation in intensity of $Y_2SiO_5:Dy^{3+}$=1mol% with different conc. of Ce^{3+} ions under NUV excitation.

3.3 PL Results of $Sr_2CeO_4:Dy^{3+}$

Sr_2CeO_4 belongs to intrinsic luminescence material. The main feature of these host is that, if we add an impurity elements in small concentration, then its interaction with regularly arrange luminescence elements (centers) promotes special delocalization of excitation energy, which favors the emissions in other electromagnetic spectral range with different intensity [9]. Figure.(5) gives the emission spectra of Sr_2CeO_4 with different concentration of Dy^{3+} ions under 350 nm excitations.The luminescence intensity is found to be affected by Dy^{3+} ions, and it found to be increase with adding Dy^{3+} ions, under 350 nm excitations. The maximum doping concentration quenching is found to Dy^{3+} = 0.2 mol % to Sr^{2+}ions. The first observed broad spectrum from 400 nm to 560 nm is mainly due to CT transitions in Sr_2CeO_4 matrix and contribution of transitions between $^4F_{9/2} \rightarrow {}^6H_{15/2}$ of Dy^{3+} ions. And thesecond sharp peaks emission at 573 nm in yellow color region is due to transitions between $^4F_{9/2} \rightarrow {}^6H_{13/2}$ in Dy^{3+} ions. The small red shifting is also clearly seen by doping Dy^{3+} ions in Sr_2CeO_4 matrix for the first peak. This fig.(5) is taken from our previous research paper of R.S. Ukare et al [12].The variation in PL emission intensity of Sr_2CeO_4 with different conc. of Dy^{3+} ions under 350 nm excitation are shown in fig.(6).

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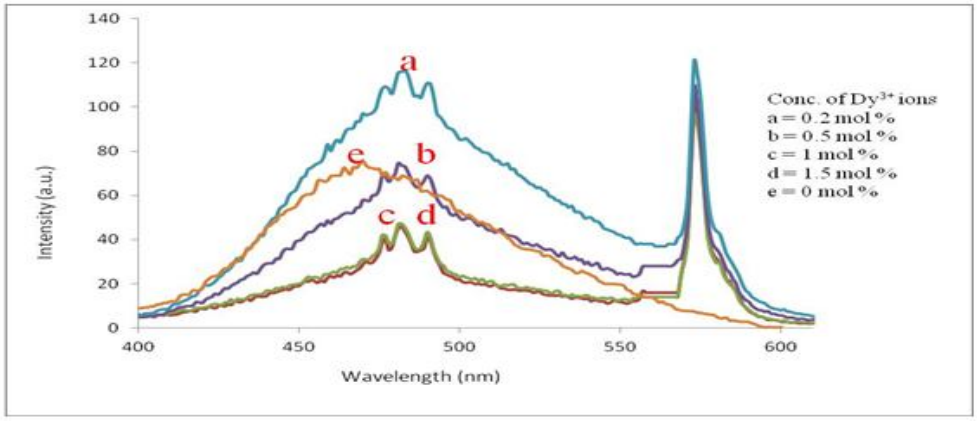

Fig.5: Emission spectra of Sr_2CeO_4 with different conc. of Dy^{3+} ions at λ_{ex}=350 nm[12].

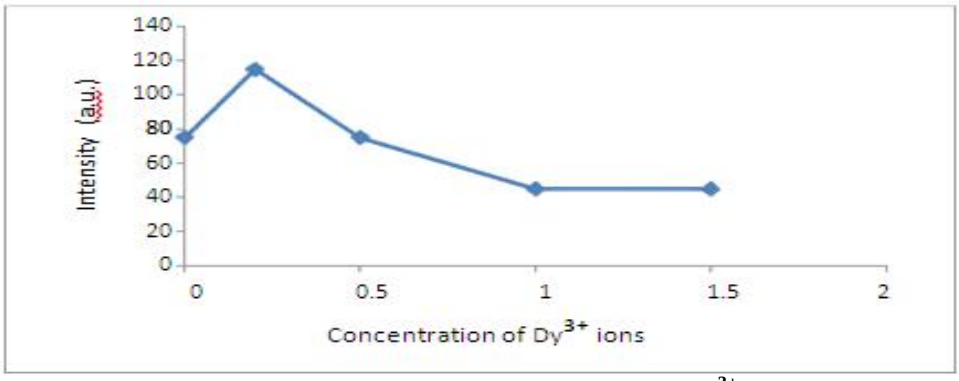

Fig.6: The variation in intensity of Sr_2CeO_4 with different conc. of Dy^{3+} ions under350 nm excitation.

3.4 Mechanism of Energy Transfer from Ce^{3+} to Dy^{3+}

Resonance energy transfer can be performed by exchange interaction or multi-pole interaction. In practice the exchange interaction can be examined by efficient of radiative transfer, whichrelies how efficiently the activator fluorescence is excited by the sensitizer emission. However, this requires a significant spectral overlap of the emission line of the sensitizer (donor) and the absorption line of the emitter (acceptor) for energy transfer to take place. Resonance energy transfer inY_2SiO_5 and in Sr_2CeO_4between Ce^{3+} and Dy^{3+} by exchange interaction can be explain as below.

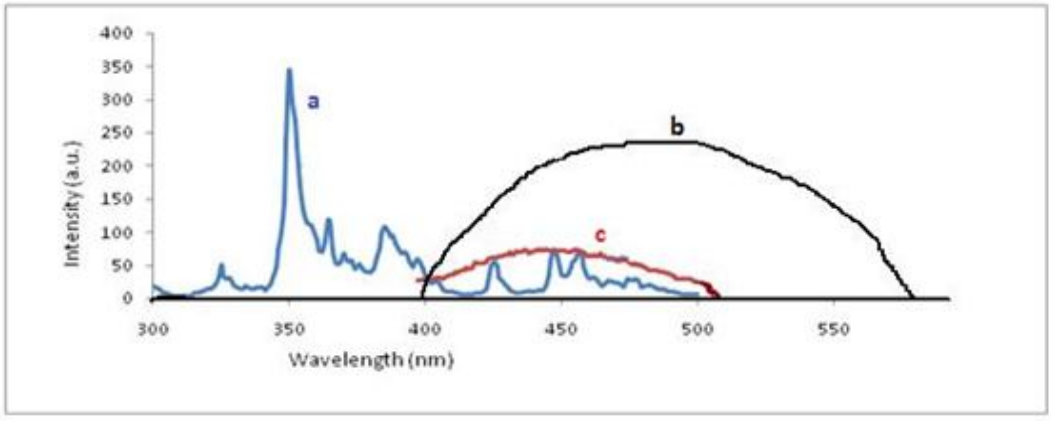

Fig.7: (a)Typical excitation spectra of Dy^{3+} (b)Emission peak of Ce^{3+}at Y_2SiO_5, (c) Emission spectra of Sr_2CeO_4.

Consider two emitting centers S and A, separated in solid by distance R, we use notation S and A (for sensitizer and activator). If S is in excited state and A is in ground state, the transfer its energy from relaxed excited state of S to A may takes place. The rate of such energy transfer process has been calculated by Dexter[13,14]. Dexter result are as follows.

$$P_{SA} = \frac{4\pi^2}{h}|\langle S,A^*|\, H_{AS}\,|\, S^*,A\rangle|^2 \int g_s(E).g_A(E)\mathrm{d}E \qquad \text{.....(2)}$$

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In eqn.(2), the integral represents the spectral overlap of $g_S(E)$ and $g_A(E)$ being the normalized optical wave function of sensitizer and activator respectively (see fig.7 where the optical overlap has been matched between 400 nm to 500 nm for both Y_2SiO_5 and Sr_2CeO_4 phosphor). The transfer rate P_{SA} increases with increasing wave function overlap. The matrix element in Eq^n.(2) represents the interaction (H_{AS} being the interaction Hamiltonian) between initial state |S*,A and the final state |S,A* .

From the fig.(7) emission band of the Ce^{3+} ion overlaps with the strongest excitation band of Dy^{3+} very well. Therefore, for both Y_2SiO_5 and Sr_2CeO_4 powder the conditions for very efficient energy transfer from Ce^{3+} ion to Dy^{3+} ion are fulfilled as per above observation of Dexter. It is obvious that the very efficient energytransfer between these two ions leads to much higher emission intensity than only singly Ce^{3+} ions doped sample.

To find possibility of energy transfer by dipole-dipole,dipole-quadrupleand quadruple-quadrupleinteraction we use Dexter's energy transfer formula and Reisfeld's approximation, the following relation can be obtained [15, 16,17]:

$$\frac{n_o}{n'} \propto C^{n/3} \ldots\ldots\ldots\ldots \quad (3)$$

Here and the luminescence quantum efficiencies of Ce3+ without and with Dy3+, respectively. C is the concentration of Dy3+ ion. n =6, 8, 10, corresponding to dipole – dipole, – dipole, dipole – quadruple and quadruple - quadruple interaction, respectively. The value of can be roughly estimated by , where and I are luminescence intensity of Ce^{3+} ion without and with Dy^{3+} ion respectively. We draw a graph between and or different values of n. From the graph we see that well straight line is obtain in d-d graph in both Y_2SiO_5 and Sr_2CeO_4 powder up to 1 mol % of Ce^{3+} ions doping as shown in fig.(8). Implying that energy transfer between donor (Ce^{3+}) and acceptor (Dy^{3+}) ions take place through dipole-dipole interaction as observed by Luxiang Wang et. Al and G.V. Lokeswara Reddy[6,8]. Beyond 1 mol % of Ce^{3+} ions in both samples non radiative energy transfer takes place between the dipoles.

The critical distance (Rc) for which the nonradiative transfer rate equals the internal decay rate (radiative rate), between Dy^{3+} and Ce^{3+} luminescent centers for which the ET is possible has been determined using the following equation [8,18]:

$$R_c = 2\left(\frac{3V}{4\pi X_c Z}\right)^{1/3} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (4)$$

Where V is the volume of the unit cell, X_c is the critical concentration of Dy^{3+} (acceptor) ions when the luminescence intensity of Ce^{3+} (donor) ions decreases to its half value and Z is the number of available crystallographic sites per unit cell. ForY_2SiO_5:Dy^{3+} = 1mol% and Ce^{3+}= 01mol% phosphors, the values of V and N are113160 nm ^{3} and 3, respectively. For Sr_2CeO_4 powder the eqn.(4) is not valued, because it is self luminescence (intrinsic luminescence) material, if we add an impurity elements in small concentration, then its interaction with regularly arrange luminescence elements (centers) promotes special delocalization of excitation energy, which favors the emissions in other electromagnetic spectral range with different intensity.

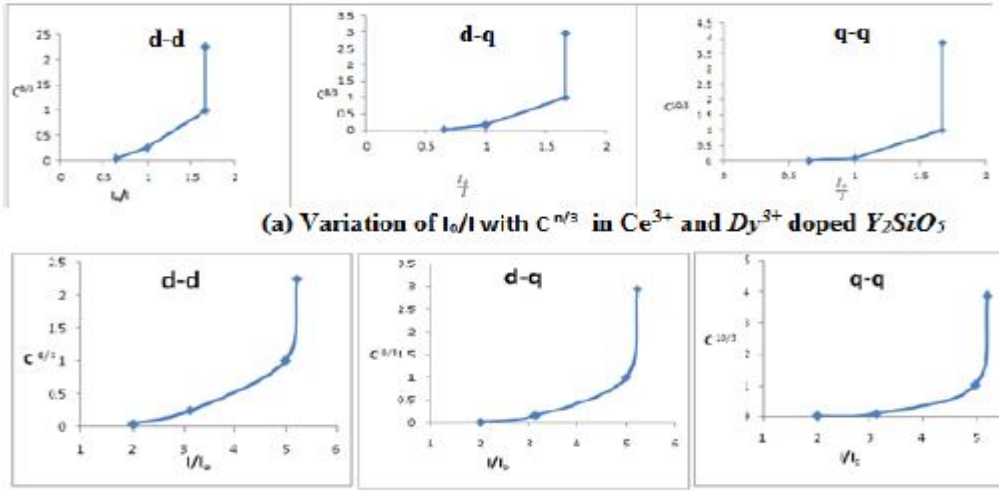

Fig.8: (a) Variation of I_o/I with $C^{n/3}$in Ce^{3+} and Dy^{3+} doped Y_2SiO_5 and (b) Variation of I_o/I with $C^{n/3}$ in Dy^{3+} doped Sr_2CeO_4.

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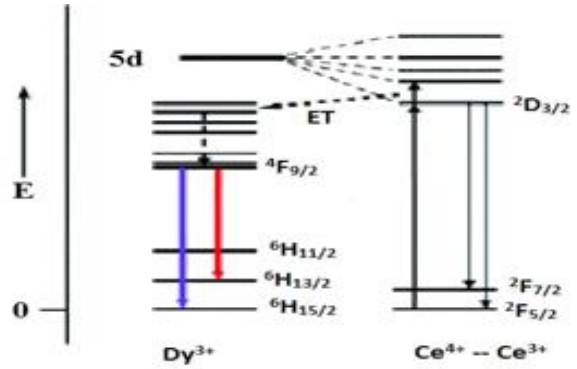

Fig.9: Energy level diagram of Ce^{3+} and Dy^{3+} in Y_2SiO_5 and Sr_2CeO_4 host.

The observed energy transfer can be explain by using energy level diagram of Ce^{3+} and Dy^{3+} in Y_2SiO_5 and Sr_2CeO_4 powder sample. Since emission band from cerium doped sample is related to the parity and spin allowed Ce^{3+}: 5d → 4f transition.The emission spectra, of Y_2SiO_5:Dy^{3+} = 1 mol % with different concentration of Ce^{3+}ions and Dy^{3+} doped Sr_2CeO_4, clearly indicates that defect and impurities levels are present in energy level diagram as shown in fig.(9)[19-20]. These levels are intermediate levels of cerium and some are due to oxygen vacancy. When we excite the sample with near UV radiation, some of excited electrons are captured by the defect levels of cerium (five 5d levels of Ce^{3+} ions since emission is mainly due to change-transfer transition Ce^{4+}–O^{2-})[21,22]. Then intermediate energy transfer from defect levels and impurities levels of dysprosium to excited state of Ce^{3+} ions (i.e. electron jumps from defect levels and impurities levels to excited state of Ce^{3+} ions) non-radiatively, that increases the population of $^2D_{3/2}$ (lower excited level of Ce^{3+} ions), thus transition probability from $^2D_{3/2}$ excited state to the two splitting ground $^2F_{5/2,7/2}$ states, respectively. Thus by incorporation of Ce^{3+} enhances the luminescence intensity of Dy^{3+}doped oxide based phosphors by efficient energy transfer from Ce^{3+} to Dy^{3+}.

4. CONCLUSIONS

We have successfully prepared Y_2SiO_5:RE (RE=Dy^{3+}, and Ce^{3+}) and Dy^{3+} doped Sr_2CeO_4 phosphors at comparatively low temperature. Y_2SiO_5:Dy^{3+} have been prepared first times which gives good photoluminescence under near UV excitations. The formation of single phase monoclinic Y_2SiO_5 at 900^0C temperature and triclinic Sr_2CeO_4 are confirmed by XRD analysis. By adding some percentage (0.1mol% to 0.3 mol%) of Ce^{3+} at Y_2SiO_5:Dy^{3+} and some percentage of Dy^{3+} in Sr_2CeO_4 PL intensity were found to increase. Energy transfer from Ce^{3+} to Dy^{3+} were reported by detail analyzing photoluminescence emission spectra and possible mechanism of energy transfer were discussed by using theoretical formula and energy level diagram.

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THERMODYNAMIC PARAMETERS STUDY OF ASPIRIN BY CONDUCTIVITY METHOD

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ABSTRACT
This research work deals with conductometric measurement Aspirin drugs at two different concentration 0.005M and 0.01M by changing the temperature. The thermodynamic parameters viz., Gibbs free energy (ΔG), enthalpy (ΔH) and entropy (ΔS) of analgesic and antipyretic drug (aspirin) were calculated from solubility of aspirin in alcoholic medium at different temperature. It was found that solubility and solubility product of aspirin decreases with decreased concentration in ethanol.

Keyword: Conductivity, Solubility, solubility product, thermodynamic parameters, etc

INTRODUCTION
It is well known that electrolyte solutions frequently obey Ohm's Law, where the conductance (reciprocal of the resistance) is the electrical property of the solution that establishes readily the inherent facility with which it transports electric charges, under the influence of an electric field , .The conductance depends on the temperature, the solution's composition, and the geometry of the electric field applied in reference to the solution. However, the electrical conductivity of the system can also be defined, which does not depend on the said geometry, Aspirin is analgesic and antipyretic drugs, typically used as mild to moderate fever and pain control. In the present research work conductance measurement was used for the study of influence temperature on solute-solvent interaction in alcoholic medium.

Conductivity method is used for the study of the dissolution of compound in mixed solvent system . Also it is an important tool to measure degree of disassociation of weak electrolyte, to measure degree of hydrolysis and for the analysis of the physicochemical properties of electrolyte in solution . Conductometric measurement at different temperature gives idea of solubility product of drugs. Which is useful to explain the thermodynamic properties aspirin in alcoholic medium. Molar solubility "S", solubility product "Ksp" and Gibbs free energy "ΔG" is determined from the following equation

$$Ksp = [A+] [B-] = S \times S = S2 \quad ..(1)$$

$$\Delta G = -RT \ln (Ksp) \quad ..(2)$$

Where "R" is the universal gas constant, 'T" is the absolute temperature and "ΔG" is Standard Gibbs free energy is related to "ΔH" and "ΔS" by following relation

$$\Delta G = \Delta H - T\Delta S \quad ..(3)$$

The value of thermodynamic parameters are calculated at two different temperature T1=301K and T2 = 308K by considering temperature range 301K to 318K

MATERIAL AND METHOD
In the present research work, conductivity method was used for the study of the influence of temperature on solute-solvent interaction in alcoholic medium. All reagents are used such as Aspirin (E. Merck), Ethanol (E. Merck) each of these analytical grade reagent. These stock solutions were prepared in double distilled ethanol. Digital Conductivity meter ELICO (CM-180), JCE (LJ-101) magnetic stirrer, Thermostat (No.51633075, India) Pioneer Analytical Balance (SCPA64C) were used to carried out experiment.

0.01M aspirin prepared by M/1000 molecular weight into 100ml of ethanol.Solution of 0.005M concentration were prepared by considering 0.01M stock solution. And this solution was stirred for 30 minutes and then this solution was kept overnight to get maximum saturation. On next day the conductivity of different concentration solution were recorded at different temperature using digital conductivity meter. The solution was placed in water bath during the measurement of conductance and temperature was controlled by thermostat at a fixed temperature.

CALIBRATION OF CONDUCTIVITY METER
At the given reading of the conductivity cell the knob of the conductivity meter was adjust and the conductivity cell was dipped in conductivity water so that the calibration was done.

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DETERMINATION OF CELL CONSTANT

The 0.1 N KCl solution was prepared in 100 ml of distilled water then conductivity cell was immersed in a beaker which containing KCl solution and the conductance was recorded. that gives value specific conductance of KCl by considering following equation.

Cell Constant=Specific Conductance / Observed Conductance …(4)

Table: 1

Temp in K	Equivalence conductance(λ) of 0.1M KCl in $x10^{-3}$ Scm^2eq^{-1}	Observed conductance(λ) of 0.1M KCl in $x10^{-3}$ Scm^2equ^{-1}	Cell Constant (k) in cm^{-1}
301	13.24	14.78	0.8961
308	14.75	15.02	0.9820
318	17.02	17.24	0.9872

DETERMINATION EQUIVALENT CONDUCTANCE

It is defined as the conducting power of all the ions produced by dissolving one gram equivalent of an electrolyte in solution.It is expressed as Λ_e and is related to specific conductance as

$$\Lambda_e = \frac{\kappa \times 1000}{C} = \kappa \times \frac{1000}{M} \quad \ldots(5)$$

where C is the concentration in gram equivalent per litre (or Normality). This term has earlier been quite frequently used. Now it is replaced by molar conductance. The units of equivalent conductance are $Ohm^{-1}\,cm^2(gm\,equiv)^{-1}$.

RESULT AND DISCUSSION

Solubility is the amount of substance dissolved into the solution. If the compound is soluble in major extent it means that its dissolution is in large amount, i.e form large numbers of ion in a solution. that's why solubility is directly related to conductance of solution.

The solubility and solubility product of solutions of aspirin in alcoholic medium were calculated at 301K, 308K and 318K shown in the table no 2.

In general solubility of substance increases with temperature but from table 2 it is observed that solubility and solubility product decreases with temperature. This is because of association of aspirin molecule takes place when temperature of solution increases.

The plot-1 between concentration of aspirin and observed conductance tells that conductance decreases with decrease in concentration of solution this is because of less numbers of mobile ions present in a solution.

The plot-2 shows that solubility product is low when concentration is less but with increase in concentration solubility product increases.

Table 2: Conductance measurement of Aspirin solution at different concentration and different Temperature in Ethanol solvent

Temp(T) in K	Concentration in Mole/lit	Observed conductance(λ) of Aspirin in $x10^{-3}$ Scm^2equ^{-1}	Specific conductance (k) of Aspirin	Solubility (S)	Solubility Product (Ksp) $x10^3$	logKsp
301K	0.01	3.85	3.44	246.78	60.90	11.016
	0.005	1.78	1.59	114.09	13.01	9.474
308K	0.01	2.15	2.11	149.95	22.48	10.020
	0.005	1.98	1.94	138.09	19.06	9.855
318K	0.01	0.49	0.49	38.09	1.45	7.280
	0.005	0.34	0.34	26.49	0.70	6.553

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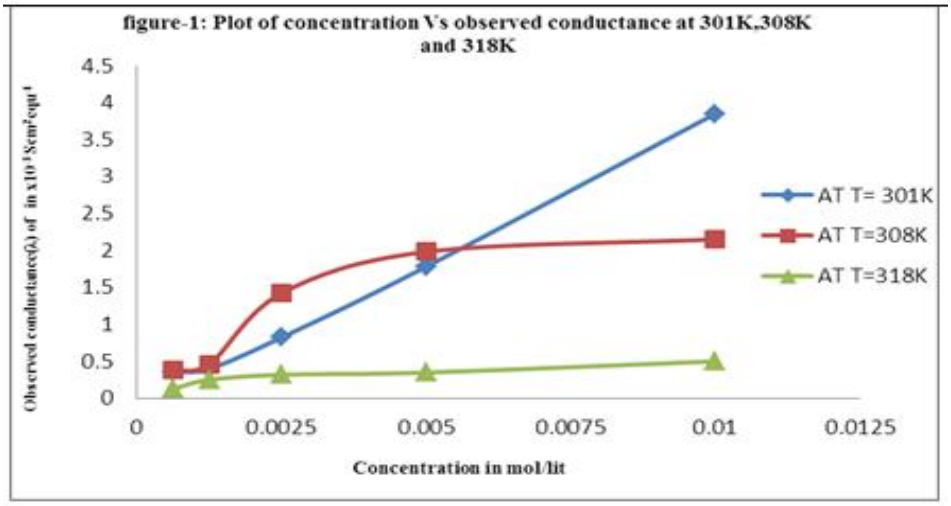

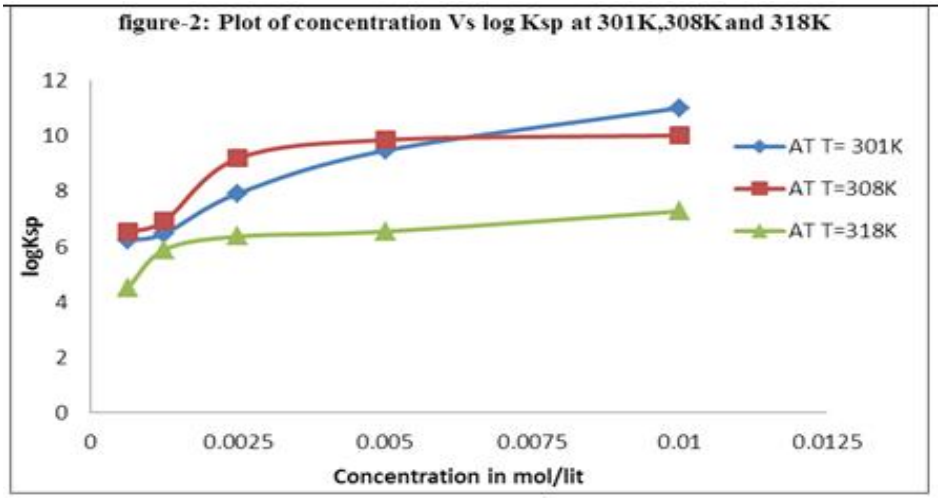

Table-3: Thermodynamic parameters of aspirin drug at different concentration & temperature difference

In between temp	Concentration in Mole/lit	ΔG in Joule/mole x 10^3	ΔH in Joule/mole x 10^3	ΔS in Joule/mole
301K-308K	0.01	-27.570	252.668	931.026
	0.005	-23.709	296.816	1242.881
308K-318K	0.01	-25.659	513.894	1751.8
	0.005	-25.238	619.255	2092.51

Form table no.3 it is observed that value of ΔG is negative in all cases which indicate process of dissolution of aspirin in alcohol is spontaneous and moving in forward direction. Spontaneity of reaction is depends upon magnitude of ΔG. If value of ΔG is higher greater is the spontaneity of reaction.

Positive value of ΔH indicate endothermic reaction and process of crystallization. Crystallization increases with increase in temperature.

ΔS is the measure of disorder or randomness. System is stable when value of ΔS is high. At high temperature molecule associate with energy which increase randomness of molecule, hence ΔS has greater value at high temperature.

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SEED SURFACE CHARACTERISTICS AND PRELIMINARY PHYTOCHEMICAL STUDY OF *STRYCHNOS NUX- VOMICA* SEEDS LINN

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ABSTRACT
Medicinal plants are widely used in drug industry. Seeds are the basic and important source of food and therefore their study is important for identification and classification. For morphological and anatomical observations of Seed coat study determine surface characteristics which is important for seed identification. Strychnos nux- vomica seeds are studied not only for surface identification but also it contain various chemical constituents. Seeds are mostly used for therapeutic purposes. S. nux-vomica is a non edible tree with a strong content of two poisonous alkaloids, strychnine and brucine .Morphologically seeds are discoid ,circular ,flat with silky coating. The Scanning Electron Microscopy of seeds of Strychnos nux- vomica L .shows elongated trichomes ,flat ,thick aggregated near hilar region. The seed anatomy shows elongated trichomes on the epidermal layer with ground tissues and endosperm region. The phytochemical analysis shows presence of various phytoconstituents in it .Alkaloids, Flavonoides present in all the three extract, petroleum ether, chloroform, methanol etc. whereas 04 phytochemicals present in petroleum ether,09 in chloroform and 05 in methanol etc. In Thin Layer Chromatography detect three amino acids like DL-Ornithine monohydrochloroid, L-Tyrosine ,Unknown-01.Seed morphology and anatomy gives the surface details while phytochemical analysis and TLC test detect the qualitative analysis of the powder drugs. Bioactive constituents help for drugs preperations.Economically it is important gives benefits to society.

Keywords: Strychnos nux- vomica Linn. seeds , seed morphology (SEM),seed anatomy, phytochemical analysis, TLC.

INTRODUCTION
Morphologically plant shows evergreen, dense,medium size tree.(Fig 01- Fig 02).Food, shelter and cloths are three basic needs of man. These needs fulfilled by plants. So plants are most important for us .We directly or indirectly depends on them. It creates healthy environment for us. Plants are the oldest form of health care known to mankind. Medicinal plants are the back bone of traditional remedy. Two poisonous alkaloids, Strychnine and brucine are found in this tree (Magdalin Joy and Reginald Appavoo, 2014). Plants have been a rich source of drug. Because they produce a wide array of bioactive molecules.(Bhavya D.K. *et.al.*2014). *Strychnos nux - vomica* is an evergreen tree native to South East Asia and India belonging to the family Loganiaceae (Perumal. B, S.*et al* 2016)

Fig 01
Fig 01:- Plant morphology

Fig 02
Fig 02:- Plant with mature fruits and seeds

MATERIALS AND METHODS
A) Sample collection:- Some seeds of *Strychnos nux -vomica* Linn**.** family Loganiaceae were collected from local place Amravati District.,Maharashtra. For seed coat study all the seeds parameters were studied using dissecting and binocular microscope. Digital weighing balance was used for weighing the seeds in mg. The morphological observations of seeds were done followed by their photography ,using 1 cm. scale.

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B) Seed coat morphology (SEM) :- To study the seed coat morphology scanning electron microscopy is most important. For this purpose, the individual seeds were dipped in alcohol for 5-10 min.,to remove the dust from them. The seed mounted on pin type stubs using double sided adhesive tape or conductive silver paint to prevent charging of the surface during scanning and then coated with a very thin layer of gold in a polaron sputter coating unit. For spermoderm study of seed photomicrograph were taken in the scanning electron microscope (SEM) (LEO 430) at Birbal Sahani Institute of paleobotany, Lucknow.

C) Seed coat anatomy:- For the anatomical observation of seed coat study take the transverse sections of seed coat. Using permanent slide preparation method or double staining method place the section on various alcohol grade like 30%,50%,70%,90% absolute alcohol, xylene, DPX etc. The staining like safranine and light green stain used for staining.

D) Priliminary phytochemical tests:- The preliminary phytochemical analysis is most important for detection of various chemical constituents . Trease and Evans (1989) test were done. Qualitative phytochemical analysis of the crude powder of the seeds of the plant for the identification of phytochemicals like alkaloids, carbohydrates, reducing sugars,steroids,glycosides,flavonoides,terpenoides,saponine,protein,tannins,amino acids, volatile oil or essential oil. Priliminary phytochemical test were done using different extract.

E) Thin Layer Chromatography:- Using BAW (Butanol 80ml : Acetic acid 20ml: Water 20ml)solvent, aqueous extract with seed powder, TLC plate (MERCK)silica with aluminium sheet, capillary tube, chromatography chamber, lid, wax for sealing, spray, etc.

OBSERVATIONS

Fig:--03 *Strychnos nux vomica* Linn. seeds flat,discoid,silky

Externally seed 2.11cm-1.85cm discoid, circular, milky white,1533.92 mg, radial hilum apical, acute, seed surface smooth, seed coat consists of compactly arranged fibrous, threads like tissues, seeds slightly grooved at middle surface ,seed flat, outer boundary thick, circular, fibrous coating is silky. (Fig.03)

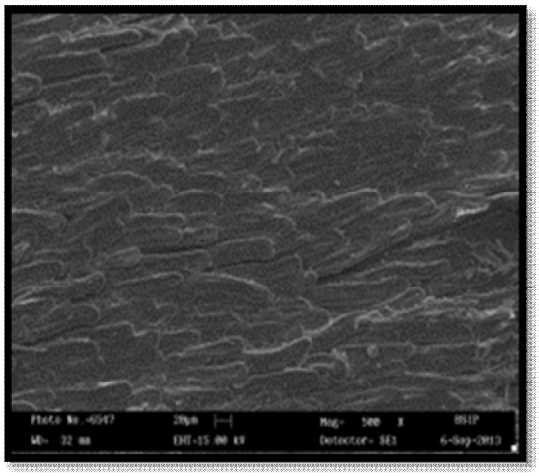

Fig 04

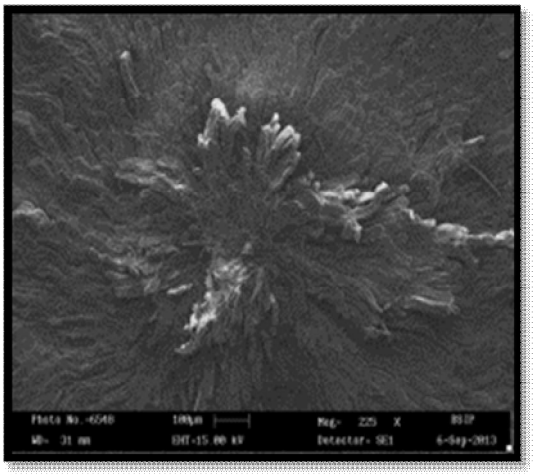

Fig 05

Fig 04 – 500X -- Fig 05- 225X :- Scanning electron microscopy images of *Strychnos nux -vomica* L. seed surface shows silky elongated flattened trichomes which is aggregated near hilar region.

Scanning electron microscope study in 500X and 225X magnification shows regular elongated, thick, silky trichomes respectively. It is elongated, aggregated silky trichomatous coating near hilar region.(Fig 04-Fig 05)

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Internally the testa of seed is thick. The testa is divided into an outer trichomatous epidermis and an inner layer of ground tissue. Trichomes elongated. Epidermis looks sclerenchymatous. The ground tissue of the testa functional as a nutrient layer which is brownish and parenchymatous followed by endosperm region which is composed of thick walled cellulosic parenchyma.Endosperm cells are parenchymatous. Aleurone grains present in them. The trichomes are elongated and measures about 593.13µm in length and 34.89µm in breadth. Endosperm cell are 58.15µm in length and 34.89µm in breadth. (Fig 06-Fig 11)

Fig 06

Fig 07

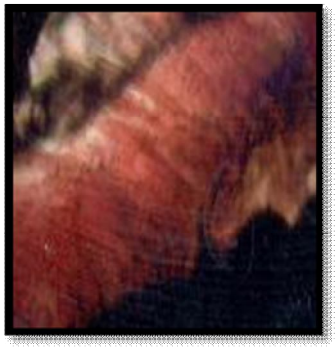

Fig 08

Fig 06:- T.S. of seed coat of *Strychnos nux- vomica* L. with elongated trichome, epidermis and endosperm, 160X, Fig 07:- T.S.of endosperm , Fig 08:-T.S. of elongated trichomes

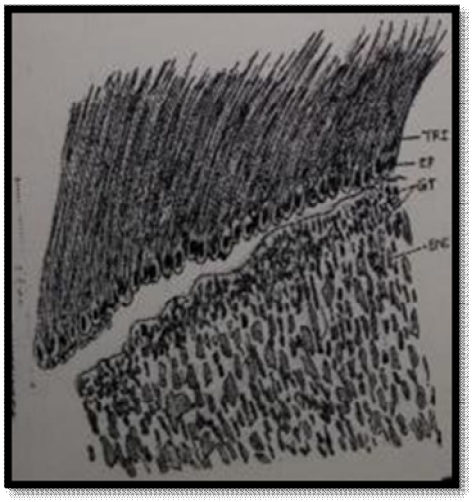

Fig 09

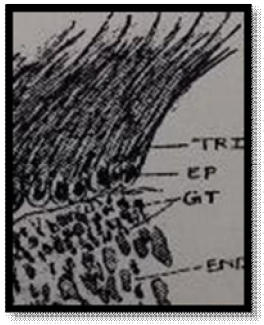

Fig 10

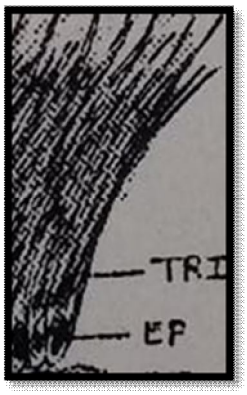

Fig 11

Fig 09:-X100 Sketched diagram of T.S.of seed coat of *Strychnos nux- vomica* L. shows elongated trichomes with epidermis ,ground tissue and endosperm, Fig 10:- Outer trichomatous epidermis with ground tissue and thick walled cellulosic parenchyma .Fig 11:- Elongated trichomes with epidermis.(TRI-Trichomes, EP-Epidermis, GT-Ground tissue ,END-Endosperm)

Medicinal uses:- Seed is nervine stomachic, tonic and aphrodisiac, spinal stimulant also respiratory and cardiac stimulant.(Narayanrao 2003) Nux- vomica seeds in powdered form are preferred for administration, especially in the treatment of dyspepsia and diseases of the nervous system (NIIR Herbs cultivation and Medicinal uses)

Seed bark :- On chicken pox, paralysis, rheumatism, piles, eczema and other skin diseases, body and muscular pain seed bark is used as a reliving purpose. (Jain,1991,Jain *et al*.)

Phytochemical study of *Strychonos nux- vomica* L. seed powder treated with different extract.

OBSERVATION TABLE (01)

Sr. No.	Phytochemicals	Petroleum ether	Chloroform	Methanol
01	Alkaloids	+	+	+
02	Carbohydrates	-	+	+

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03	Reducing sugars	-	+	-
04	Steroids	-	+	-
05	Glycosides	+	-	+
06	Flavonoides	+	+	+
07	Terpenoides	-	+	-
08	Saponine	-	+	-
09	Protein	-	-	-
10	Tannins	-	+	-
11	Amino acids	-	-	+
12	Volatile oil or essential oil	+	+	-

Present (+) , Absent (-)

From the above phytochemical observations we use seed powder of *Strychnos nux- vomica* L. which is treated with different extract like petroleum ether, chloroform, methanol. The phytochemicals like alkaloid, glycosides ,flavonoids and volatile oil or essential oil present in petroleum ether. In chloroform extract alkaloids, carbohydrates, reducing sugars, steroids, flavonoids, terpenoids, saponine, tannins, volatile oil or essential oil is present. The phytochemicals like alkaloids, carbohydrates, glycosides, flavonoids are present in methanol. The alkaloids , flavonoids found in all extract. Carbohydrates found in chloroform and methanol, Glycosides present in petroleum ether and methanol. Volatile oil or essential oil present in petroleum ether and chloroform. Amino acids present in Methanol extract. Protein is absent in all the three extract. Reducing sugar, steroids, terpenoids, saponine, tannins present only in chloroform extract.

Fig 12:- TLC plate showing DL-Ornithine monohydrochloroid ,L-Tyrosine and unknown 01.

Table 02: shows Thin layer chromatography of *Strychnos nux- vomica* L. seeds

Sr. No.	Amino Acids	No. of Amino Acids	Total
1	DL-Ornithine monohydrochloroid	17	01
2	L-Tyrosine	23	01
3	Unknown-01	25	01
Total			03

The thin layer chromatography of *Strychnos nux- vomica* L. seeds contains three amino acids DL-Ornithine monohydrochloride,L-Tyrosine and unknown 01.

DISCUSSION

In Indian society plants are used as a medicine from ancient time. In Ayurveda, *(*Gopalkrishna SV *et al 2016)* Unani , and other medicine plants play a very important role for the preparation of drugs. All parts of the plants are very useful for various drug discoveries. So seeds are the most important organ of the plants. Seed study includes morphology ,anatomy, qualitative analysis, biochemical constituents. *Strychnos nux- vomica* L. is a evergreen , deciduous tree. Seeds of *Strychnos nux- vomica* L. are medicinally very important .It contains various chemical constituents like alkaloids, flavonoids, carbohydrates ,glucosides, essential oil ,terpenoids, saponine, tannin, aminoacids etc. Alkaloids ,flavonoids are in large amount while others are in medium or less amount.

These results are shown in all the three extract like petroleum ether, chloroform, methanol respectively. In Thin Layer Chromatography seed powder treated with water i.e, aqueous extract shows the detection of three amino

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acids like DL-Ornithine monohydrochloroid (17), L-Tyrosine (23), Unknown-01(25) etc. The qualitative analysis detect the above amino acids present in the seeds. Morphologically seed discoid ,circular ,tough, silky trichomatous, flat .Anatomically the T.S. of seedcoat shows elongated trichomes with well developed epidermis and ground tissue. The endosperm region well developed. Seeds contain curative property of medicinal plant which shows various secondary metabolite in them. Seperation of various amino acids through qualitative test and preliminary phytochemical analysis useful for the detection of bioactive compound, isolation. purification and standardization of biologically active compound(Shazad Y *et al* 2012) .Above observations are useful to fulfill to identify the new species of the plant. The micromorphological characteristic features of seed coat help for seed identification. Seed gives theruptic efficacy. In pharmaceutical industry various drugs prepared which is beneficial for the society.

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ADSORPTION KINETIC AND THERMODYNAMIC STUDIES FOR REMOVAL OF CHROMIUM(VI) FROM WASTE WATER USING NEWLY GENERATED ADSORBENT

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ABSTRACT
In the present era, water pollution is one of the most serious problems facing by human, plants and animals. Pollution of water due to the presence of certain heavy metal ions is a severe socio-environmental problems caused by the discharge of industrial wastewater. In view of their toxicity, non-biodegradability and persistent nature their removal becomes an absolute necessity. Hexavalent chromium metal is one of the carcinogenic pollutants in the environment and is frequently present in wastewater from various industrial units. The present research article reports the characterization and use of activated carbon derived from the bark of Pongamia pinnata (PPAC) as a potential adsorbent for removal of hexavalent chromium from aqueous solution. SEM analysis proved the mesoporous nature of the material under investigation. The batch experiment was carried out to study the effect of significant process parameters such as pH, contact time and adsorbent doses. The maximum adsorption efficacy for Cr(VI) removal by PPAC was found at pH 5, 5 gm/lit of adsorbent dose and 160 min contact time. The adsorption data were found to be well fitted for Freundlich isotherm. The kinetic data were analyzed using 1st order Lagergren kinetic. The Gibb's free energy was determined and found to be -2.746 KJ/mole for Cr (VI) removal from industrial waste. The negative value of ΔG^o indicates the feasibility and spontaneous nature of adsorption. This investigation verifies that PPAC, a mesoporous material can be successfully used as an excellent sorbent material for removal of hexavalent chromium from contaminated water and thus can be applied in wastewater treatment.

Keywords: Adsorption, Hexavalent chromium, Pongamia pinnata bark, Freundlich isotherm, Gibb's free energy

INTRODUCTION
The use of bio-adsorbents derived from bio-materials for the removal of pollutants from industrial waste effluent during recent past has shown interesting results and generated the new concept in of pollution. Pollution of water has its origin mainly in urbanization, industrialization and increase in human population observed during the past one and half century. Several industries like sugar factories, dairies, paper and pulp, tanneries, metal plating, fertilizer industries etc. releases substantial quantities of toxic heavy metals in water. The removal of heavy metal contaminants from aqueous solution is one of the most important environmental concern because metals are biorefractory and are toxic to many life forms[1]. Metals which are significantly toxic to human beings and ecological environment, include chromium, copper, lead, mercury, cadmium, nickel, iron etc[2].

Chromium(VI) is one of the most toxic and carcinogenic form for bacteria, plants and animals. Chromium and its compound are widely used in the chromplating, leather tanning, metal processing, wood preservatives etc[3,4]. The maximum concentration limit for chromium discharge into inland surface water is 0.1mg/l and it should not exceed to 0.05mg/l in potable water. A number of treatment methods have been employed for the removal of chromium from aqueous solution. The usual methods include chemical reduction, Nanofilteration[5], ion exchange[6], precipitation and adsorption[7,8] Amongst all of these, adsorption onto commercial activated carbon is well-established and effective technique. However, it is highly expensive since most of the activated carbon materials are obtained from non renewable sources like coal, lignite, peat etc. It is a growing need to derive the activated carbon from cheaper and locally available waste materials. Several research workers used different low cost adsorbents from agriculture waste such as coconut coir pith, sawdust, rice husk, cotton seed hulls, sugarcane bagasse, peanut hull etc. for the removal of Cr(VI) from contaminated water. The present investigation, studies were carried out for the removal of Cr(VI) from aqueous solution using activated carbon derived from bark *Pongamia pinnata* belong to *Rhamnaceae family* which is an extremely drought hardy and native fruit of India. *Pongamia pinnata* having tremendous medicinal properties, attributed by adverse group of secondary metabolites such as alkaloids, flavonoids, terpenoids, saponin, pectin, triterpenoic acids and lipids. It is extensively used in Ayurveda, Unani and Haemeopathic medicine. The sorbent was characterized by FTIR and Scanning Electron Microscopy (SEM) studies. Batch isothermal equilibrium method was conducted at 303K to evaluate the efficiency of newly synthesized sorbent for removal of Cr(VI) from the aqueous solution.

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Experiments were carried out to study the effect of pH, adsorbent dosage, contact time and initial Cr(VI) concentration. The newly synthesized adsorbent have been proved to be very good adsorbent which can be successfully used for removal of carcinogenic hexavalent chromium from aqueous solution.

MATERIAL AND METHOD

Chemicals

All the chemicals used in the investigation were of either analytical or chemically pure grade and procured from Merck (Mumbai, India).

PREPARATION OF ACTIVATED CARBON FROM THE BARK OF *PONGAMIA PINNATA* (PPAC)

The bark of *Pongamia pinnata* tree was collected from the local area. The bark was cut into small pieces, washed with tap water to remove the sand particles and then treated with formaldehyde to avoid release of any colour of bark into aqueous solution. Then, it was washed several times with deionized water and sun dried for 6 days. After drying, the bark was subjected to pyrolysis process for carbonization using Muffle Furness at 800-900^{0}C for 7 to 8 hrs so that volatile constituents were removed and residue was converted into a char. The char was then subjected to microwave activation in microwave oven at 360 W for 30 min[9]. The resulting activated carbon particles were ground and sieved in 120-200 mm size. This activated carbon was then washed with double distilled water and dried at 105^{o}C for 3 hrs and stored in airtight bottle.

CHARACTERIZATION OF PPAC

Characterization of PPAC was done by FTIR (Fig.1) and SEM (Fig.2)

ADSORPTION STUDIES

Working standards were prepared by progressive dilution of stock solution of Cr(VI). Removal of Cr(VI) using PPAC was carried out by batch equilibrium method. The influence of various parameters such as effect of pH, contact time and adsorbent dosage were studied, taking 25 mg/l of initial Cr(VI) concentration and 5 g/l of adsorbent dose. The effect of adsorbent doses was studied by varying them from 0.5-10g/l.

RESULT AND DISCUSSION

CHARACTERIZATION OF PPAC

FTIR spectrum of PPAC is shown in **Fig.1**. The band at 3445.27cm^{-1} indicates presence of the free hydroxyl group. The band at 2662.41cm^{-1} is due to the C-H bond stretching of aldehyde (C-H=O Group). The absorption at 1633.30cm^{-1} is due to the C=O stretching mode of the amido (CONH) group. The two characteristic bands appeared at 1005.85cm^{-1} and 911.73cm^{-1} (skeletal vibration involved in C-O-C stretching) prove the presence of saccharide structure**.** The peaks at 532.07cm^{-1} and 464.47cm^{-1} corresponds to N-H bending.

Fig.2 represents SEM micrographs of PPAC. SEM image has been obtained using an accelerating voltage of 20kV at X1500, magnification. High magnification SEM micrographs clearly reveal that the wide varieties of pores are present on the surface of PPAC accompanied with fibrous structure. It can also be noticed that there are holes and cave type openings on the surface of the adsorbent, which would have created more surface area available for adsorption. The size of holes and caves was found to be in the range 1- 10µm.

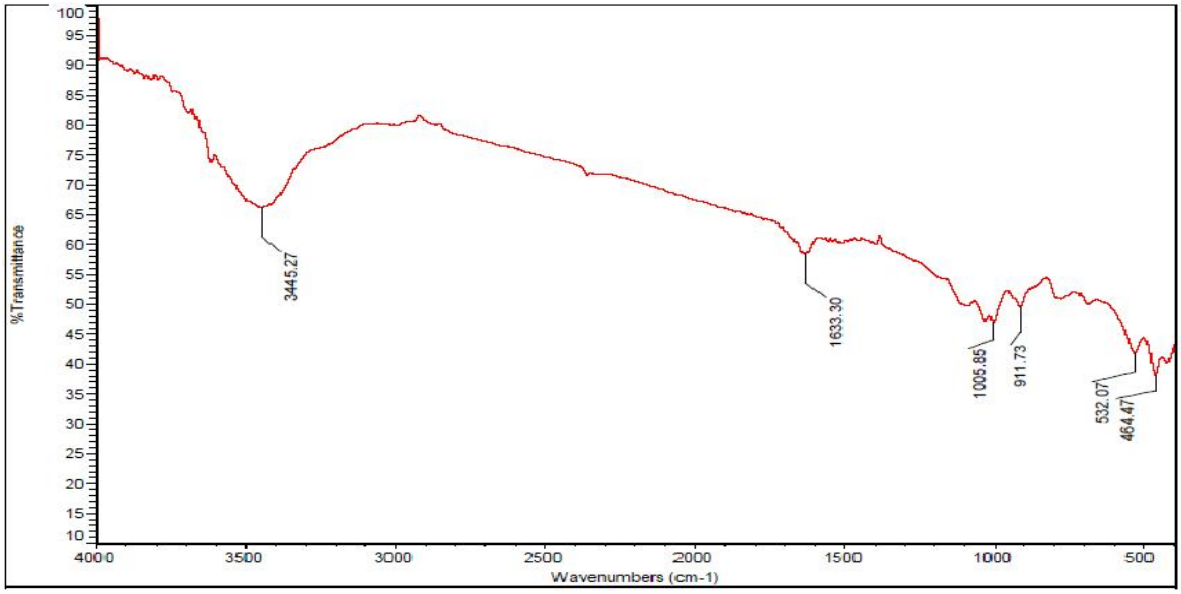

Fig.1: FTIR Spectrum of *Pongamia pinnata* Activated Carbon (PPAC)

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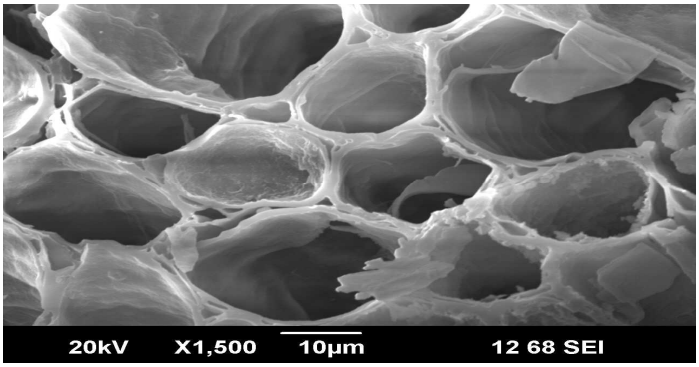

Fig.2: SEM image of *Pongamia pinnata* Activated Carbon (PPAC)

EFFECT OF pH

The effect of pH on the adsorption of Cr(VI) by PPAC was studied at pH 1 to 8. From **fig.3** it is clear that the removal of Cr(VI) increases with increase in pH from 1.0 to 5.0 and it is optimum at 5. The percent of adsorption increases from 60 to 96 as pH was increased from 1 to 5. The percentage of adsorption decreases steadily to 83% when pH increased above 5.0 and it was further decreased to 70% as pH was raised to 8.

EFFECT OF CONTACT TIME

Adsorption experiments were conducted as a function of contact time and results have shown in **Fig.4**. It can be observed that Cr(VI) removal ability of PPAC increased with increase in contact time before equilibrium was reached. Other parameters such as dose of PPAC, pH of solution and initial concentration were kept optimum. It can be seen from fig.4 that Cr(VI) removal efficiency increased from 25 to 96% when contact time was increased from 10 to 180 min. Optimum contact time for PPAC was found to be 160 min. Cr(VI) removal efficiency remained nearly constant after 160 min i.e. equilibrium time.

EFFECT OF ADSORBENT DOSAGE

Fig.5 shows the effect of dosage on the removal of Cr(VI) which was studied by varying the amount of PPAC from 0.5 to 10g/l while keeping other parameters (pH, contact time and initial concentration) constant. It is clear from the figure that percentage removal of Cr(VI) increased with the increase in PPAC doses and it was found to be maximum i.e. 95% at the dose of 5g/l. This is due to availability of more surface area. It indicates that by increasing the PPAC dosages, the adsorption efficiency for Cr(VI) removal increases. After 5g/l dose of PPAC, the adsorption efficiency remain constant because the maximum adsorption set in and amount of Cr(VI) present in the solution bounded to adsorbent remains nearly constant after this dose.

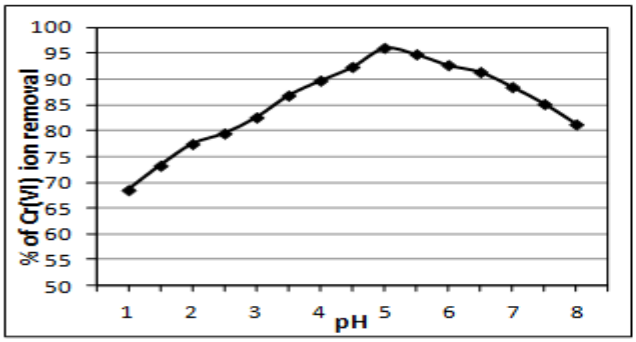

Fig.3 Effect of pH on Cr(VI) removal by PPAC

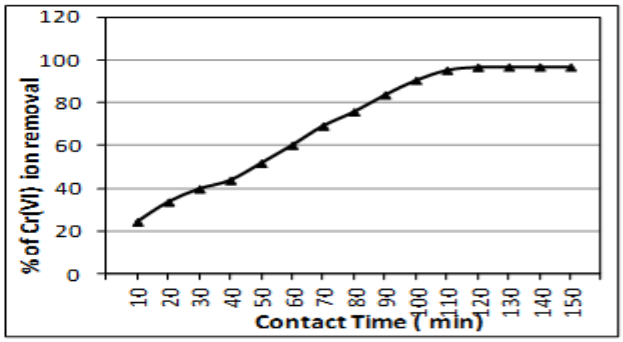

Fig.4 Effect of Contact time on Cr(VI) removal by PPAC

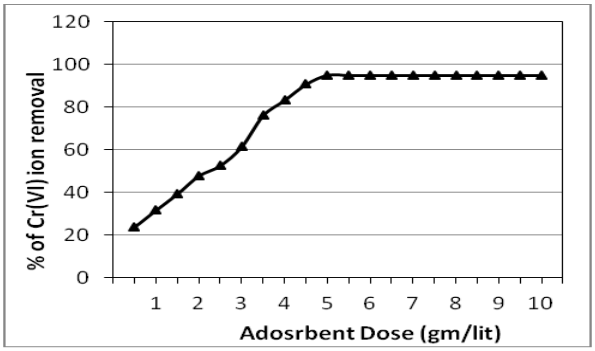

Fig.5 : Effect of Adsorbent dose on Cr(VI) removal

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ADSORPTION ISOTHERM

Adsorption isotherm studies are very important for the designing of proper adsorbent. Isotherm represents the amount of solute adsorbed per unit mass of adsorbent as a function of equilibrium concentration in bulk solution at constant temp. The equilibrium data obtained were fitted to Langmuir & Freundlich isotherms. Linear form of Langmuir equation

$$\frac{1}{X} = \frac{1}{Xm} + \left(\frac{1}{Ce}\right)\left(\frac{1}{bXm}\right)$$

Where X is the of amount of solute adsorbed in mg, m is the mass of adsorbent, Ce is equilibrium concentration of solute (mg/lit), Xm is amount of solute adsorbed per unit wt. of adsorbent. b is constant related to heat of adsorption or Langmuir affinity constant (M^3/mole). Freundlich equation indicate adsorptive capacity, x/m is function of equilibrium concentration of solute. The Freundlich equation is expressed as

$$log\frac{x}{m} = \log k_f + \frac{1}{n}\log C_e$$

The thermodynamic equilibrium constant Kc was obtained at 32 $\pm$ 1^oC

$$Kc = \frac{Ca}{Ce}$$

Ca = concentration of Cr(VI) on adsorbent at equilibrium in mg/lit and Ce = equilibrium concentration of Cr(VI) in solution gm/lit.

Initial concentration of Cr(VI) tested was 100ppm for both, synthetic effluent as well as waste water, at an adsorbent dosage of 5 g/lit. The adsorption followed Freundlich isotherm. Freundlich plot is shown in Fig 6. The graph show that the process is followed 1st order mechanism. The K_f & n values as calculated from fig 6. For synthetic effluent having 100ppm of Cr(VI) was found out to be as 4.365 mg/g. and 3.759mg/g respectively. Waste water having 100ppm of Cr(VI) at 4.5 pH has K_f & n values as 16.22 mg/g. and 7.782 respectively. The value of 'n' greater than 1 indicates that the adsorption on PPAC is favorable and though the capacity is slightly reduced at the lower equilibrium concentration. The higher value of adsorption capacity obtained with PPAC sorbent indicates that it can be used for the treatment of chromium waste. The Gibbs free energy (ΔG^o) for the adsorption process was obtained using equation.

$$\Delta G^o = - RT \ln Kc^0$$

Value of ΔG^o & thermodynamic constant Kc^o for various systems are show in table no. 2

The Gibbs free energy gives idea regarding the spontaneity of the adsorption process. Higher negative values indicate more favorable adsorption process. The –ve value of ΔG^o for the system under investigation confirms feasibility of the adsorbent and spontaneity of adsorption. Lower pH is found suitable for better adsorption of Cr(VI). For waste water sample more than 89% of Cr(VI) removal was observed. It is noticed that there is negligible influence of presence of other metal ions on adsorption of Cr (IV). Thus PPAC is more selective for chromium adsorption.

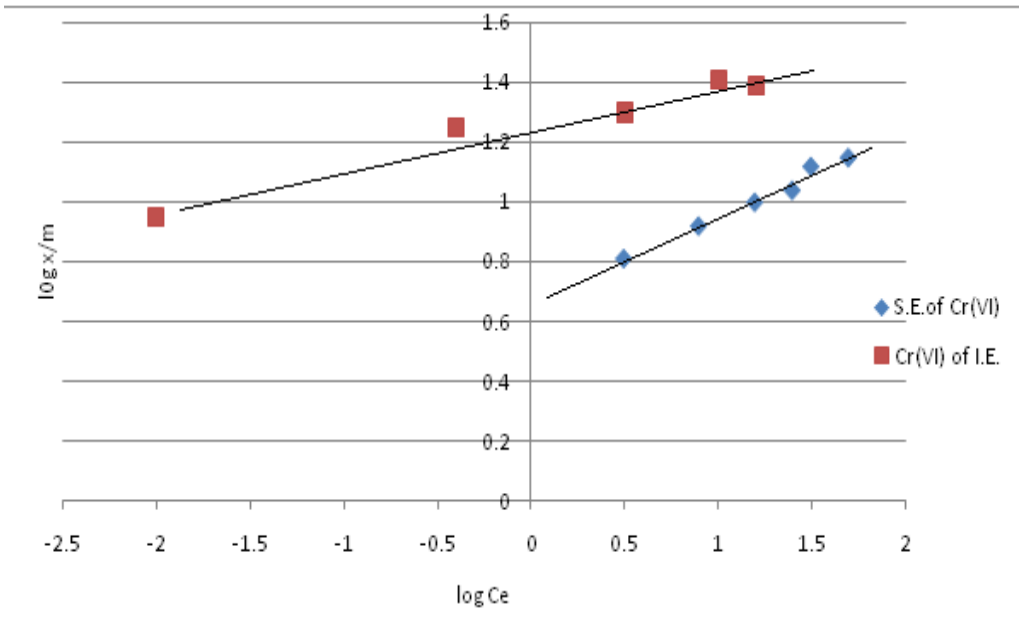

Fig.6: Freundlich plot for the adsorption of Cr(VI) from synthetic effluent (S.E.) having Cr(VI) 100 ppm and waste water (I.E.) having Cr(VI) 100 ppm at 32^{0}C

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Table 1: Adsorption rate constant for PPAC for various System

Con. Of Cr(VI)	pH	Rate Constant K_{ads} (min^{-1})	R^2
100 ppm Cr(VI)	2.0	1.780 x 10-2	0.9623
100 ppm Cr(VI)	3.0	1.091 x 10-2	0.9554
100 ppm Cr(VI)	4.7	0.912 x 10-2	0.9997
100 ppm Waste Water	4.5	4.12 x 10-3	0.9510

Table 2: Thermodynamic parameter for the adsorption of Cr(VI) by PPAC

Effluent	Conc. Of Cr(VI)	pH	Equilibrium Constant Kc	Gibbs free Energy ΔG^o KJ /mole
Pure solution	100 Cr(VI)	2	7.50	- 5.109
Pure solution	100 Cr(VI)	3	3.10	- 2.867
Pure solution	100 Cr(VI)	4.7	1.20	- 0.462
Waste Water	100 Cr(VI)	4.5	2.95	- 2.746

CONCLUSION

- The activated carbon derived from the bark of *Pongamia pinnata* and characterized employing FTIR and SEM studies.
- The newly developed PPAC high porous structure and excellent surface area.
- PPAC was most effective for Cr(VI) removal. At pH 5.0, 96% of Cr(VI) was removed from aqueous solution. Adsorption was found to pH dependent. Above pH 5.0, decline in Cr(VI) removal was noticed.
- The increase in percent removal capacity for Cr(VI) was observed with increase of adsorbent dose and contact time. Maximum removal is 95% for 5.0 g/l dose and 160 min. of contact time.
- The kinetic of Cr(VI) adsorption of PPAC was found to follow first order mechanics. The Gibbs free energy for the system was found to - 2.746 KJ/mole for Cr(VI) for removal from waste water
- The adsorption data satisfactory explained by Freundlich isotherm. High sorption capacity of PPAC proves the practical applicability of the sorbent under investigation for control of Cr(VI) pollution.
- The activated carbon under present investigation can be successfully employed for Cr(VI) abatement from contaminated water and thus can be used for water/ wastewater treatment.

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COMBAT HERBS FOR CANCER: A REVIEW

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ABSTRACT
The present review describes 38 herbs used in the treatment of cancer. These herbs are reported to be used in blood cancer, intestinal cancer, breast cancer, liver cancer, throat cancer etc. This review provides traditional knowledge to research communities involved in cancer diagnosis and treatment.

Keywords: Herbs, Cancer treatment

INTRODUCTION

Plants used for the treatment of many diseases since long time. It is found that people are living in vicinity of forest area; they have traditional knowledge to cure various types of diseases and ailments. Cancer is one of the diseases which cause death in developed as well as undeveloped countries. There are many types of therapies depends on the type of cancer viz. surgery, radiation therapy, chemotherapy, immunotherapy, targeted therapy, hormone therapy, stem cell transplant etc. Many institutes and hospitals are involved in diagnosis and treatment of cancer in the world.

Tribal medicine men, herbal plant practitioners and local people used plants for the treatment of cancer. In present review, attempt has made to find out plants used to cure cancer by tribals and non- tribals. During the literature survey, total 38 plant species found to be used for the treatment of cancer from different localities. Plants those are used for the treatment of cancer as traditional medicine are enumerated with their citation as follows.

1. *Aegle marmelos* (L.) Corrêa
   Kala (2006) reported fruit powder exhibited anti-cancerous properties.
2. *Agave americana* L.
   Tribal people and medicinal practitioners of 'Chatara' block of Sonebhadara district of Uttar Pradesh used leaf to cure cancerous ulcers. The plant is locally known as *Rambans* (Singh *et al*, 2010).
3. *Annona squamosa* L.
   Singh *et al* (2010) documented traditional knowledge on cancer treatment. Leaves and fruits are useful to cure tumor and cancer.
4. *Argemone mexicana* L.
   Malasar tribals in Coimbtore district of Tamil Nadu used roots for cancer treatment (Venkataswamy *et al*, 2010).
5. *Bacopa monnieri* (L.) Wettst.
   During the ethnobotanical survey of wild flora at G. Udaygiri forest in Kondhamal district of Eastern Ghats, Odisha, Shadangi *et al* (2012) reported leaves used for tumor and cancer.
6. *Baliospermum solanifolium* (Burm.) Suresh
   People of Santor and Mount Abu (Shirohi district of Rajastan) applied clarified butter on affected area and tied leaves to reduce node (cancer) and node subsides (Negi *et al*, 2012).
7. *Boerhavia diffusa* L
   Negi *et al*, 2012 documented red flowers variant in treatment of blood cancer from Santor and Mount Abu region of Shirohi district, Rajastan. Rahul (2013) reported whole plant used in cancer treatment by rural people of Taindol village of Jhasi district (Bundelkhand, Uttar Pradesh).
8. *Bryophyllum pinnatum* (Lam.) Oken
   Five to ten drops of extract of aerial plant used to cure blood cancer (Hutke *et al*, 2012).
9. *Cannabis sativa* L.
   Rahul (2013) documented flower and fruits for treatment of cancer from Taindol village of Jhasi district (Bundelkhand, Uttar Pradesh).
10. *Carissa carandas* L
    Ethnic group of Thottianaickans of Semmalai hills of Tamil Nadu taken root bark paste with goat meat (Ganesan *et al*, 2006).

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11. *Cassia fistula* L
Tribal people of Bidar district of Karnataka applied fruits (crushed with water) at affected parts till cure (Prashantkumar and Vidyasagar, 2006).

12. *Catharanthus roseus* (L.) G.Don
Villagers of Madurai, Dindigul and Theri districts of Tamil Nadu used dry bark powder (Rajenran *et al*, 2008). Natarajan *et al* (2010) reported that leaves boiled and orally taken by Malligainnatham villagers, Kandarvakottai taluk, Pudukottai district, Tamil Nadu. For blood cancer plant decoction given by traditional healers in Gulbarga district of Karnataka (Ghatapanadi *et al*, 2011). Leaves (juice) are taken for mouth ulcers and different types of cancers by Malyali tribe Kalarayan hill Taminl Nadu (Natarajan *et al*, 2012). Leaf extract used by tribals of Bankura district of West Bengal (Sinhababu and Banerjee, 2013) and Taindol village, district Jhashi, Bundelkhand, Uttar Pradesh (Rahul, 2013). Razafindrafe (2013) reported whole plant used in treatment of cancer from Southern Madagaskar. Juice of whole plant is used by Irula tribe of Thirumurthi hill of western Ghats, Tamil Nadu (Vijayalakshmi *et al*, 2014).

13. *Clematis vitalba* L.
Popovic *et al* (2012) reported that plant used for treatment of cancer from Deliblato sands (Serbia).

14. *Coleus forskohlii* (Willd.) Briq.
For the treatment of intestinal ulcers and cancer *Bhotias* people of Dharchulha in Pithorgarh (Uttranchal) given dried roots to chew (Garbyal *et al*, 2007).

15. *Curcuma longa* L.
Bhardwaj and Gakhar (2005) documented traditional knowledge of tribals of Mizoram, taken rhizome of the plant (crushed with leaves of *Mikania micrantha*) for the treatment of breast cancer.

16. *Dalbergia sissoo* DC.
Seeds used to cure breast cancer reported by Joshi and Tyagi (2011) from Himalyan region of Uttrakhand.

17. *Derris scandens* (Roxb.) Benth.
For the treatment of cancer like wounds and tumor in throats rural people of Kalarayan and Shevarayan hills, Eastern Ghats, Tamil Nadu used bark and stem (Kaduvul and Dixit, 2009).

18. *Dillenia indica* L
Bark (paste) filtrate mixed with water and kept overnight and taken to cure blood cancer (Majumdar *et al*, 2006).

19. *Dioscorea alata* L.
Residents of Dibru- Saikhowa biosphere reserve, Assam applied tuber paste on cancerous wounds (Purkayastha *et al*, 2007).

20. *Euphorbia hirta* L.
People of Sheshachal heal range of Kadapa district; Andhra Pradesh (India) used entire plant for the treatment of cancer (Reddy *et al*, 2011).

21. *Hedera nepalensis* K.Koch
Ahmad *et al* (2014) reported leaves to cure cancer.

22. *Holoptelea integrifolia* Planch.
Tribal people of Betul district of Madhya Pradesh used stem bark paste externally in cancer (Jain *et al*, 2010).

23. *Juniperus communis* L.
Berries, fruit and wood reported to be used in folk remedies of cancer from Neelam valey and Muzafrabad of Kashmir (Ishtiaq *et al*, 2013).

24. *Litsea glutinosa* (Lour.) C.B.Rob.
Stem bark decoction given internally to cure cancer in Balaghat district of Madhya Pradesh (Jain *et al*, 2011).

25. *Nerium oleander* L.
Murad *et al* (2013) reported leaves extract used for remedy of cancer from Banda daud shah, district karak, Pakistan.

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26. *Plumbago zeylanica* L.
    Juice of whole plant is given to treat cancer by Oromo people, Ghimbi district southwest Ethiopia (Abera, 2014).
27. *Pteridium aquilinum* (L.) Kuhn
    Popovic *et al* (2012) reported root used for cancer treatment from Deliblato sands (Serbia).
28. *Ricinus communis* L
    Seed oil is used to treat cancer by people of plains of Yamuna Nagar district, Hariyana (Parul, 2015).
29. *Schleichera oleosa* (Lour.) Merr.
    Local people of Udaygiri forest eastern Ghat, Orisa used barks and stem for cancer treatment (Shadangi *et al*, 2012).
30. *Scrophularia nodosa* L.
    Popovic *et al* (2012) reported from Deliblato sands (Serbia) used whole plant for cancer treatment.
31. *Solanum trilobatum* L.
    Natarajan *et al* (2010) recorded leaves boiled and drunken regularly to cure cancer by Malligainnatham villagers, Kandarvakottai taluk, Pudukottai district, Tamil Nadu.
32. *Tabernaemontana divaricata* (L.) R.Br. ex Roem. & Schult.
    At the preliminary state, leaf twigs extracted and is taken as remedy for cancer by Hmar tribe of Cachar district, Aasam (Nath and Chaudhary, 2010).
33. *Taxus wallichiana* Zucc.
    Kunwar *et al* (2010) reported juice of bark and leaf used for cancer treatment from West Bengal. It is also reported from Neelam valey and Muzafrabad of Kashmir by Ishtiaq *et al* (2013).
34. *Thysanolaena latifolia* (Roxb. ex Hornem.) Honda
    Inflorescence paste is mixed with slaked lime and applied to cure boils and cancer by Khasi traditional healers and village folks in Meghalaya (Hynniewta and Yogendra kumar (2008).
35. *Tinospora sinensis* (Lour.) Merr.
    Ten gram green leaves of wheat and leaves of *Tinospora sinensis* crushed with water and used to cure cancer by Tribe of Amarawati district Maharashtra (Hutke *et al*, 2012).
36. *Viola pilosa* Blume
    Flowers are reported to be used in cancer treatment from Buner district, NWFP, Pakistan (Hamayun, 2006).
37. *Vitex negundo* L.
    Ladda and Magdum (2012) recorded that decoction of leaves used in cancer treatment.
38. *Ziziphus jujuba* Mill.
    Fruit extract used by tribal people of Deori taluka, Gondia district of Maharashtra for the treatment of Liver cancer (Ghosal *et al* (2013).

CONCLUSION

Literature survey indicates that *Catharanthus roseus* is widely used in the treatment of cancer. Four plant species viz. *Boerhavia diffusa, Bryophyllum pinnatum, Catharanthus roseus* and *Dillenia indica* are used to cure blood cancer. In breast cancer *Cassia fistula, Curcuma longa* and *Dalbergia sissoo* are used by people of N. E. India. *Coleus forskohlii, Ziziphus jujuba* and *Derris scandens* are used in the treatment of intestinal cancer, liver cancer and throat tumors respectively and rest of the herbs are used to cure cancers in different regions of India. The present review provides traditional knowledge to research communities involved in cancer diagnosis and treatment.

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POLLINATION BIOLOGY OF OKRA (*ABELMOSCHUS ESCULENTUS* L. MOENCH)

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ABSTRACT
Okra [Abelmoschus esculentus (L.) Moench] breeders have long recognized the importance of alien germplasm as sources of genes for biotic and abiotic stress resistance in crop improvement programs. However potential uses of these alien germplasm in improvement of desirable traits are often limited by pre or post-fertilization barriers. In our study, pollination biology was studied with respect to the behavior of pollen and pollen tubes of okra. Fluorescein diacetate and Aniline Blue method were used to access the pollen viability and growth of pollen tube in pistil. Highest pollen viability was observed within one hour after anthesis which drastically declined with time in okra. Normal growth of pollen tubes with higher rate of success of fertilization was observed upon selfing in A. esculentus.

Keywords: Abelmoschus, Aniline blue, Okra, Pollination biology

INTRODUCTION
The cultivated okra [*Abelmoschus esculentus* L. (Moench), Malvaceae] is an important multipurpose vegetable grown throughout the all environmental conditions in India. Okra has an ideal ratio of essential nutrients, proteins, fats and carbohydrates in fruits and therefore, popular as a valuable supplementary food in the tropical diet (Patil et al. 2013). Over past ten years the average productivity of okra increased by only 3.1 mt/ha (in 1991-92 productivity was 8.5 mt/ha) while, in 2010-11 productivity has raised to only 11.6 mt/ha (NHB database-2011), which is less than the productivity (15mt/ha) realized through the trails in India. The low productivity in okra is attributed to poor seed replacement due to the limited availability of quality seed and high incidence of pests (jassids, white fly and borers) and yellow vein mosaic virus (YVMV) which severely affects the crop resulting in low production (Jambhale and Nerkar 1981).

Genetic resistance involving interspecific crosses in okra have been exploited commercially time to time for YVMV and other abiotic stress. Hence hybrids are very much admired in this crop and the hybrid seed production is based on traditional breeding techniques such as hand emasculation and hand pollination. Any hybrid seed production program of vegetable crop requires basic knowledge of its pollination biology (Tyagi 2002). An understanding of the biological nature of the incompatibility systems that prevent hybridization and/or seed development is most essential for the successful hybridization and introgression between okra and its wild relatives. Hence, in the present study, pollen viability, pollen tube germination and its growth, fertilization pathway was observed.

MATERIAL AND METHODS
The study was conducted on Pusa Sawani, popular growing cultivar in India. Emasculation of unopened flower buds was done by removing the petals and undehisced anthers with a small knife in the afternoon between 4:00 and 6:00 pm and was covered with paper bags. The pistil from self-pollinated flowers were collected at 1, 2, 4, 8, 12 and 24 hours after pollination (HAP) and fixed in FAA solution (5% formalin: 5% acetic acid: 90% ethanol) for 12h and then transferred in 70% ethanol for further process. Pistils were stained with 0.001% Aniline blue dissolved in 0.1% K3PO4 solution (Kho and Baer 1968) for at least 15 minutes. Pollen viability was observed by FDA (Fluoroscein di-acetate) test. The observations were carried out under Leica DM 5000B fluorescent microscope at 390 to 420nm with a 450nm emission filter. Quantification of fertilization barriers was done as pollen grains observed on stigma (Phase I), percentage of pollen germination and further growth of pollen tube subsequent to stigma (Phase II), style and up to the ovary (Phase III) and inside the ovary (Phase IV).

RESULTS AND DISCUSSION
The flowers were hermaphrodite, with terminal style and papillate stigma having 5 lobe. The time of anthesis varied with cultivar, temperature and humidity. In the present study, flowers fully opened at 9:00 to10:00am and closed by 3:00 to 5:00pm on the same day in the month of November to January at the temperature ranging from 28-30^{0}C. The dehiscence of anther was transverse and occurred 15-30min after anthesis and pollens were found viable only for 1hr after anther dehisces and pollen viability declined further with time. This indicates that morning time is quite effective to increase rate of success of crossing efforts in okra.

The pathway of the events which contributed to the successful fertilization in *A. esculentus* was traced with the help of Aniline Blue Florescent (ABF) method. Pollen grains germinated quickly on the papillate stigma and

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produced pollen tubes in a polysiphonous manner. Pollen adhesion, hydration, germination and penetration of pollen tube into the stigma were found to be completed within an hour after deposition of pollen on stigma. During next 6 hrs pollen tubes travel through the transmitting tissue and after 8 hrs reaches the ovary. This reproductive pathway have been divided in four phases (I, II, III, IV) depicting pollen tube growth on stigma (phase I), in the style (phase II), entry into the ovary (phase III) and growth inside the ovary (phase IV) as shown in Figure 1. This finding can help to trace the pre- and post-fertilization barriers reported by Abdullah et al., (2000) and Tyagi (2002). Also, present study suggest that morning time, especially 8:00 am to 9:00 am is most suitable time for conducting crossing experiments in okra. Knowledge of pollination biology play a crucial role in planning of breeding programs. Therefore, present research work, definitely, boost the efforts of okra breeders to develop new okra varieties.

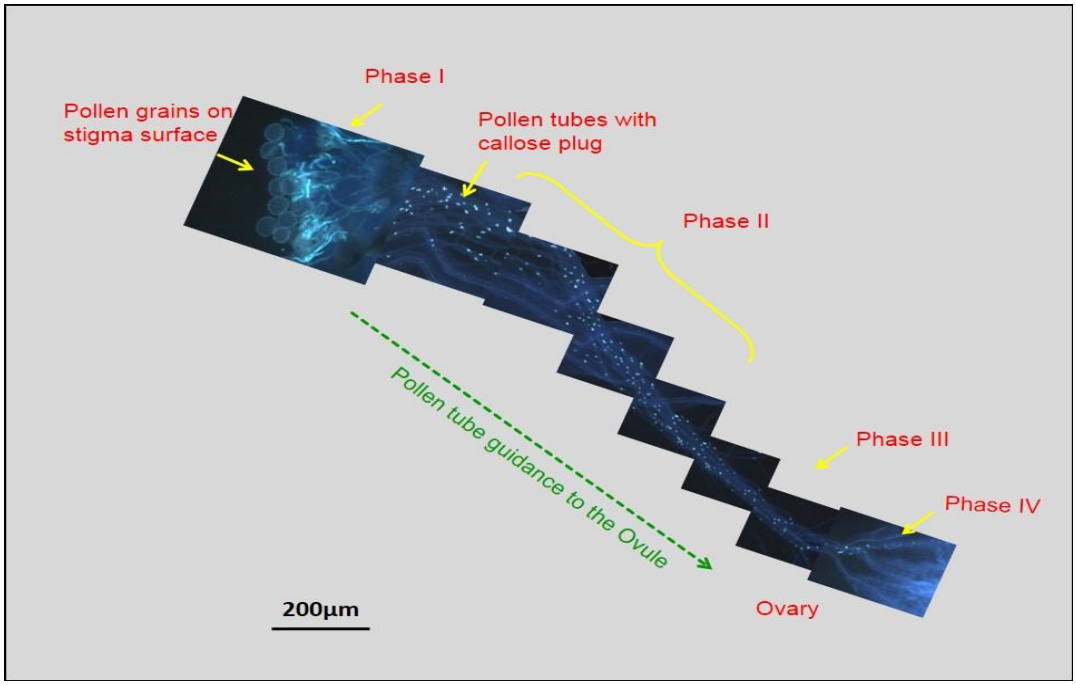

Figure 1 Reproductive pathway in okra traced by Aniline blue method showing various phases in pistil.

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FISH DIVERSITY OF SAUNDAD LAKE, DISTRICT GONDIA, (M.S.) INDIA

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ABSTRACT
The present study deals with fish diversity undertaken during period June 2012 to May 2013to census and commercially important fishes in the Saundad Lake. The present paper deals with the variety and abundance of fresh water fishes in Saundad Lake, Dist. Gondia (M.S.) India. The results of present investigation reveal the occurrence of 40 fish species belonging to 6 orders, 15 families and 23 genera. Among the collected species, order Cypriniformes was most dominant constituting 50% followed by order Siluriformes constituting 19% order Perciformes constituting 14.28%, orders Osteoglossiformes 9.58%and Synbranchiformes constituting 4.76% and orders Beloniformes constituting 2.38% of the total fish species.

Keywords : Fish diversity, Economic value, Nutritive Value, Saundad Lake.

INTRODUCTION
Biodiversity is essential for stabilization of ecosystem, protection of overall environmental quality for understanding intrinsic worth of all species on the earth.[Ehrlich, P.R. and E.O. Wilson, 1991]. Fish biodiversity of reservoir essentially represents the fish faunal diversity and their abundance. Reservoir conserves a rich variety of fish species which support to the commercial fisheries.

Fish plays an important role from ancient time in providing protein rich and less fat diet to the mankind .It is one of the main component of animal protein in diet, computed11kg/yr/person. (Government of India, 1980) Fishes are one of the important elements in the economy of many nations as they have been a stable item in the diet of many people. They constitute slightly more than one-half of total number of approximately 54,711 recognized living vertebrate species; there are descriptions of an estimated 27,977 valid species of fishes [Nelson, J.S., 2006].

In India potential of fish culture is yet to be fully exploited. Fishes being rich source of proteins and have high nutritive value. Extensive development of aquaculture needs to be given priority after green revolution to feed ever growing population. Success of fish culture depends apart from other factors, on selection of suitable species. Secondly the country is rich in diversity of such important group of animals. Further, there is a need of a survey of diversity of fishes in different types of habitats of Reservoir all over the country.

The total area of Saundad Lake is 80 hectare. It has catchment area of 100 sq.km. The catchment area of lake occupied by forest.It has capacity to irrigate 100 hectare. The length of Embankment is 1.0 km. Lake divided in to two parts due to crossing of national highway (Bombay-Kolkata) no.6.

Present investigation was undertaken to study the fish diversity of Saundad Lake, Ta. Sadak/Arjuni, Dist. Gondia (M.S.) India. the objective of study was to give recent data regarding Fish diversity of the this reservoir, aiming to contribute a better knowledge of the fish diversity and a tool for conservation planning of aquatic environments in this region. It is the first effort made in this direction, various indigenous, commercially important and economically valuable fishes were found in the Lake.

MATERIAL AND METHODS
Fishes were collected from Saundad Lake Dist. Gondia (M.S.) India with the help of local fishermen using different type of nets namely gill nets, cast nets, dragnets and Bhor jal. Immediately photographs were taken with help of digital camera.

Fishes were brought to laboratory and preserved in 10% formalin solution in separate specimen jars according to the size of species. Small fishes were directly placed in the 10% formalin solution.While large fishes were given an incision in their abdomen and preserved.

The Meristic and morphometric characters collected fishes were measured an identified up to the species level, with the help of standard keys and books (Day, F., 1967, Jayaram, K. C., 1999.Talwar, P.K. and A. Jhingran, 1991).

RESULT
During the study period different fish varieties have been observed in the Saundad Lake, Dist. Gondia (M.S.) India. The results showed that the area was rich in fish diversity. Fishes belonging to 6 orders and 15 families

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were collected during course of the study period. Many collected fishes having economic importance sold after collection in the local fish market. In the present fish diversity study 40 species of 23 different genera 15 families and 6 orders were recorded from the Saundad Lake number of catches carried out during June 2012 to May 2013. The members of Order Cypriniformes were dominated by 15 species followed by Siluriformes 6 species, Perciformes 7 species, Osteoglossiforms 4 and Synbranchiformes with 6 species each and Beloniformes 2 species each.

15 fish families represented by 40 fish species, Family Cyprinidae was dominant group with 13species in the assemblage composition in which *Garra Lamta, Rasbora daniconius* and *Puntius ticto* were found most abundant. *Catla-caltla, Puntius punctius, Puntius sarana sarana, Puntius sophore, Lebeo rohita, Cyprinus carpio, Hypothalmichthys molitrix, Chela bacaila, Cirrhinus mrigala* found abundant. *Cirrhinus reba, Labeo calbasu* and *Gambusia affinis* were found less abundant. Followed by Family Bagridae in which *Mystus cavasius* was found abundant. *Mystus aor* (*Aorichthys*), and *Mystus Seenghala* were found less abundant.

Among Family Channidae *Channa striatus* was found less abundant while *Channa punctatus* and *Channa gaucha* were found abundant. Followed by Family Notopteridae in which *Notopterus Notopterus* was found abundant. *Notopterus chitala* was found rare. Family Siluridae in which *Wallago attu* was found abundant. Family Ompok bimaculatus was found rare.Family Mastacembelidae in which *Mastacembelus armatus* and *Mastacembelus pancalus* were found less abundant. Followed by family nandidae in which *Nandus nandus* where found less abundant. Family Ambassidae in which *Chanda nama* and *Chanda ranga* are found less abundant.Family Claridae in which *Claris batrachus* found abundant.

Family Mugilidae in which *Mugil cephalus* was found rare.Family Belonidae in which *Xenentodon cancila* was found rare. Family Cichlidae in which *Oreochromis mossambica* were found abundant.Family Anabantidae in which *Anabas testudineus* were found abundant.Family Gobiidae in which *Glassogobius giuris* were found rare.

Fourty Eight species were identified and recorded in the Shionibandh Reservoir. Among these order Cypriniformes was most dominant constituting 50% followed by order Siluriformes constituting 19%, order Perciformes constituting 14.28%, orders Osteoglossiformes 9.58% and Synbranchiformes constituting 4.76% and orders Beloniformes constituting 2.38% of the total fish species showed in the (Fig. 1).

Fishing operations were done throughout year with so many different fish species catches in monsoon compared to post monsoon and summer seasons.

Table 1 : The fish diversity and Economic value of Saundad Lake (June 2012 to May 2013)

S.No.	Order	Family	Scientific name	Common name	Status
1	Osteoglossiformes	Notopteridae	*Notopterus notopterus*	Feather back	+
			Notopterus chitala	Moy	-
2	Cypriniformes	Cyprinidae	*Catla catla*	Catla	++
			Garra lamta	Garra	+++
			Rasbora daniconius	Black line Rasbora	+++
			Rasbora rasbora	-	++
			Cyprinus carpio	Common carp	++
			Puntius ticto	Ticto	+++
			Puntius amphibious	Khavli	++
			Puntius sarana sarana	Khavli	++
			Puntius sophore	Sophore	++
			Cirrhinus mrigala	Mrigala	++
	Cypriniformes	Cyprinidae	*Cirrhinus reba*	Reba	+
			Labeo rohita	Rohu	++
			Labeo calbasu	Calbasu	+
			Labeo bata	-	+
			Oxygaster bacaila	Indian glass barb	+
		Bagridae	*Mystus aor (Aorichthys)*	Aor	+
			Mystus cavasius	-	+
			Mystus seenghala	Seenghala	+
3	Siluriformes	Siluridae	*Ompok bimaculatus*	Buter cat fish	-

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			Wallago attu	Fresh water shark	+
		Claridae	*Claris batrachus*	Mangur	++
		Sisiridae	*Glyptothorax spp.*	-	-
		Heteropneustidae	*Heteropneustus fossillis*	Singhur	-
4	Beloniformes	Belonidae	*Xenentodon cancila*	Kowa	
			Gadusia chapta	-	+
5	Synbranchiformes	Mastacembelidae	*Mastacembelus armatus*	Baam	+
			Mastacembelus pancalus	Malga	+
			Mastacembelus aculeatus	-	+
		Cichlidae	*Tilapia mossambica*	Telapi	+
6	Perciformes	Anabantidae	*Anabas testudineus*	Koi	+
		Gobiidae	*Glassogobius giuri*	Goby	-
		Nandidae	*Nandus nandus*	-	-
		Ambassidae	*Chanda ranga*	Glossyfish	++
			Chanda nama	-	-
		Channidae	*Channa striatus*	Banded snake head	+
			Channa punctatus	Spotted snake head	++
			Channa gaucha	Dhok	-
			Channa marulius	Maral	+

*Most abundant; ++ +, Abundant; ++, Less abundant; +, Rare; -.

DISCUSSION

Sakhare, V.B. and P.K. Joshi,(2003) Reported 34 species of fishes in reservoirs of Parbhani Dist. of Maharashtra.India (Shinde, S.E., et.al, 2009]) Reported the lchthyofauna of Harsool-Savangi Dam Aurangabad (M.S.) India. Total 15 fish species belonging to 3 orders, 4 families and 12 genera. The order cypriniformes found dominant with 11 species, followed by perciformes 3 species and siluriformes with 1 species.Mahapatra, D.K., (2003)Recorded abundance of catfishes in Hirakund reservoir (India). Total 43 species were present in which 18 were commercially important.

The work has been concluded with future strategies for development of fish fauna conservation of Saundad Lake, Ta.Sadak/Arjuni, Dist. Gondia (M.S.) India. Recent data regarding Fish diversity of the Saundad Lake, aiming to contribute a better knowledge of the fish diversity planning of aquatic environments in this region. To maintain Fish biodiversity has an immense importance as it is not always possible to identify individual species critically to sustain aquatic ecosystem.

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IN-VITRO EVALUATION OF 2'-HYDROXY CHALCONES FOR ANTIOXIDANT ACTIVITY

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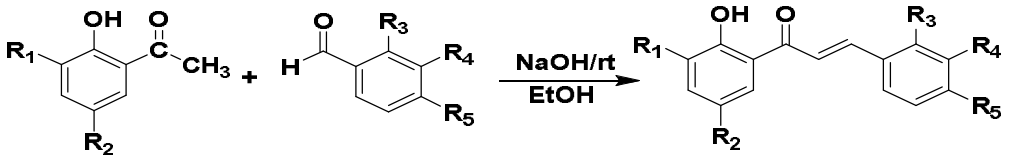
ABSTRACT
Chalcone are an important class of natural product, they are found to be much in use for their therapeutic properties. They are also used as precursors for the synthesis of different heterocyclic derivatives. In the present work 2'-hydroxy chalcone are synthesized by halogen substituted 2'-hydroxy acetophenone and different aromatic benzaldehydes. An array of novel chalcones from different aromatic benzaldehyde and differently halogen substituted acetophenone were synthesized by Claisen-Schmidt condensation in the presence of aqueous 50% sodium hydroxide at room temperature and assessed for their antioxidant activity. The structure of these chalcone have been determined by physical and spectral method such as melting point, IR, MASS ,[1] H-NMR spectroscopy.

INTRODUCTION
The chalcone are naturally occurring compound belonging to the flavonoid family. Specificity of chalcone is specific ring system linked by an aliphatic three carbon chain in which carbonyl group is linked with double bond[1]. So that variety of novel heterocyclic compound with good pharmaceutical profile can be designed. Kostaneki S.V. and Tambor [2] gave the name "chalcone" are an important class of compound which are good intermediate for the synthesis of various heterocyclic compound like pyridin , pyrimidine, pyrazoline, Iso-oxazole.[3] Chalcone exhibit high reactivity due to α, β-unsaturation present in the compound. Chalcone have been revised for their wide biological activities such as anticancer[4], antitubercular[5], anti HIV[6], antibacterial,[7] antitumor[8], antiinflamatory[9], antioxidant [10]. In the recent year, chalcone and its substituted derivatives play a significant role in pharmaceutical chemistry. Chalcone have been proved to be having promising therapeutic efficacy in the management of many human cancer.[11]

Chalcones continue to attract considerable scientific attention because of their diverse biological activities. Venkadari Srinivasrao *et al* synthesized a series of brominated chalcone[12] and Saiharish Ragvan *et al* synthesized vanilline chalcone[13] evaluate and their biological activity and found that the potencies' of these compounds were comparable or better than that of the well known drugs. Similarly as part of our continuous research interest in the chemistry of 2'-hydroxy chalcone which is core system in various synthetic pharmaceutical with broad spectrum of biological activities, we report here in the convenient synthesis of some novel 2'-hydroxy chalcone (1a-f) starting from halogen substituted 2'-hydroxy acetophenone and vanilline, 2-bromo benzaldehyde. The antioxidant activities of synthesized chalcones are described.

2. METHOD AND RESULT

2.1 Chemistry
The synthesis of chalcone (1a-f) was accomplished by Claisen –Schmidt condensation[14], in 95% ethanol between the substituted acetophenone and vanilline, ortho bromo benzaldehyde. In the synthesized chalcone, only *trans* double bond was obtained. All synthesized compound were characterized by spectral data, (IR, ^{1}H-NMR and MASS) which is consistent with the proposed structure. The purity was established by TLC. The stereochemistry around the olefinic double bond was established using corresponding, ^{1}H-NMR coupling constant.



Tabele 1: Substitution pattern and yields for compounds (1a-1f)

Sl. No.	R^1	R^2	R^3	R^4	R^5	Yield %
1a	Br	Br	Br	H	H	60
1b	I	I	Br	H	H	62
1c	I	Cl	H	OCH_3	OH	60
1d	I	I	H	OCH_3	OH	70
1e	I	CH_3	H	OCH_3	OH	68
1f	Br	Br	H	OCH_3	OH	65

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3 EXPERIMENTAL SECTIONS

3.1 Chemistry

All the starting materials are commercially available research grade chemical and used without purification. Melting points were determined in open capillary tube using melting point apparatus and are uncorrected. 1H-NMR spectra were measured in deuterated (CDCl3) on an EA 400 MHZ NMR spectrophotometer. IR spectra were recorded on Shimadzu FT-IR Spectrometer using KBr pellets.

Reaction progress was monitored by (TLC), using silicagel plate and pet ether ethyl acetate (7:3) as eluent system. The spot were visualized in an ultraviolet light at δ λ=254-266nm.

3.2 General procedure for synthesis of chalcone (1a-1f)

A mixture of the corresponding acetophenone (0.001mol) and aldehyde (0.001mol) were dissolved in ethanol (15 ml), under stirring and aqueous KOH (50% 12 ml) was added drop wise. The reaction mixture was stirred at room temperature and kept overnight in a bulb oven at 50-60^{0}C. After 14 to 16 hr, the reaction mixture was diluted with H_2O and acidified with HCl (10%). The separated solid was filtered and crystallized from glacial acetic acid afforded crystalline chalcone.[15]

1a: (E)-1-(3,5-dibromo-2-hydroxy phenyl)-3-(2-bromophenyl)prop-2-en-1-one

IR (KBr, cm^{-1}): 3442 (OH), 1647 (C=O), 1574 (CH=CH); ^{1}H-NMR(DMSO-d_6): δ 13.52 (s, 1H, OH), 8.31-8.34 (d, *J*=16 Hz, H_α), 7.66-7.69 (d, *J*=12Hz, 1H, H_β), 7.30-7.97 (m, 6H, Ar-H); Mass: (M^+): m/z 460.94.

1c: (E)-1-(5-chloro-2-hydroxy-3-iodophenyl)-3-(4-hydroxy-3-methoxyphenyl)prop-2-en-1-one

IR (KBr, cm^{-1}): 3438 (OH), 1649 (C=O), 1582 (CH=CH); ^{1}H-NMR(DMSO-d_6): δ 13.62 (s, 1H, OH), 12.60 (s, 1H, OH), 7.91-7.95 (d, 1H, *J* =16 Hz, H_α), 7.50-7.58 (d,1H, *J*=12Hz, 1H, H_β), 7.00-7.60 (m, 5H, Ar-H), 4.04(s, 3H, OCH_3); Mass: (M^+): *m/z* 431.82.

1d: (E)-1-(2-hydroxy-3,5-diiodophenyl)-3-(4-hydroxy-3-methoxyphenyl)prop-2-en-1-one

IR (KBr, cm^{-1}): 3427 (OH), 1643 (C=O), 1567(CH=CH); ^{1}H-NMR(DMSO-d_6): δ 13.60 (s, 1H, OH), 12.57 (s, 1H, OH), 7.91-7.94 (d, 1H, *J* =16 Hz, H_α), 7.31-7.35 (d,1H, *J*=12Hz, 1H, H_β), 7.00-7.79 (m, 5H, Ar-H), 4.07(s, 3H, OCH_3); Mass: (M^+): *m/z* 522.89.

Table II Elemental Analysis

Compound	Molecular Formula	Melting Point ^{0}C	Elemental analysis	
			Calculated	Found
1a	$C_{15}H_9Br_3O_2$	152	C 39.09, H 1.97	C 39.05, H 1.91
1c	$C_{16}H_{12}ClIO_4$	148	C 44.63, H 2.81	C 44.57, H 2.78
1d	$C_{16}H_{12}I_2O_4$	127	C 36.81, H 2.32	C 36.79, H 2.34

4. EVALUATION OF ANTIOXIDANT ACTIVITY

Antioxidant activity of synthesized compound was evaluated by DPPH and OH radical

DPPH assay

DPPH (2, 2, diphenyl-1-picrylhydrazyl) radical scavenging assay was carried out as per reported methods with slight modification (Kato *et al.*, 1998). Briefly, 1ml of test solution (Test compound) added to equal quantity of 0.1mM solution of DPPH in ethanol. After 20 min incubation at room temperature, the DPPH reductions were measured by reading the absorbance at 517 nm. Ascorbic acid used as reference compound.

Hydroxyl radical scavenging assay

Hydroxyl radical scavenging activities were determined by the earlier reported method (Yu *et al.*, 2004). The reaction cocktail contained 60 µl of 1 mM, $Fecl_3$, 90 µl of 1 mM 1,10-phenanthroline, 2.4 ml of 0.2 M phosphate buffer (pH 7.8), 150 µl of 0.17 M H_2O_2, and 1.5 ml of various concentration of individual compound. Reaction mixture kept at room temperature for 5 min incubation and absorbance was measured at 560 nm using spectrophotometer. α- Tocopherol was used a reference compound.

Table III. DPPH radical scavenging activity and OH radical scavenging activity

Sr. NO.	Name of compound	DPPH	OH
1	1a	14.30±0.67	25.65±0.88
2	1b	19.79±0.34	13.27±0.92
3	1c	31.19±0.02	36.45±0.17
4	1d	3.70±0.63	13.35±0.06
5	1e	13.50±0.96	18.37±0.52
6	1f	33.50±0.96	14.46±0.14

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7	STD	93.11±0.15	90.87±0.98

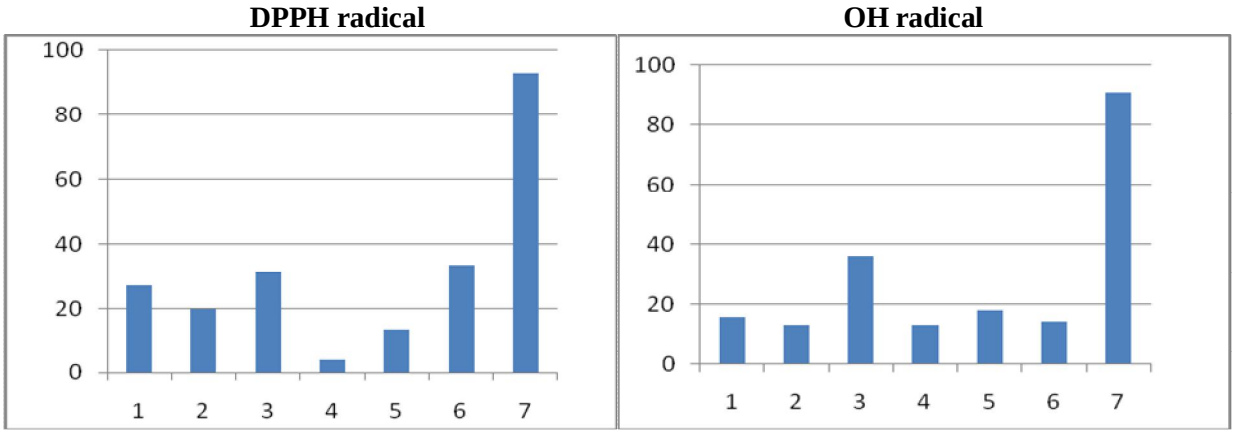

Figure I. Antioxidant activity DPPH and OH radical scavenging activity of synthesized compounds.

5.CONCLUSION

In conclusion, here we have reported some novel chalcones using halogen substituted ortho hydroxyl acetophenone with two different aromatic aldehydes with better yield. The newly synthesized chalcone were confirmed by spectral analysis and further evaluated for their antioxidant activity. The above result we concluding the compound 1c was showing the good antioxidant activity. The reason is due to that compound contain two different halogen group. We concluding the compound 1c is may be best fit molecule having the antioxidant activity. All other compound showed good activity.

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DEVELOPMENT OF GREEN ECOFRIENDLY PRODUCTS BASED ON NATURAL VEGETATION

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ABSTRACT
Now a day's people are very much aware of the ingredients in cosmetics products, the benefits of plant products and harmful effects of chemical ingredients. Most of the commercial soaps and detergents contain chemicals that can be harmful to the skin. Using a natural herbal soap and detergents can be a good alternative. Herbal soaps and detergents are made using natural herbs and ingredients that are healthier and beneficial for the skin. The Soap and Detergent industry is profoundly lucrative with splendid market potential as well as bright future scope.

In these article, we have discussed the synthesis of novel ecofriendly polymer based on natural resources like herbal plants, carbohydrates , starch, castor oil, coconut oil, rosin,etc with minor amount of petroleum products and then application of these polymer in manufacturing of liquid, powder and cake detergent. These detergents further analyzed for various physicochemical properties. The prepared detergent product compared with in all aspect of study with commercially available products. It is found that prepared formulation of detergents are technically feasible, economic & ecofriendly. It requires small setup for running small scale industry. So synthesis of novel ecofriendly polymer & their industrial application in detergent formulations are cost effective and a novel approach towards green economy.

Keywords: Ecofriendly, coconut oil, Rosin, Laundry Liquid Detergents, Polymeric Surfactant.

INTRODUCTION
In India, we have a very vast potential of renewable vegetable sources. Various plants, oilseeds, herbs are a great natural treasure available with us. We have to use these products as substitutes for petroleum products. We have specially chosen coconut oil and rosin for our studies.

Coconut oil is an edible oil with enormous industrial use extracted from the kernel or meat of matured coconut harvested from the coconut palm.

Rosin is the residue obtained from the distillation of pine exudates. Rosin is also abundantly available and widely used in a large number of industrial products like paints, detergents, cosmetics and pharmaceuticals.

In this paper we have depicted the synthesis of novel alkyd polymers based mainly on natural products such as coconut oil, rosin and linseed oil.

A novel polymeric surfactant based on coconut oil1, maleic anhydride2 and rosin3 has been synthesized, technically it is a rosinated4 short oil alkyd resin5 resin has been successfully used as polymeric surfactants in various powder and liquid detergents. In this piece of research work, the mole ratio, catalyst and heating schedule has been standardized to get a alkyd resin with molecular weight in the range of 3000 to 5000. The conditions have been worked out to get desired acid value6, hydrophilic-lipophlic balance7, viscosity8 and solubility characteristics. An effort has been made to replace crude petroleum based acid slurry and sodium lauryl sulphate(SLS) with novel polymers. Two selected polymers have been used for formulation of powder. (Given in table no.1) The special feature of our polymers is use of 30 to 40% rosinand coconut oil 40 to 50%, which is abundantly available. The other ingredients are minor proportions of glycerol 10% and maleic anhydride 7.5%. The combined used of rosin and coconut oil gives good foaming and cleaning properties.

This shows our effort to promote the use of ecofriendly and biodegradable polymers in commercial products like paints, lubricants and detergents.

It will be a great value to examine usage of such materials as polymeric surfactants.

METHODOLOGY
- Coconut oil has been specially chosen as an ingredient in all the Novel formulations. Coconut oil is available in huge quantities in our country. Therefore it is our aim to develop value added product from coconut oil for export purpose.

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- Rosin has some positive attractive features as an ingredient for alkyds. First of all being a monobasic acid it controls the polymerization reaction as a chain stopper. Secondly it has a natural tendency of making good emulsion. We can utilize this characteristic for development of novel water based composition
- The use of small proportion of maleic anhydride and benzoic acid give additional control in resin synthesis. The maleic anhydride is known to accelerate the rate of body, durability and hardness. Thus the use of maleic anhydride from 5 to 10% gives us useful products in shorter time.
- Benzoic acid regulates and controls the polymerization, it is also known as a chain stopper ingredient.
- In normal alkyd synthesis of short oil alkyd we need 10 to 12 hours to get the finished product while in our synthesis the total time of reaction is 8 hrs. Thus there is a saving of time as well as energy. Benzoic acid works as a chain stopper and regulates the fast polymerization reaction.
- In our earlier attempts we have used a lower concentration of catalyst. It has been observed that a high percentage of catalyst (0.5% sodium bisulphite and 1.5% sodium bisulphate) give remarkable properties therefore in this piece of work we have used higher percentage of catalyst.

EXPERIMENTAL

A) The reactor- The preparation of polymeric surfactant was carried out in a glass reactor. The reactor consists of two parts. Lower part of the reactor is round bottom vessel with very wide mouth. The upper part of the reactor is its lid having four necks with standard joints. A motor driven stirrer was inserted in the reactor through the central neck, while another neck was used for thermometer a condenser was fitted with the reactor through the third neck. The fourth neck was used for dropping the chemicals in to the reactor. An electric heating mantle having special arrangement for smooth control of the temperature (-/+2) has been used. A regulator controlled the speed of the stirrer.

b) Preparation of Novel Polymer :

The polymer was prepared in a three neck glass reactor fitted with stirrer condenser and temperature control of +/-2 0C. A novel catalyst 1.5% sodium bisulphite and 0.5% sodium bisulphate has been used for this reaction.

C) Neutralization of novel Polymer with aqueous KOH: - 100 gm of Novel polymer was heated to 70 0C the calculated amount of 30%KOH was added to novel polymer with constant stirring so as to get slightly alkaline solution of polymer with pH of 8.

Table 1: The Best Experimental formulations of Alkyd Polymerz

S. N.	Ingredients	Formulation (%)
1	Coconut Oil	40.00
2	Rosin	42.50
3	Maleic Anhydride	07.50
4	Glycerol	10.00
5	Sodium Bisulphite (Catalyst)	0.5
6	Sodium Bisulphate (Catalyst)	1.5

Table: 2 Physico-Chemical Analysis of Novel Rosinated Alkyd Resins based on coconut oil and rosin

S.N.	Analysis	Result
1	Acid Value	30.89
2	Color	Dark brown
3	Consistency	Thick
4	HLB (By Sap. Value method)	14.2
5	Solubility	CCl_4
6	Mol. wt. (By Viscosity Avg. Method)	4618
7	Viscosity (sec) Ford Cup No.4 at 30 ^{0}C at(70:30)	289
8	Oxirane-oxygen value (By HBr method)	13.2

PREPARATION OF LAUNDRY LIQUID DETERGENT

The compositions of Laundry liquid detergents based on novel polymers are given in Tables .Required amount of novel polymer and other ingredient like acid slurry. Isopropanol, glycerin, alpha olefin sulphonate, sodium

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lauryl sulphate and sorbitol, were taken in 500ml beaker and homogenized by running the stirrer for about half an hour. A clear solution of Laundry liquid detergent was obtained after filtration. This clear liquid solution was filtered and packed in superior grade airtight plastic container. The prepared samples were analyses for various parameters such as density[9], foam height[10], surface tension[11] and percentage detergency[12].

Table 3: The Ideal Liquid Laundry Detergent Compositions

S. N.	Ingredients	LD10
1	Neutralized Acid slurry (75% solid)	1.2
2	Sodium Lauryl Sulphate	1.55
3	Alpha Olefin Sulphonate (70% solid)	7.1
4	Sodium Sulphate	5.0
5	Urea	2.5
6	Sodium Lauryl Ether Sulphate (76% solid)	10.0
7	Sorbitol (70% solid)	7.0
8	Neutralized Novel Polymer	9.6
9	Distilled Water	56.05

CONCLUSIONS

The following conclusions stand confirmed in the light of above experimental work

- Novel polymer based on vegetables renewable sources like coconut oil, rosin and glycerol can be successfully introduced in powder and liquid detergent composition from 2 to 12% without adversely affecting the foam, surface tension, cleaning and stain removing capacity. The best sample of Liquid detergent is **LD-10.**
- Acid slurry which is of petroleum origin can be replaced in substantial proportions by our novel polymer without sacrificing technical and cleaning properties.
- The samples are ecofriendly as the ingredients are of vegetables origin and we are not using sodium tripolyphosphates and acid slurry.
- Some of our compositions are best in performance and reasonable in cost they should be tried on pilot plant scale.

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GROWTH RESPONSE OF CHAETOMIUM THERMOPHILE, COONEY & EMERSON AND THERMOASCUS AURANTIACUS, MIEHEI. ISOLATED FROM SOIL

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ABSTRACT
These fungi were isolated from the coal mine soil dumping area. They are very important in fungal biotechnology and agriculture. They exist in most of environments. These fungi are called Thermophilic because they require elevated temperature for their growth. Temperature and pH requirement was studied by measuring the radial mycelial growth and mycelial dry weight. Chaetomium thermophile, Cooney & Emerson, grows rapidly to 9cm within 4 days at 50^{0}C & at pH near neutral on agar plates. Whereas, the Thermoascus aurantiacus, Miehei grows well at 45-55^{0}C, reaches upto 9cm in 4-5days and also showed broader range of pH tolerance from 5-8. These fungi are unique in their nature of growth with respect to temperature and pH requirements.

Keywords: Thermophilic fungi, temperature, pH, mycelial dry weight, radial mycelial growth.

INTRODUCTION

Depending on the temperature tolerance fungi can be categorize as psychrophiles, mesophiles and thermophiles. However, about thermophilic fungi, Cooney & Emerson (1964) formulated less elaborate definition as the thermophilic species can conveniently be defined as those with minima for growth at or above 20^{O}C and maxima for growth at 50^{O}C or above, whereas thermotolerant fungi are ones that have a thermal maximum near 50^{O}C and a minimum below 20^{O}C. Nowadays, the term thermophilous is used to designate both thermophilic and thermotolerant fungi (Mouchacca 1997).

Thermophilic fungi have worldwide distribution. It seems more likely that a generally worldwide distribution is a result of the worldwide occurrence of self heating masses (Maheshwari et al., 1987). All of which may self heat to spontaneous ignition. These fungi are believed to be significant contributors to self heating and biodeterioration in each case. These fungi have usually been sought in hot habitats; these habitats have therefore, provided the preponderance of concerning occurrence and possible growth. These fungi can grow at high temperature, in man made habitats such as cooling towers, effluents from nuclear power reactors, ducts used for thermal insulations (Johri and Satyanarayana 1986) and that the ability to do so is a dominant characteristic of these species.

The present work deals with the temperature and pH requirement studies of two thermophilic fungi isolated from coal mine soil.

MATERIALS AND METHODS

Thermophilic fungi were isolated from different soils from various areas such as coal mine soil. The isolations were made on Emersons YpSs agar medium (Thakre and Johari, 1976), after isolations fungal cultures were made pure by single spore inoculation technique. The isolated cultures were identified with the help of available literature. All the isolates were subjected to common temperature to grow at 45^{0}C. Then the identified cultures of *Chaetomium thermophile*, and *Thermoascus aurantiacus* were tested for themperature (30-55^{0}C and pH (4-10) requirements. Radial Mycelial Growth (RMG), Mycelial Dry weight (MDW) was measured (Thakre 1984).

RESULT AND DISCUSSION

1. Chaetomium thermophile

The RMG of *Chaetomium thermophile* at various temperatures showed differential behavior. At 50^{O}C, rapid growth was recorded and 9cm growth was achieved in 4 days of incubation. This was followed by the growth at 45 and 55^{O}C, respectively. At rest of the temperatures viz., 30, 35 and 40^{O}C the growth was slower (Fig 1A).

At most of the temperatures tested, maximum MDW was recorded on 6th day of incubation. However, incubation at 25 and 60^{O}C resulted in distinct growth pattern than the incubation at other temperatures. The growth was rather sluggish in these cases. At the temperature of 30 -50^{O}C the growth was more or less similar (Fig 1B).

pH of the medium distinctly affected the growth of *Chaetomium thermophile*. The rapid and maximum growth in terms of RMG was seen at pH 5, 6 and 7. Although, the growth was slow at pH 8, 9 and 10 but the fungus grew completely before 8 days of incubation. However, at pH 4 the growth was not only slow but also incomplete (Fig 1C).

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In case of MDW production at different pH, the maximum MDW was found at pH 7. pH 5, 6 and 8 were also found to be favourable for the growth of *Chaetomium thermophile* (Table 1).

The scattered growth pattern of this fungus was evident from observation in present investigation. This isolate grows well at 50^{O}C in agar medium. However, 40-50^{O}C temperature is favourable for the production of maximum mycelial dry wt. The findings of present study are similar with the results of Apinis (1959) and the range of pH 5-7 was suitable for the maximum RMG (Madan and Thind, 1998).

2. Thermoascus aurantiacus

This isolate had shown rapid growth at 45, 50 and 55^{O}C by attaining the 9cm growth in 4-5 days. An intermediate response of growth was recorded at 35 and 40^{O}C while, the growth was minimal at 30^{O}C (Fig 2A).

The maximum MDW was found to be on 6^{th} day of incubation in almost all the cases. However, considerable variation in terms of MDW existed. The minimum MDW was recorded at 25 and 60^{O}C. This was followed by 55^{O}C at which significant increase in dry wt was observed. Although, at other temperatures MDW was more but the difference between them was not significant (Fig 2B).

Comparatively broader pH range was found to be suitable for the RMG of this isolate. Maximum RMG was recorded at pH 6 followed by 5, 7 and 8. The least growth was found at pH 4, 9 and 10 (Fig. 2C).

The MDW increased steadily from pH 3 to 6 and attained the maxima of 0.075g. It then declined further till pH 10 (Table 1).

Apinis (1952), Maheshwari et al., (2000) and Salar and Aneja (2006) reported 35^{O}C temperature to be optimum temperature for the growth of their isolate but in present investigation both RMG and MDW was faster at 50-55^{O}C whereas, pH 5-6 seems to be better range for the growth. Similar findings were reported by Rosenberg, (1975).

CONCLUSION

The two thermophilic fungi *Chaetomium thermophile* and *Thermoascus aurantiacus* were tested for their temperature and pH requirements, both of them grows well in thermophilic environment, they are true thermophiles. The isolate of *Thermoascus auratiacus* showed higher temperature limit than earlier reports. These can be utilized for biotechnological as well as agricultural processes because their thermostable enzymes are industrially very important.

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Table 1: Effect of Different pH levels on Mycelial dry wt production

Sr.No.	Fungi	Mycelial dry wt (gm) at varying pH levels							
		3	4	5	6	7	8	9	10
1	***Chaetomium thermophile***	0.070	0.085	0.128	0.191	0.205	0.210	0.070	0.052
2	***Thermoascus aurantiacus***	0.030	0.049	0.061	0.076	0.058	0.041	0.035	0.030

Fig. 1A : Growth pattern of *Chaetomium thermophile* at different temperatures (^{O} C)

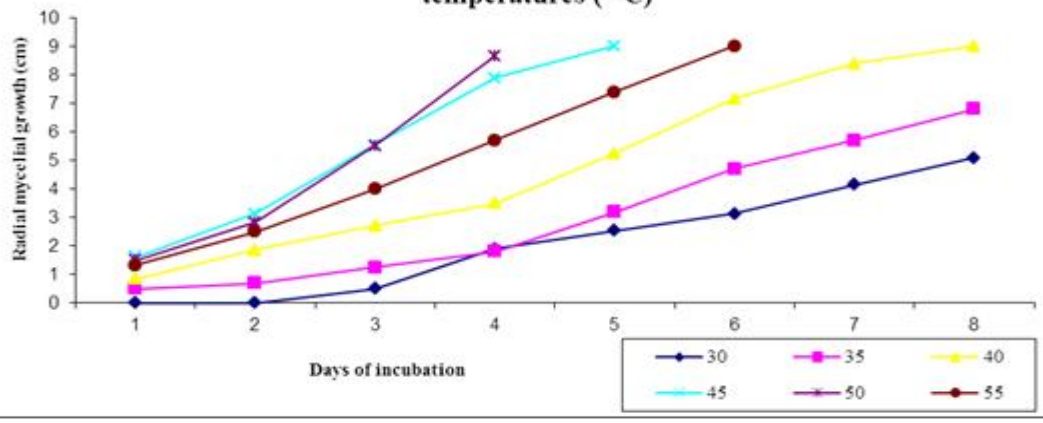

Fig. 1 B : Mycelial dry wt of *Chaetomium thermophile* at different temperatures (^{O} C)

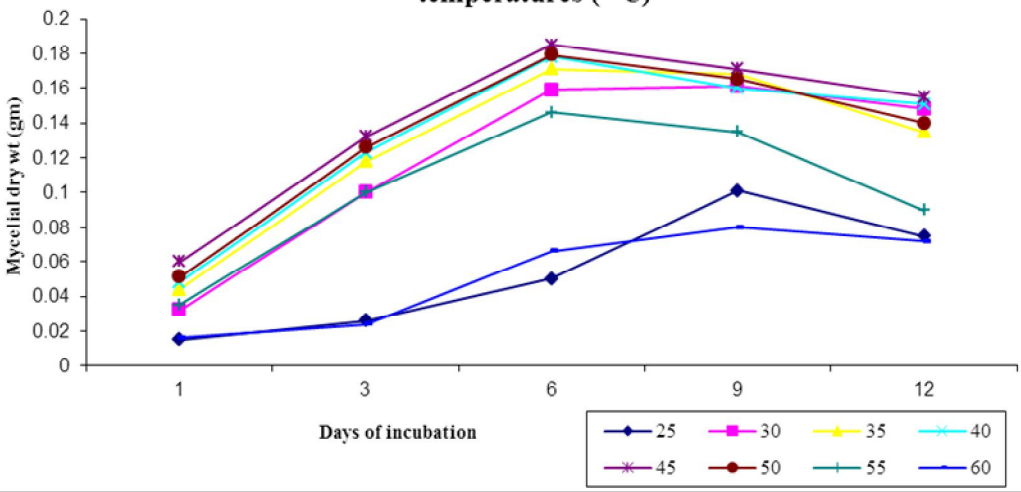

Fig. 1 C : Growth pattern of *Chaetomium thermophile* at different pH

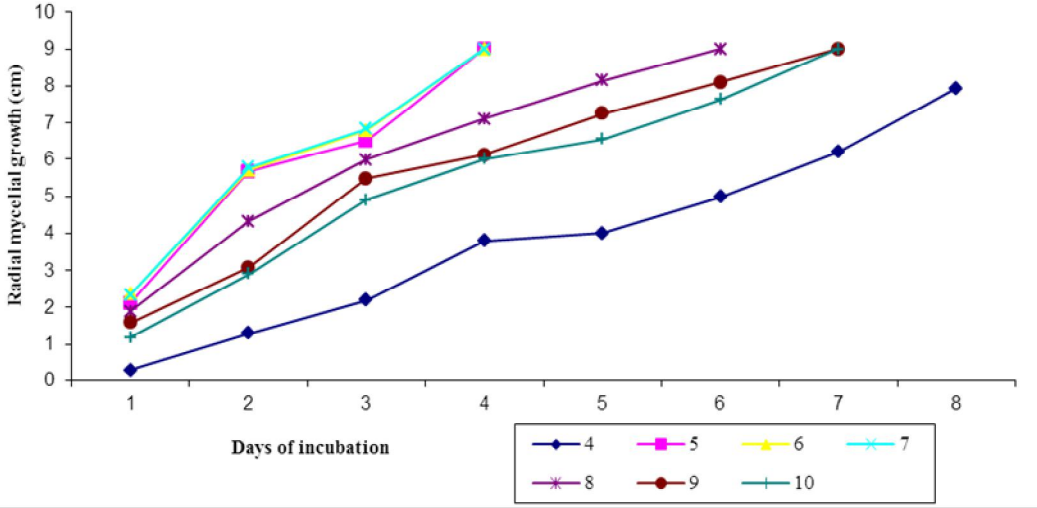

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Fig. 2 A : Growth pattern of *Thermoascus aurantiacus* at different temperatures (^{O} C)

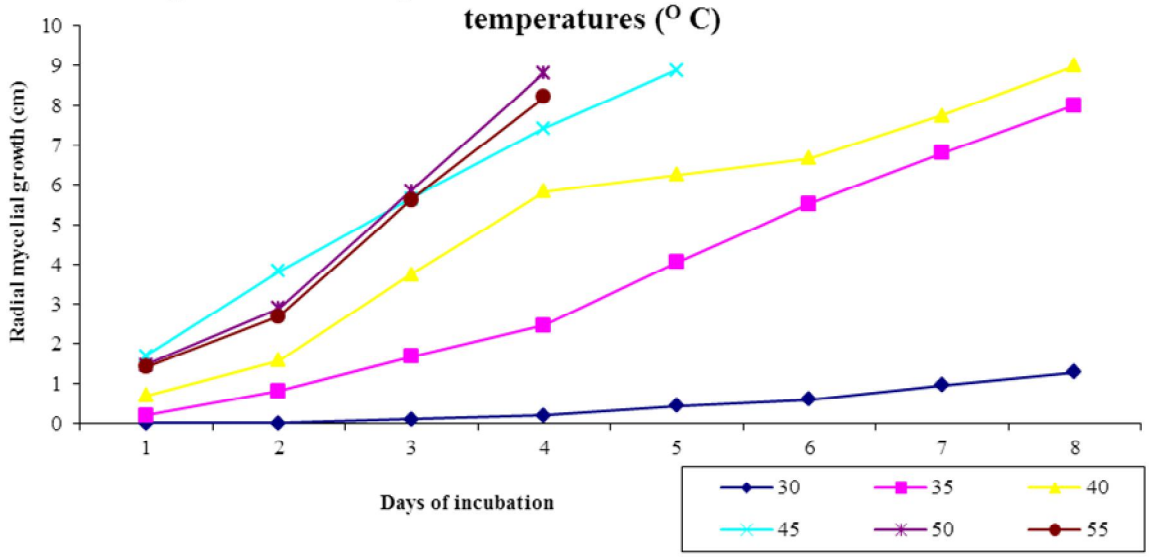


Fig. 2 B : Mycelial dry wt of *Thermoascus aurantiacus* at different temperatures (^{O} C)

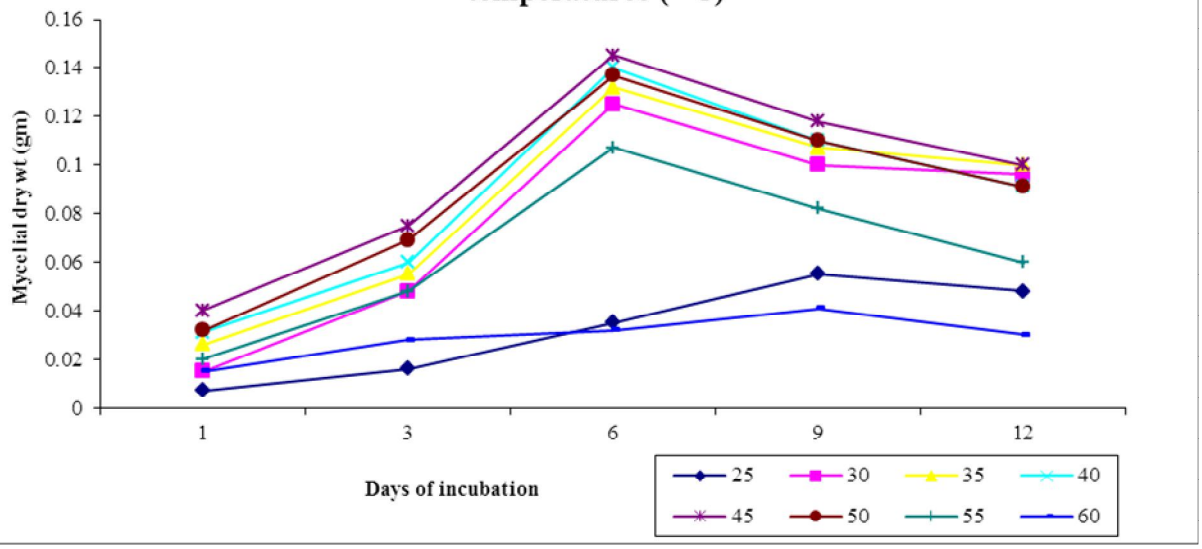
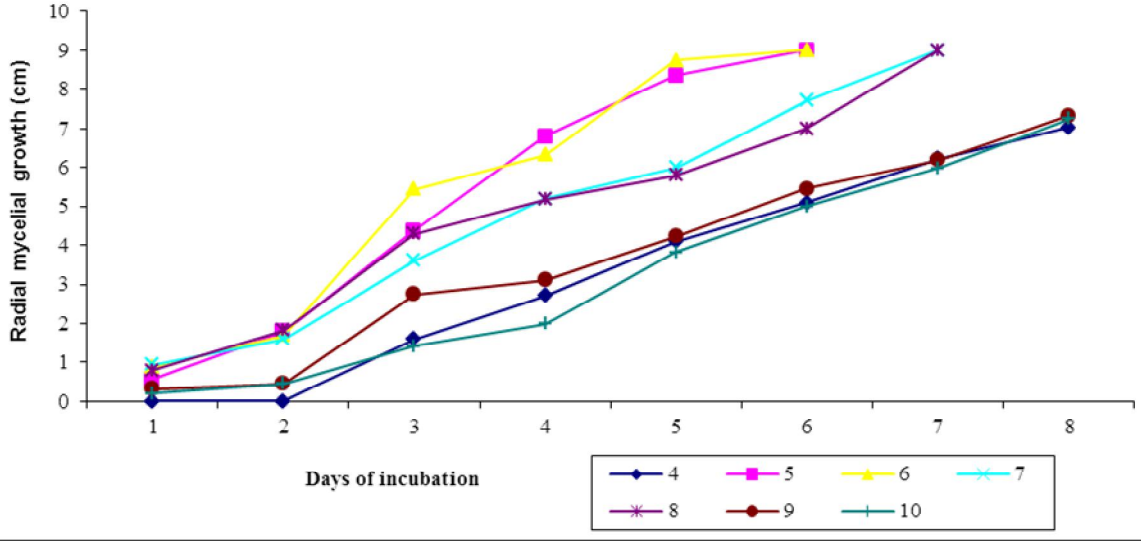


Fig. 2 C : Growth pattern of *Thermoascus aurantiacus* at different pH



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EFFECT OF VEHICULAR POLLUTANTS ON THE MORPHOLOGY OF SOME PLANTS OF NAGPUR CITY

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ABSRTACT
Vehicular pollution is a common problem in cities. In the present investigation, twenty plants were studied for the effect of vehicular pollution. Out of 20 plants 3 species are herbs, two species are tree species and 15 are shrubs. The morphological features of leaves, petiole and stem; weight of leaves with dust and without dust have been studied in the 20 species. The present study twenty species belong 15 families the following morphological features experimental the as size of leaves, length and breadth of leaves, length of petiole and internode have been considerably reduced in all the species except Annona squamosa, Calotopis procera, Ficus religiosa, which are compared the plant growing in the non-polluted sites, leaves become pale yellow and stem become thin in Alstonia scholaris, Alternenthera sessilis, Bougainvillea, Casia fistula, Duranta erecta, Leucaena latisiliqua

Keywords :Vehicles, Roadside pollution, Ravi nagar , Futala, Morphology, Quantitative.

INTRODUCTION

Clean air has so far been treated as an unlimited and free natural's resource. Only now as the health costs of polluted air are mounting, people are beginning to realize that clean air is valuable. The health impact of pollution is considerable. Premature deaths due to respiratory and cardio – vascular diseases like asthma and bronchitis have increased. According to a world bank study, in 1995 air pollution might have accounted for some 40,350 premature deaths and 19,805 thousand hospital admissions and 1200 million minor illnesses. In the last 4 years the number of premature deaths have increased by 28% and the number of sickness and hospital admissions by 30% Another study estimates that 4,10,000 to 5,70,000 women and young children die prematurely every year because of indoor air pollution caused by the burning of bio fuels in poor ventilated homes.

Urban air pollution is growing due to increasing power consumption industrialization and vehicle use. In urban centers studied by the central pollution control board, the suspended particular matter (SPM) is residential area exceeds critical limits set by the board in many cities. These studies revealed that it is not necessary that the larger cities are the more polluted ones Kanpur for instance has more particulate matter in the air than Mumbai, Calcutta or Delhi.

In India surprisingly neither industries nor vehicles nor vehicles are the main source of air pollution. Burning of unprocessed cooling flues in homes causes the most pollution pollutants released indoors, due to their proximity to humans are for more dangerous than those released outdoors

Clean air can no longer be taken for granted. Today the air in most large Indian cities is severely polluted and this pollution has a tremendous impact on the health of the population. Industrialization, the growth in number of vehicles in urban areas and the burning of bio-fuels in rural households have lead to a rapid deterioration of indoor and outdoor air quality out of the 23 metro and Mega cities, Delhi is the most polluted followed by **Mumbai, Calcutta, Bangalore,Chennai, Kanpur, Ahmadabad** and **Nagpur** in India. They have severe air pollution problems with the average levels of suspended particulate matter levels much higher than the prescribed standards

IMPACT OF AIR POLLUTION

Air pollution may cause several health problems. Its impact economic productivity reduce agricultural productivity, damage property and causes ecological changes that increases the risk of environmental disasters flight schedules are routinely disrupted in winter due to smog in Delhi and other cities, when airports are shutdown for the lack of visibility. According to a study by the National Environmental Engineering Research Institute the health costs due to air pollution in the National Capital Territory (NCT), Delhi are as much as Rs.117crore per year **(Anonymous, 2001).**

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Table – 1 :Component of vehicular pollution and their effects on Human and Environment (Anonymous, 2001)

Substance	Source	Health Effects	Environmental Effects
Co	Mainly from petrol emissions	Fatal in large, doses, aggravates heart disorders, affects central nervous system, impairs O_2 carrying capacity of blood, reflexes and causes drowsiness	Contributes to global warming by removing hydrogen radical from the air.
Oxides of nitrogen	Vehicles emissions both petrol and diesel	Irritation of respiratory tract reduces lung function, make a person prone to viral infection	Acid rain contribute to global warming helps to form ground level ozone (smog)
Ozone	Interaction of hydrocarbons and oxides of nitrogen	Eyes, nose and throat irritation risk to asthmatics, children and those involved in heavy exercise	Damage to vegetation crops, contributes to global warming
Lead	Petrol additive	Affects nervous system and blood impairs mental development of children, causes hypertension	Remains in soil from which it reaches the food chain, inhaled directly into blood stream
Hydrocarbon	Mainly from unburned petrol	Drowsiness, eye irritation, coughing	Contributes to global warming by forming ground level ozone.
Benzene	Vehicle emissions, evaporative petrol losses, coke oven, cigarette smoking	Causes cancer	None identified to date
	Polycyclic aromatic hydrocarbons	Mainly from diesel fuel	Non identified to date
So_2	Mainly from diesel fuel	Irritation of respiratory tract large doses can cause laryngotracheal and pulmonary oedema, heart and lung diseases	Source of acid rain, Damages monuments and buildings
Particulates	Mainly from diesel fuel	Irritation of the respiratory tract cause cancer, reduced lung functions	None identified to date

MATERIALS & METHODS

STUDY AREA

Certain roads in Nagpur City are always seen with heavy vehicular traffic. The Ravinagar to Futada square always has shown a very heavy vehicular traffic. In these area many plant grow in roadside. These plants are constantly exposed to tremendous vehicular pollutions. At these segments consist of many important signal areas, lots of vehicles packed for road signals, the exposed the plants are morning to night constantly exposed to the exhaust smoke pollutants of vehicles.

For the study of polluted plants following methods were used.

1) Selection of Site

Site for collecting polluted plants was chosen as Campus square signal because it is a National Highway and there is heavy traffic of two wheelers, three wheelers, four wheelers and multi axel heavy vehicles.

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2) **Collection of Plants**

For the present study, plants were collected in the month of Jan- Feb. The polluted plants were collected from the traffic signals whereas, unpolluted plants were collected from the RTMNU Campus, which are healthy and there is no effect of pollution. Collected plants were bought to the laboratory for the study. They were identified by using standard Floras. The following plants were chosen for the current study.

Table -2 : List of Taxa Studied for the Present investigation

No.	Species	Family	Common Name
1	*Alstonia scholaris*(Linn.) R. Br.	Apocynaceae	Saptaparni
2	*Alternenthera sessilis* (Linn.) R. Br. Ex DC	Amaranthaceae	Kanchari
3	*Annona squamosa*Linn.	Annonaceae	Sitaphal
4	*Bougainvillea spectabilis*Willd	Nyctaginaceae	Boganvel
5	*Calotropis procera*(Ait.) R. Br.	Asclepiadaceae	Ak
6	*Cassia fistula* Linn.	Caesalpiniaceae	Amaltash
7	*Catharanthus roseus*(L.) G Don.	Apocynaceae	Sadafuli
8	*Citrus aurantifolia* (Christm.) Swingle	Rutaceae	Nimbu
9	*Duranta erecta Linn.*	Verbenaceae	Golden Duranta
10	*Euphorbia hirta*Linn.	Euphorbiceae	Dudhi
11	*Ficus religiosa*Linn.	Moraceae	Pipal
12	*Hibiscus rosa-sinesis*Linn.	Malvaceae	Jaswand
13	*Lantana camara* Linn	Verbenaceae	Ghaneri, Raimoni
14	*Leucaena latisiliqua* (Linn.) Gillis	Mimosaceae	Subabhul
15	*Nerium indicum* Mill	Apocynaceae	Kaner
16	*Psidium guajava* Linn.	Myrtaceae	Amrud
17	*Tabernaemontana citrifolia* Linn.	Apocynaceae	Swastik
18	*Tabernaemontana divaricata* (Linn.) R. Br.	Apocynaceae	Tagar
19	*Tridax procumbens* Linn.	Asteraceae	Kambarmodi
20	*Ziziphus mauritiana* Lam.	Rhamnaceae	Ber

3) Morphological study

The plants collected from the polluted and unpolluted area, were bought to the laboratory and the following morphological parameter were recorded

- Diameter / perimeter of stem
- Length , breadth &colour of leaf
- Internode size and length
- Size of petiole & length
- Weight of leaf with dust & without dust.

4) Quantitative characters

1. **Size of stem**: The size of stem was observed with comparing the plants that grow in polluted and unpolluted region.
2. **Leaf size**: The length and breadth of leaf was calculated by taking a 5 mature leaves from the plant and their length and breadth were calculated and the mean value was recorded.
3. **Length of internode**: The length of internode of the plant was calculated at different regions from the 3rd node in each branch.
4. **Petiole size**: The length of petiole was calculated with the help of scale for those the mature leaf was selected.
5. **Weight of leaf**: the weight of the five leaves was measured and means value was recorded. The leaves were washed, dried and again weighed to record the amount of dust deposited on them.

RESULT AND DISSCUTION

Result described in table show that there was significantly slow growth in all the investigated parameters in all the plant species at polluted site with respect to non polluted site, which might be due to severe vehicular

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pollution in the city center the air pollutants effects the plant growth and morphological characters adversely . of all the plants parts , leaf is the most sensitive part to be affected by vehicular pollutants and reduction in leaf length , width in area of road side plants was the witness of bad effects of the city environments. Similarly the reduction in leaf area growing in the vicinity of heavy pollutants was also observe in many plants in many plants. The plants growing close to the busy road of the city are highly affected by auto emission the inhibitory affects on the growth of plants due to the presence of toxic material in the auto emission. The present study twenty species belong 15 families the following morphological features experimental the as size of leaves, length and breadth of leaves, length of petiole and internode have been considerably reduced in all the species except *Annonasquamos,calotopisprocera,Ficusreligiosa*,which are compared the plant growing in the non-polluted sites, leaves become pale yellow and stem become thin in *Alstoniascholaris*, *Alternentherasessilis*, *Bougainvillea*, *Casia fistula*, *Durantaerecta,Leucaenalatisiliqua*

Therefore, plant quickly responds to air pollutants and this is brought out by the modification of various fruits in them. Hence they can be utilized as biological indicators of air pollution. The present study on clearly establishes that the experimental sites chosen in this study is highly polluted.

Table - 3: Morphological Features of the Plants under Study from Polluted and Unpolluted Sites

Sr. No	Name of Plant	Stem	Leaf size & Length	Leaf Colour	Petiole size and length	Internode size and length	Weight of leaf with dust	Weight of leaves without dust
1	*Alstoniascholaris*(Linn.) R. Br.							
	a) Unpolluted	Thick	(L)13.6cm X (B) 3.6cm	Dark green	Long (1.5cm)	Long (7.5cm)	0.1.0728g	0.0348g
	b) Polluted	Same	(L)13.7cm X (B)0.7cm	Pale yellow colour	Short (0.8cm)	Short (5.5cm)	0.1705g	1.705g
2	*Alternentherasessilis* (Linn.) R. Br. Ex DC							
	a) Unpolluted	Thin	(L)2.8cm X(B)13cm	Dark green colour	Short (0.2cm)	Short (4cm)	0.404g	0.392g
	b) Polluted	Thin	(L)2.6cm X (B) 1.1 cm	Dark green	Long (3.6cm)	Long (3.6cm0	0.074g	0.073g
3	*Annonasquamosa*Linn.,							
	a) Unpolluted	Thick	(L)11.8cmX (B)4.7cm	Dark green	Long (1.6cm)	Long (2cm)	0.6674g	0.664g
	b) polluted	Thin	(L)12.8cm X 4.8cm	Dark green	Short (13cm)	Short (1.3cm)	1.707g	1.705g
4	*Bougainvillea spectabilis*Willd							
	a) Unpolluted	Thick	(L) 5.7cm X (B) 4cm	Dark green colour	Long (1.2cm)	Long (2.2 cm)	0.856g	0.842g
	b)Polluted	Thin	(L)3.5cm X (B) 2.3cm	Pale yellow colour	Short (1cm)	Short (1.6cm)	1.026g	0.976g
5	*Calotropisprocera*(Ait.) R. Br.							
	a) Unpolluted	Thin	(L)8.5cm X (B)5.4cm	Dark green	-	Long (4.8cm)	0.7302g	0.6102gm
	b) Polluted	Thick	(L)8.7cm X (B)6.3cm	Dark green	-	Long (6cm)	1.8338g	1.8282gm

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6	***Cassia fistula* Linn.**							
	a) Unpolluted	Thick	(L)1.6cm X (B)4.2cm	Green colour	Long (11.5cm)	Long (4.6 cm)	0.783g	0.776g
	b)Polluted	Thin	(L)9.1cm X (B)4.1cm	Pale yellow colour	Short (0.5mg)	Short (4.5cm)	0.536g m	0.342g
7	***Catharanthusroseus*(L.) G Don.**							
	a) unpolluted	Thick	(L)3.8cm X (B) 2cm	Deep green colour	Long (05cm)	Long (1.5cm)	0.1038g	0.1032g
	b) Polluted	Thin	(L)3.5cm X (B) 1.8cm	Pale yellow colour	Short(0.3)cm	Short (0.5cm)	0.1378g	0.1372g
8	***Citrus aurantifolia* (Christm.) Swingle**							
	a) Unpolluted	Thin	(L)6.5cm X (B)3.8cm	Dark green	Long (1.4cm)	Long (2.3cm)	0.3136g	0.4876g
	b) Polluted	Thick	(L)6.3cm X (B) 3.5cm	Dark green	Short (0.7cm)	Short (1.5cm)	0.399g	0.398gm
9	***DurantaerectaLinn.***							
	a) Unpolluted	Thin	(L)2.3cm X(B)1.3 cm	Green and yellow	Long (0.4cm)	Long (11.cm)	0.0422g	0.0408g
	b) Polluted	Thick	(L)1.9cm X (B) 1.4 cm	Same	Short (0.2cm)	Short (1cm)	0.0368g	0.0346g
10	***Euphorbia hirta*Linn.**							
	a) Unpolluted	Thick	(L)0.2cm X (B)1.2cm	Dark green	Long (0.2cm)	Long (0.5cm)	0.0202g	0.0116g
	b) Polluted	Thick	(L)0.1cm X (B) 1.1cm	Dark green	Short (0.1cm)	Short (0.3cm)	0.0301g	0.300g
11	***FicusreligiosaLinn.***							
	a) Unpolluted	Thick	(L)8.3cm X (B) 3.9 cm	Dark green	Short (1.5cm)	Short (2.3cm)	1.424g	1.418g
	b) Polluted	Thin	(L)12.5 cmX (B) 7.4cm	Dark green	Long (6cm	Long (2.5cm)	1.424g	1.420g
12	***Hibiscus rosa-sinesis*Linn.**							
	a) Unpolluted	Thin	(L)8.5cm X (B) 5.4cm	Dark green	Long (5.9cm)	Short (2.2cm)	0.6354g	0.6342gm
	b)Polluted	Thick	(L)6.2cm X (B)5.1cm	Dark green	(short (5.1cm)	Short (2cm)	0.6918g	0.6910g
13	***Lantana camara* Linn**							
	a) unpolluted	Thick	(L)4.8cm X (B)3.8cm	Dark green	Short (1.3)cm	Short (5cm)	0.3472g	0.359g
	b) polluted	Thin	(L)3.4cm X (B) 3.5cn	Dark green	Long (2cm)	Long (7cm)	0.1598g	0.792g
14	***Leucaenalatisiliqua* (Linn.) Gillis**							
	a) Unpolluted	Thin	(L)12.12c m X (B)5.5cm	Dark green	Long (1.6cm)	Long (3.3cm)	0.913g	0.910g
	b) Polluted	Same	(L)9.8cm X (B)4.8cm	Dark green	Short (0.5cm)	Short (2.5cm)	0.9098g	0.9090g

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15	***Neriumindicum* Mill**							
	a) Unpolluted	Thin	(L)11.3cm X (B) 2.3cm	Dark green colour	Short (1.5cm)	Long (4.5cm)	1.856g	1.860g
	b)Polluted	Thick	(L) 10.2cm X (B)1cm	Dark green colour	Same (1.5cm)	Short (3.6cm)	1.625g	1.619g
16	***Psidiumguajava* Linn.**							
	a) unpolluted	Thin	(L)12.9cm X (B)6.2cm	Green	Long(0.4 cm)	Short(3.8cm	1.0988g	0.8926gm
	b) Polluted	Thick	(L)8.5cm X (B) 5.4cm	Dark green	Short (0.2cm)	Long (4.1cm)	0.399g	0.6126gm
17	***Tabernaemontanacitrifolia* Linn.**							
	a) Unpolluted	Thick	(L) 9.2cm X (B) 2.7 cm	Dark green	Short (0.6)cm	Long(0.7cm)	0.5958g	0.394g
	b)Polluted	Thin	(L) 7cm X (B) 2.4cm	Dark green	Short (0.4)cm	Short (1cm)	0.2698g	0.2694g
18	***Tabernaemontanadivaricata* (Linn.) R. Br.**							
	a) Unpolluted	Thick	(L)12.1cm X (B) 5.5cm	Dark green	Long (1.6cm)	Long (3.3cm)	1.0124g	1.0113g
	b) Polluted	Thin	(L)9.8cm X (B) 4.8cm	Dark green	Short (05cm)	Short (2.5cm)	0.9098g	0.012g
19	***Tabernaemontanadivaricata* (Linn.) R. Br.**							
	a) Unpolluted	Thin	(L)3 cm X (B) 1.5cm	Dark green colour	Same (0.5cm)	Long (1.7cm)	0.0936g	0.0964g
	b)Polluted	Thick	(L)2.4cm X (B)1.1cm	Dark green colour	Same (0.5cm)	Short (3.6cm)	0.139g	0.148g
20	***Ziziphusmauritiana* Lam.**							
	a) Unpolluted	Thick	(L)1.8cm X (B)1.3cm	Shiny green	Same (0.2cm	Same (2.5cm)	0.0158g	0.0132g
	b) Polluted	Same	(L)1.5cm X (B)0.7cm	Same	Same(0.2cm)	Same (2.5cm)	0.0366g	0.0348g

L – Length, B – Breadth

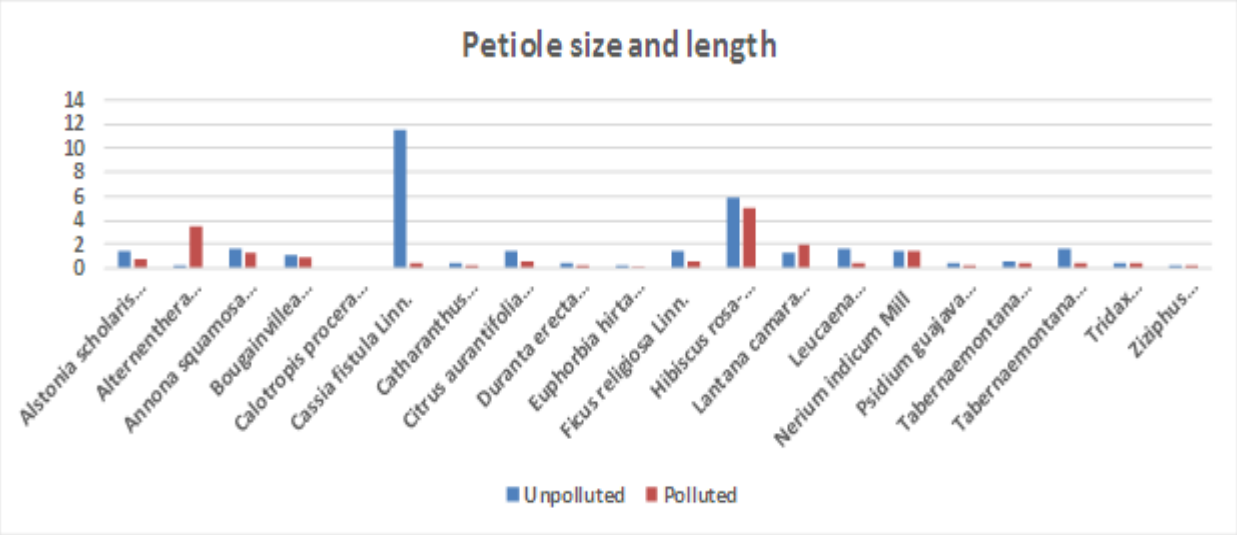

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Figure 1: Effect of Vehicular pollution on petiole size and length.

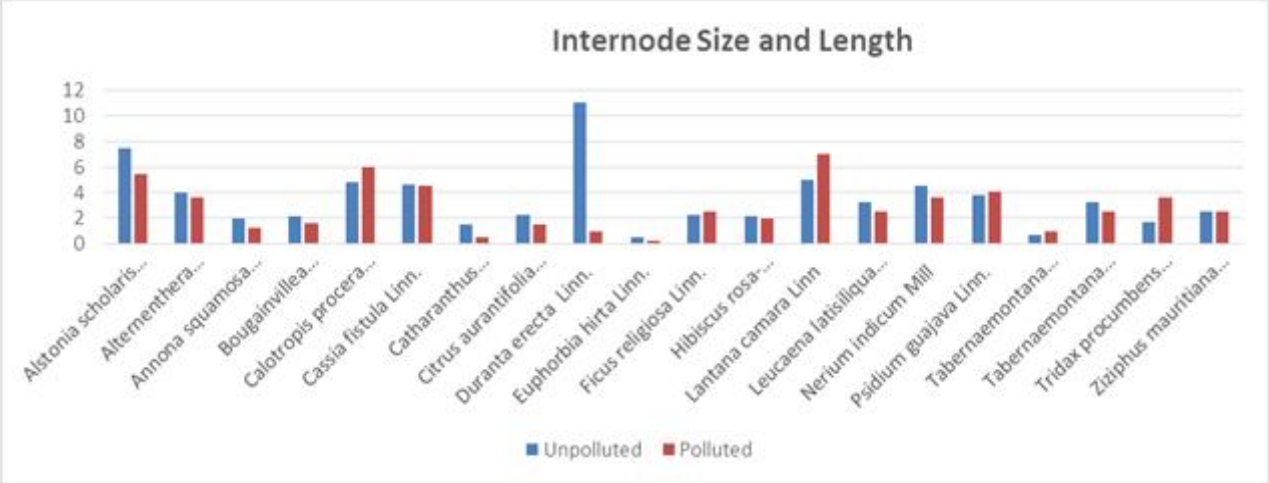

Figure 2 :Effect of Vehicular pollution on Internode size and length

CONCLUSIONS

It is difficult to estimate the effects of air pollutants because the organism are exposed to a wide range of uncontrolled variable on the morphological point of view, the plants from polluted sides present important changes especially regarding their color, shape, leaf length, width, area and petiole length, despite of these changes, plant where survived well at the polluted environment of Nagpur city. After this study we can consider that there is still a lack of knowledge of the impact of air quality on vegetation in the urban areas, overall, the study reveals that all the plant species growing in the polluted environment of the city are badly affected by auto emission. There is a need to set limits on how much of a pollutants is allow in the air. The exchange of experience and information from the developed countries on these aspects of pollution impact on plants might be useful; our goal must be have clean air for flora and fauna. We should take necessary steps to get rid of the ever increasing pollutions.

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ANTAGONISTIC ACTIVITY OF FUNGAL ISOLATES AGAINST *HELMINTHOSPORIUM ORYZAE* CAUSING BROWN LEAF SPOT DISEASE ON RICE IN EAST VIDARBHA

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ABSTRACT
Present study is carried on performance of different phylloplane isolates against Helminthosporium oryzae causing brown leaf spot disease of rice shows different result in antagonistic study. This pathogenic fungus is controlled by non-pathogenic fungi. Total 24 isolates (non-pathogenic fungi) are tested for antagonistic activity and positive result shows by 20 isolates on pathogenic fungus. Antagonistic line is observed cleared in position. Plus or square signaling is very good indication of result. The radial mycelial growth of the pathogenic fungus on cultural petridish is found variable with tested isolates.

Keywords: Rice, Antagonistic, Helminthosporium oryzae, Phylloplane isolates, Brown leaf spots.

INTRODUCTION
Rice (*Oryza sativa* Linn.) is an important staple food crop affected by various fungal, bacterial and viral diseases. The *Helminthosporium oryzae* was commonly isolate from leaf surface in the present work. It was recorded from the green and yellow leaf surface of rice. The fungus was originally reported from the rice leaves causing brown spot disease. The disease has been reported from all the rice growing countries of world. First time the disease was reported by Sundararaman from Madras in 1949 and since then it is prevalent in all the rice growing states of India (Padmanabhan, 1954). The disease causes loss in the states like West Bengal, Assam, M.P., Karnataka, Kerla, Tamilnadu, Orissa, Maharashtra, U.P. etc.

H. oryzae Breda de Hann; Syn. *Bipolaris oryzae* (Breda de Hann.) Shoemakar. All parts of the plant are being infected except roots. Sometimes necrotic lesions are found on emerging leaves (Krishanmurthy et al, 2001). Dark brown spots observed on the upper surface of leaf lamina and sheath. The spots vary in their size, ranging from 1-14 mm in length and 0.5-5 mm in width. In the severe cases leaves become dried and wilted. The panicle becomes shrunk, discoloured and sometimes it fails to develop.

H. oryzae is belongs to Class-Deuteromycetes, Order-Moniliales and Family-Dematiaceae. The perfect stage of fungus is *Cochlibolus miyabeanus* (Ito and Kuribayashi) Dressler (Kumar and Mishra, 1994). The mycelium of fungus is both inter and intra cellular within the mesophyll tissue of the leaves. Conidiophore is 44-600 µ long and 3-9 µ wide, septet, dark brown at the base and possesses the characteristic knee-bands. Conidia are generally 5-10 septa. They are about 14-160 µlong and 10-26 µ broad (Alcon, 1988).

The present pathogen commonly observed in Gondia District of East Vidarbha. It is need to control this pathogen eco-friendly. To develop and utilize low cost technology in the crop productions programme because chemicals are hazardous to plant and ecosystem.

MATERIAL AND METHODS
Screening of phylloplane mycoflora on rice is performed for antagonistic study by both direct and indirect methods.

DIRECT METHOD
a) Field Observation: Survey has been carried out monthly to observe the disease and photographs were taken with the help of Nikon digital camera (8.0 megapixels). It gives direct images of object on screen.

b) Laboratory Observation: Infected leaves observed and collected in sterile polyethylene bags as per infected morphological appearance from different area randomly with one month interval. Laboratory section done by section cutting of infected yellow and green leaves. 1% aqueous solution of lactophenol cotton blue was used as stain and microscopic photographs also taken.

INDIRECT METHOD
Infected leaf cut into to 2 cm pieces and washed with tap water then transfer in 0.1% mercuric chloride ($HgCl_2$). Infected leaf pieces transferred into flask containing 100 ml sterile distilled water and washed serially for 5 – 6 times with changing sterile distilled water in aseptic condition, these small leaf pieces were transferred on sterile filter paper so as the blot dried for inoculation.

Culture of Fungi: Washed and blotted dried leaf pieces transferred on CzA (Czapek's Dox Agar) culture media in petridishes by spot inoculation method. The antagonists are selected from phylloplane of rice against *H.*

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oryzae. Isolated antagonist (non-pathogens) inoculated at four equidistance places around the inoculated spot of pathogenic fungi. Petridishesh were incubated at room temperature 25 ± 20°C for 7 days or till the antagonistic activity appear to get uniform results. Three replicate plates were prepared for each 24 sample of isolates.

Antagonistic Activities: The observation on redial mycelial growth of pathogenic fungi were recorded and all significant data differences of antagonistic activities were observed 3rd, 5th, & 7th day after incubation. Inhibition percentage calculated by using following formula (Adams,1990).

$$\text{Inhibition \%} = \frac{\text{Test fungus in control- Test fungus in treatment}}{\text{Test fungus in control}} \times 100$$

RESULTS

In result of antagonists showing different growth activity line in testing petridishes, some fungi show super strong activation zone. The pure culture of *H. oryzae* grows regularly but testing pathogen cultural plate show variation in redial mycelial growth. When pathogenic and nonpathogenic fungi react with each other, that time they change colour form activation line zone (square + signaling). Table: 1 show the radial mycelial growth of pathogen and antagonists was measured and inhibition percentage was calculated. The results indicated that out of 24 fungal species, 20 shows antagonistic activity against *H. oryzae*. The antagonistic activity show by *Trichoderma viride, T. harzianum,T. aureoviride, Myrothecium roridum, Fusarium poae* and *Cladosporium cladosporides* was to be found highly antagonistic as compared to other fungi (Table- 1 & 2, fig-1 & plate- 1). *Phytothora cyamopsis* was poor antagonist and it shows growth on the surface of *H. oryzae*.

Maximum radial growth of *H. oryzae* was recorded in control. *H. oryzae* control shows 18 mm, 12 mm and 15 mm radial mycelial growth after 3rd, 5th and 7th day. Most of the *Aspergilli* and *Penicillium* showed antagonistic activity but Phycomycetes did not show strong antagonistic action. Maximum 3-6 mm inhibition zone shows by *T. harzianum, T. viride, T. aureoviride* and *Myrothecium roridum*. Some are associative fungi and therefore they do not shows significant antagonistic activity like *Pestalotia mangifera, Khuskia oryzae, Fusarium avenacea* and *Staphylotrichum cucurbitarum.*

Table 1: Growth inhibition percentage of *H. oryzae* against different antagonists

Sr.no.	Treatment	Inhibition % radial mycelial growth (mm)		
		3DAI	5DAI	7DAI
1.	Phytopthora cyamopsis	39	42	53
2.	Aspergillus sulphureus	28	67	87
3.	Pestilotia mangifera	17	17	33
4.	Aspergillus flavus	42	75	87
5.	A. niger	44	83	87
6.	A. sydowii	33	75	87
7.	A. ustus	61	83	87
8.	A. flavipes	44	75	83
9.	Penicillum sp.	44	66	86
10.	Penicillum luteum	44	66	86
11.	Trichoderma harzianum	67	100	100
12.	T. viride	83	100	100
13.	T. aureoviride	78	83	93
14.	Alternaria humicola	61	67	87
15.	A. tenuissima	56	67	87
16.	Curvularia lunata	44	58	80
17.	Khuskia oryzae	44	50	53
18.	Fusarium oxysporum	39	100	100
19.	F. poae	83	100	100
20.	F. moniliforme	33	33	80
21.	F. avenacea	39	50	53
22.	Staphylotrichum cucurbitarum	28	83	13
23.	Cladosporium cladosporides	64	83	87
24.	Myrothecium roridum	28	83	100
25.	Helminthosporium oryzae(control)	-	-	-

DAI = Day After Inoculation

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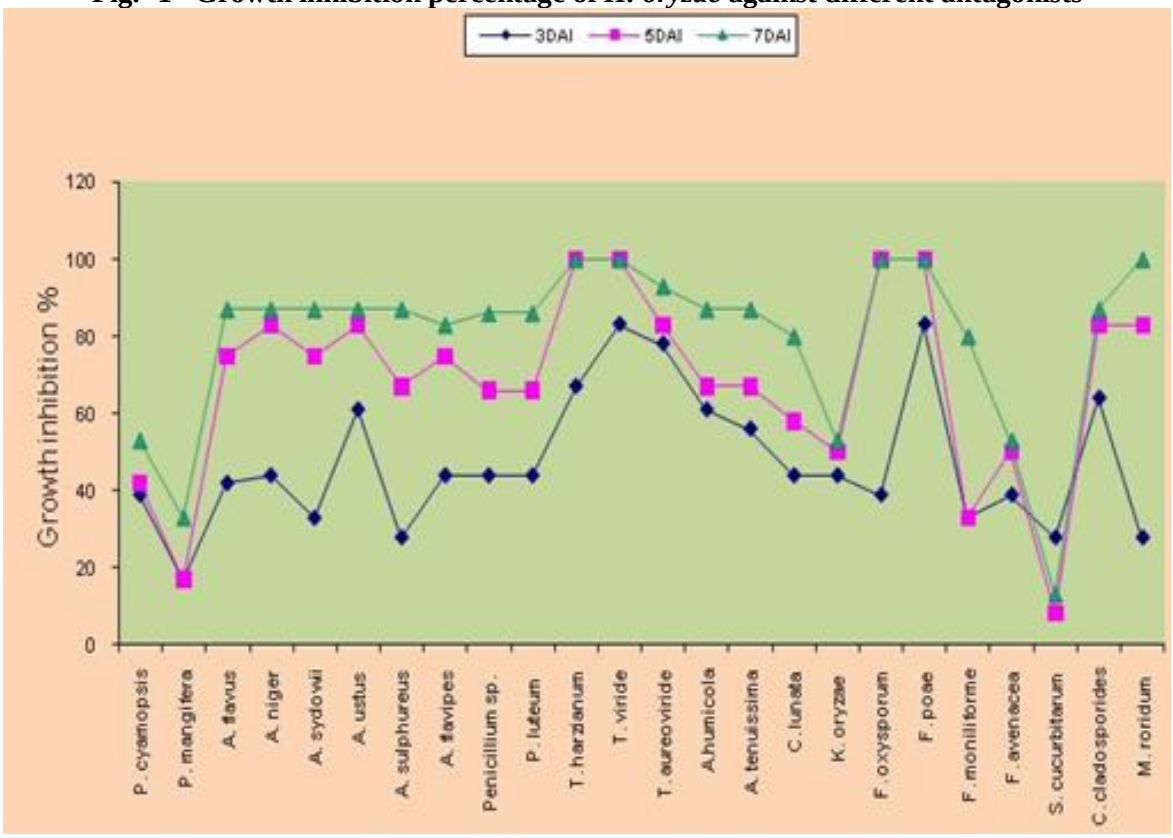
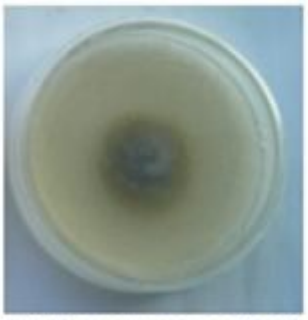
Radial mycelial growth inhibition percentage of *H. oryzae* shows 100 % inhibition after 5th and 7th day in *T. harzianum, T. viride, F. poae, F. oxysporum* and *Myrothecium roridum.* Inhibition percentage was shown by *Aspergilli* specieses, 80 to 87 %, *Cladosporium cladosporides* 87%, *Alternaria* specieses, 87%, *Penicillium* specieses 86%, *Curvularia lunata* 80% and *Fusarium moniliformis* 80% after 7th day of inoculation. Very low inhibition was 13 % in *Staphylotrichum cucurbitarum* followed by *Pestilotia mangifera* 33%, and *Khuskia oryzae, Phytopthora cyamopsis* and *F. avenacea* they show 53% inhibition after 7th day of inoculation and inhibits positively.

Fig.- 1 Growth inhibition percentage of *H. oryzae* against different antagonists

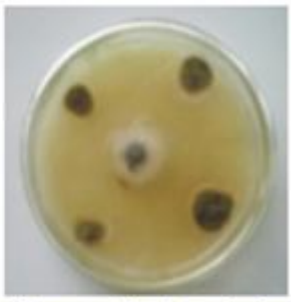


Fungal isolates (non-pathogenic)

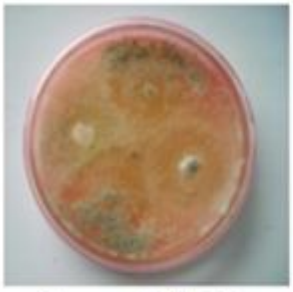
Plate-1 Antagonistic Activity



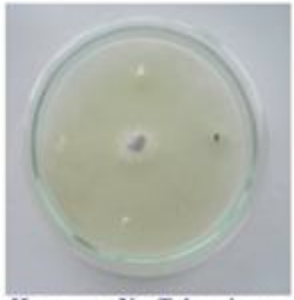
Helminthosporium oryzae (control)



H. oryzae X A. tenuissima



H. oryzae X T. viride



H. oryzae X T. harzianum

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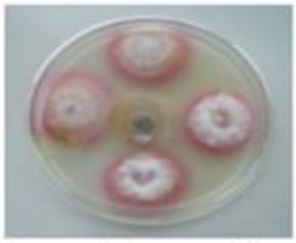
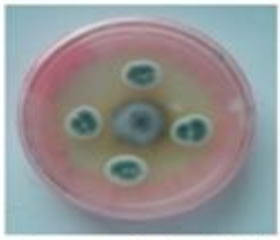
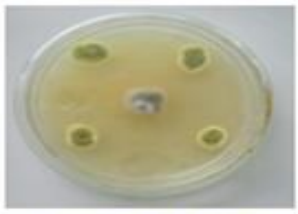
H. oryzae X F. oxysporum


H. oryzae X F. poae


H. oryzae X F. moniliforme


H. oryzae X A. sydowii


H. oryzae X P. luteum


H. oryzae X M. roridum

Table 2: **Effect of different antagonists on radial mycelial growth of *H. oryzae***

Sr.no.	Treatment	Radial mycelial growth (mm)		
		3DAI	5DAI	7DAI
Control	**Helminthosporium oryzae**	**18±3**	**12±3**	**15±2**
1.	Phytopthora cyamopsis	11±3*	7±1*	7±1*
2.	A. sulphureus	13±2*	4±0.3**	2±0.3**
3.	Pestalotia mangifera	15±4	10±2	10±3*
4.	Aspergillus flavus	10.5±2*	3±0.5**	2±0.4*
5.	A. niger	10±2*	2±0.3**	2±0.1**
6.	A. sydowii	12±2*	3±0.7**	2±0.2**
7.	A. ustus	07±1**	2±0.9**	2±0.3**
8.	A. flavipes	10±2*	3±0.7**	2±0.1**
9.	Penicillum sp.	08±1**	4±1**	2±0.6**
10.	Penicillum luteum	08±2**	4±0.9**	2±0.3**
11.	Trichoderma harzianum	06±1**	NG	NG
12.	T. viride	03±0.7**	NG	NG
13.	T. aureoviride	04±0.3**	2±0.6**	1±0.07**
14.	Alternaria humicola	07±0.5**	4±0.4*	2±0.3**
15.	A. tenuissima	08±0.6**	4±0.2*	2±0.4**
16.	Curvularia lunata	10±2*	5±1*	3±0.3**
17.	Khuskia oryzae	08±2**	6±0.9*	7±3*
18.	Fusarium oxysporum	11±3*	NG	NG
19.	F. poae	3±0.8**	NG	NG
20.	F. moniliforme	12±3*	8±2*	3±0.1**
21.	F. avenacea	11±4*	6±1*	7±2*
22.	Staphylotrichum cucurbitarum	13±3*	11±0.3	13±3
23.	Cladosporium cladosporides	6.5±1**	2±0.5**	2±0.1**
24.	Myrothecium roridum	13±2*	2±0.4**	NG

DAI = Day After Inoculation; NG = No growth
* : significant at $p < 0.05$
**: significant at $p < 0.01$

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The above table shows comparison of mycelial growth (in mm) recorded for *Helminthosporium oryzae* in presence of various antagonists and control (without antagonists). The growth measurements obtained after 3rd, 5th and 7th day of incubation were compared with the growth measurements of control recorded during the corresponding day of incubation.

DISCUSSION

Antagonistic influence of phyllosplane microorganisms on leaf surface were mentioned metabolic changes in rice leaves by *Entyloma oryzae* (Khatri et al., 1985). Bahous et al. (2003) observed interaction between pathogen and non- pathogen in the mixture could be beneficial antagonistic. All of them reported that inhibition of pathogen or reduction in disease incidence might be due to the production of antagonistic substances. The inhibition zones between an antagonists and a pathogen on agar or CzA medium are commonly considered to be the result of the production of antibiotic substances (Fokkema, 1976).

The infection caused by *H. speciferum* leaf spot diseases of tobacco have been reported to be inhibited by 6 fungi like *Aspergillus sp.; Blakslea sp.; Collelotrichum sp.; Cunninghamella sp.; Mucor sp.* and *Thieleviopsis sp*. Mechanism of hyper parasitism of phylloplane fungi from rice plant *T. viride* and *T. harzianum* were most effective against *R. solani* (Gokulapalan & Nair, 1992).

Kumar & Mishra (1994) isolate 32 rice leaf surface fungi and tested and against *Drechslera oryzae* (*Cochlibolus miyabeanus*). *T. viride* was effective biocontrol agent for the brown spot. Present study agree with the Fokkema (1971 & 1974), Balkhande (1978) Kumar & Mishra (1994), Aggarwal and Mehrotra (1998), Lewis and Papavizas (1984), Gokulapalan & Nair (1992), Present study shows *T. viride, T. harizianum, T. aueroviride* are most effective in 5th DAI and 7th DAI inhibit 100% growth of *H. oryzae*. It is correlated to Harish et al (2007), Kapgate and Rane, (2014 & 2016).

CONCLUSION

Present antagonistic study showing different mark of inhibition zone. Fungal inhibition zone or activity lines are categorized into two grades. 20 antagonists show positive activity. 3 antagonists show partial activity against *Helminthosporium oryzae*. Hence this study suggested that these antagonists are capable to control brown leaf spots disease eco- friendly, which is introduce in this area of east Vidarbha on rice crop. This study is helpful to increase the green economy along with commercial production of rice.

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IA FOSSIL DICOT WOOD FORM THE DECCAN INTERTRAPPEAN BEDS OF CHHINDAWARA MADHYA PRADESH

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ABSTRACT
In present investigation a black colour fossiliferous wood was under taken which was found in intertrappean locality of chhindwada district in Madhya Pradesh (India).The chief characteristics features wood is diffuse, porous tylosed, vessels solitary,in multiples of two or four, perforation plate was simple and oblique, septate and non-steroid. It shows the affinities with the family Tovomitosioxylon and hence named as tovomitosioxylon intertrappean after its locality.

Keyword: Intertrappean, para- tracheal, tylosed ,Tovomitosioxylon.TovomitosioxylonIntertrappean.

INTRODUCTION
In the Paleocene of India fossils were known only form the Deccan intertrappean series. The wood being comparatively more resistant than the other plant parts and were often better preserved extending form a petrified dicotyledonous wood. Findings are based on the extent of degradation of cellulose layer of cell wall. The present investigation of petrified dicotyledonous wood shows the relation with the families Lecythidaceae, Myrtaceae, ,Lythraceae,Ulmacea ,Onacaceae,Guttiferae,Mliaceae,Leguminaceae, Malvaceae and,Anonaceae various wood fossils reported from Deccan intertrappean series includes,*Tovomitososylon* wood (shalom 1963) *Ebenoxylon Mohgaonse* (chitatey and patil 1971)

MATERIAL AND METHODS
The wood sample was thoroughly ground to make the surface even. It was etched with Hydrofluoric acid and washed under running water and peels section were taken out and slides prepared. These were studied under the microscope and camera Lucida sketches were drawn.

DESCRIPTION
The wood is a diffuse, porous dicot wood without any growth ring. The wood consists of vessels, xylem parenchyma, wood fibers and wood rays.

VESSELS
The vessels were solitary or less in multiples of two to four (plate fig-1 Text fig1, 4).Pores are nearly circular in cross section. These are moderate in size with the diameter varying between 239umto241um. The vessels frequency was 16 to 20 per sq. m. m. The vessels member length varies from 322um. to 401 um .Some vessels show gum like deposition plate (plate –I fig -4 and Text-I fig-4) vessels are contagious with ray one and other side (plate I-fig -3 and Text fig -2) and perforation plate simple obliquely placed (plate-1fig 5 and Text fig-2).Intravascular pitting is alternate thick walled and bordered. Pit pores are elliptical with the diameter varying between 63um to 70um (plate-1fig text fig-5).

XYLEM PARENCHYMA
Parenchyma is well preserved, Para-tracheal; vasicentric forming a single layered sheath around the vessels .Cells of parenchyma were round and flattened (plate-fig1 and Text-fig 1, 4)

WOOD FIBERS
They are abundant forming the ground mass of the wood. They are highly thick walled and compactly arranged in radial rows between the rays without any intercellular space. The cells are pentagonal to hexagonal in shape arranged in 5 and 6 layer(plate-1 fig-1 and text fig-1).Fiber are non-septate pointed from both the ends and storied. Bordered pits are present on the fiber wall. The thickness of fiber wall is 28 um to 85 um and storied (plate-1 fig 2, 3 and text fig 2,3).

WOOD RAYS
The wood rays are mostly multiseriate, triseriate.It is 9 to12 cells in high. The ray system was homogenous consisting of procumbent as well as erect cells. Frequency of the ray is 18 to 20 per sq. mm. Height of ray 584.22 um. to 699.93 um. And breadth is about 34um. to41um. And simple pits were also absorved (plate-1 fig 2, 3 and text fig 2, 3, 4,).

IDENTIFICATION AND DISCUSSION
For identification of the present fossil wood keys given by *Metcalfe and chalk* (1950),*shallom* (1963),and *Esau* (1965) are used. On the basis of distinguishing character of the fossil wood. Vessels are solitary ad in multiples

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of 2 and 4 perforation plates. Simple obliquely placed intravascular pit, alternate, bordered, xylem parenchyma Para tracheal vasicentric, wood ray triseriate. The studied fossil was composed with earlier reported wood form this locality.*Burseraceoxylon baradense (*sheikh 1971) had similarities like parenchyma,vasicentric ray uni-biseriate.Intervasicular pit alternate, bordered with elliptical pore. But very greatly in respect of vessel number, frequency and diameter. In studied fossil parenchyma was typically Para tracheal vasicentric pit pore is simple *Chitaly oxylon deccanense* (sheikh 1971). In this fossil the vessel are solitary,intervasculer pores are circular to oval, parenchyma, Para tracheal vasicentric aciform to confluent, meta- tracheal rays, usually multiseriate, fiber aseptate with intercellular spaces. None of these characters were present in studied fossil specimen.In Ebenoxylon mahurzarii (korelar 1990),Vessels are solitary and in multiple of 2,5, perforation simple, alternate, parenchyma paratracheal vasicentric,xylem rays heterogenous, mostly uni,bi and triseriate. But in studied fossile wood vessel. In *polygonioxylon baradii* vessels mostly solitary and multiple of two perforation plate simple intervasiculer pit alternate Para tracheal vasicentric only. Thus, no appreciable affinities were observed between the earlier reported wood fossil with the present one. Accordingly, the modern day families were explored to place the wood fossil under any of them.Comprarision with families like Erythroxylaceae, Dipterocarpaceae, Quinaceae,,Cythidaceae and Annonaceae.

The fossil is not a number of family Menispermaceae because nature of parenchyma is conjunctive and apotracheal diffuse, ray interfasicular only where as in the present fossil parenchyma is Para tracheal vasicentric and rays homogenous.Dipterocarpaceae although agreeing with the fossil in certain general characters like vessel usually medium sized exclusively solitary with multiple 2 and 3 cell, perforation simple intravascular and pitting alternate. It is Para tracheal and apotracheal ray are triseriate only but in Dipterocarpaceae it is multiseriate found in the pattern of uni –tri and pentane seriate. Fiber storied exclusively non-storied.

The family Capparadaceae, although agreeing with the fossil in certain characters like vessel solitary and multiples of two perforation simple and intravascular pitting alternate ,pit to parenchyma similar Para tracheal vasicentric,fiberes storied,rays upto 2-5 cell wide mutiseriate homogenous. The only difference uncounted is in respect of fiber septation and pitting in the studied fossil wood. Fiber is acetate with pordered pit. In Annonaceae such as vessels usually few, perforation simple intravascular pitting alternate, commonly containing oil or mucilage cell or fibers with bordered pits. But it differ mainly in parenchymal Annonaceae it is apotracheal,fiber often storied and ray heterogeneous.

DIAGNOSIS

Sheikhoxylon gen.nov.

Wood dicotyledonous, diffuse porous vessels mostly solitary and in multiples of two perforations plate simple.Intervascular pit pairs alternate, bordered. Xylem parenchyma Para tracheal vasicentric, wood rays mostly trisriate, homogenous. The fibers non-septate pointed from both the ends and librifrom,storied.

Sheikhoxylon mahurzarii gen.et.sp.nov.

Vessels predominantly solitary and in multiples of two vessels diameter varying between 239 u to 241 u,frequency is 16 to20 per sq.mm. member length varies form 322 u to401 u.Intervscular pit pair alternate pore elliptical and diameter 63 u to 70 u.Parenchyma paratracheal vasicentric, ray mostly triseriate,homogenous with procumbent cell only 9to 12 cell high.Frequency of ray is 18 to 20 per sq.mm. Height of ray is 584 .22u to 699.93 u and breadth is about 134.20u to 141.65u .Fiber non –septate, libriform storied.

Holotype: IJP/wood-2 Deparment of Botany, Institute of science, Nagpur

Locality: Board Mahurzari, Nagpur

Horizon: Deccan Intertrappean series pf india.

Age-? Upper Cretaceous

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MACROFUNGAL DIVERSITY IN GONDIA DISTRICT, MAHARASHTRA, INDIA

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ABSTRACT
In the present study, attempts have been made to explore macrofungal diversity from the varied habitats of district. Total 80 taxons have been collected from the three talukas of district. Out of these 43 taxons have been identified at genus level and few are indentified up to species level. All these genera belongs to 24 families , distributed into 8 order and most of these are members of class Agariomycetes. Most of the macrofungi in current study are members of basidiomycotina and only two are from ascomycetes.

Keywords: Macro fungi, diversity, agariomycetes, Gondia

INTRODUCTION
Fungi are most important and diverse group of organisms playing vital role in ecosystem to maintaining the nutrient cycle by the process of decomposition. They inhibits in varied habitats like soil rich with humus, plant litter, dead wood and branches, swamps and even in sand and nutrient poor soil, some form mycorrhizal association with higher plants. Microfungi are characterized by macroscopic fruiting bodies of different shape and size and it included agraricus, boletales, jelly fungi, bracket fungi, puffballs, stinkhorns, coral fungi and bird's nest fungi[1,2]. Fungi are valuable source of food and medicine for human being since time immemorial. Many species of Basidiomycetes are edible and are rich source of protein and other nutritional constituents. Fungi are promising source of bioactive compounds and several species of basidiomycetes have been studied for their pharmacological applications to treat variety of human aliments ranging from common cold to cancer. Some species of macrofungi contains lethal mycotoxin and responsible for several incidences of death due to eating wrongly identified mushrooms species worldwide.

Gondia district is known for its forest cover and diverse flora and fauna. Taxanomic and ethanobotanical studies on higher plants in the district are carried out by many workers. The thick forest cover and varied niches support the growth of several other plants groups like Pteridophytes, Bryophytes, Lichens and Fungi. Till date no systematic, ecological, economical, sociological and conservative aspects of fungal diversity have not been carried out in the district.

STUDY AREA
Gondia district is located in the extreme North-Eastern of Maharashtra state. It extends from 20°39'-21°38' North latitude and 89°27'-82°42' East longitude. The whole areas of the district is rolling and open at an average elevation of 250 M to 300 M with highest elevation to southwest i.e. 714 M (Navegaon hills) above sea level. It has an area of 4883.13 Sq. Km. of which 2664.07 Sq. Kms falls under forest area. The district is bounded by Balaghat district of Madhya Pradesh in the North, the Rajnandgaon district of Chhattisgarh State in the East, Gadchiroli and Bhandara district of Maharashtra in South and West respectively. The districts consist of 8 talukas namely, Gondia, Amgaon, Deori, Salekasa, Sadak-Arjuni, Arjuni-Morgaon, Tiroda and Gorgaon.

Present study carried out in Salekasa, Amgaon, and Goregaon and Gondia talukas of Gondia district.

MATERIAL AND METHODS
The periodical survey of different fungal habitats was conducted during growing session in 2016 and 2017. During the survey sufficient photographs have been taken with variation in the taxon in the habitats. The details like odor of fruiting body, colour, size and shape of cape, hymenium arrangement; length, shape and colour of stipe; presence or absence of ring and volva have been noted in the field. Collection date, substratum, longitude and latitude of locality, associated flora, soil type, landforms and habitat destruction of taxon locality have been noted. The specimens were extracted from the substratum with the help of pocket knife, wrapped in wax paper and placed in polythene bags tagged with collection number. The collected specimens are dried and preserve for herbarium collection. Spore prints of few taxons have been taken for identification. In the present study identification of collected specimens have been done upto Genus level with the help of collected field data, photographs, and microscopic observation from available literature. The collected specimens are deposited at Department of Botany, Shankarlal Agrawal Science College, and Salekasa.

OBSERVARION
Following macrofungi have been collected and Identified from the different habitats and localities of Gondia district.

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Table:- List of identified genus and species from Gondia district.

Sr.No.	Order	Family	Genus/Species
1	Auriculariales	Auriculariaceae	Auricularia auricula-juade (Bull.) J.Schort.
2		*Exidiaceae*	Basidiodendron sp.
3	**Agaricales**	Agaricaceae	Cythus striatus (Huds.) Willd
4			Clavatia sp.
5			Agaricus compestris L.
6			Agaricus
7			Micropsalliota lateritia var. vinaceipes
8		Amanitaceae	Amanita sp.
9		Bolbitaceae	Conocybe sp.
10		Clavariaceae	Ramariopsis sp.
11			Clavalina sp.
12		Entolomataceae	Entoloma sp.
13		Hygrophoraceae	Hygrocybe sp.
14		Lyophyllaceae	Lyophyllum sp.
15			Termitomyces sp.
16			Termitomyces sp.
17		Marasmiaceae	Marasmius sp.
18		Psathyrellaceae	Coprinopsis sp.
19			Psathyrella sp.
20			Parasola sp.
21			Panaelous sp.
22		Pluteaceae	Volvariella valvacea (Bul.) Singer
23		Pleurotaceae	Pleurotus sp.
24		Schizophyllaceae	Schizophyllum commune Fr.
25		Tricholomataceae	Collybia sp.
26	Boletales	Hygrophoropsidaceae	Hygrophoropsis sp.
27	Hymenochaetales	Repatobasidiaceae	Cotylidia Sp.
28	Polyporales	Fomintopsidaceae	Antrodia sp.
29			Daedalea sp.
30		Polyporaceae	Fomes fomentarius (L.) Fr.
31			Amyloporia sp.
32			Polyporous tenuiculus (P.Beauv) Fr.
33			Polyporus alveolaris (DC) Bondartsev & Singer
34			Polyporus varius (Pers.) Fr.
35			Polyporus arcularius (Batsch) Fr.
36			Daedaleopsis sp.
37			Truncospora sp.
38			Lentinus sp.
39			Lentinus sp.
40			Lenzites sp.
41			Microporous xanthopus (Fr.) Kuntze
42			Pycnosporus cinnabarinus (Jacq.) P.Karts
43		Meruliaceae	Podoscypha sp.
44		Ganodemataceae	Ganoderma sp.
45	Phallales	Phallaceae	Colus sp.
46	Dacrymycetales	Dacrymycetaceae	Dacryopinax spathularia
47			Calocera sp.
48	Xylariales	Xylariaceae	Xylaria polymorpha (Pers.) Grev.
49			Xylaria hypoxylon (L.) Grev.
50			Hypoxylon sp.

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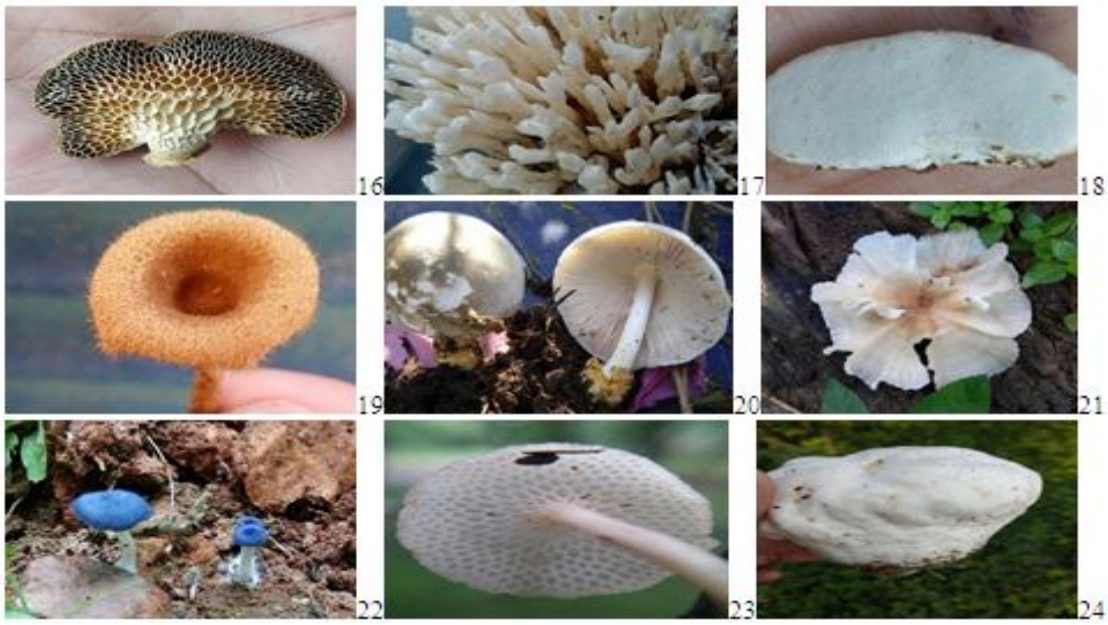
1. Daedelea sp 2. Lentinus sp. 3. Cotylidia sp. 4. Lenzites sp. 5. Parasola sp. 6. Microporus xanthopus 7. Psathyrella sp. 8. Schizophyllum communae. 9. Panaelous sp. 10. Cythus stritus. 11. Termatomycets sp. 12. Pycnopsorus cinnabarinus. 13. Fomes fomentarius. 14. Lyophyllum sp. 15 Daldinia concentrica.



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16. Polyporus alveolaris 17. Ramariopsis sp. 18. Trincospora sp. 19. Lentinus sp. 20. Volvariella valvacea 21. Podoscypha sp. 22. Entoloma sp. 23. Polyporous tenuiculus , 24. Clavatia sp. 25. Polyporous arcularius 26. Auricularia auricula-juade 27. Termitomyces sp. 28. Mycena sp. 29. Marasmius sp. 30. Xylaria polymorpha Colus sp. Conocybe sp.

RESULT AND DISCCUSSION

The preliminary survey reveals the occurrence of several macrofungal species in the district. total 80 specimens have been collected from the habitats like forest, open grassland, swamps etc. from various localities of the district out of these 80 speciemens 50 have been identified up to genus level. Attampted have made to collect maximum number of Basidiomycetes macrofungi. Total 45 genus have been identified and of these 43 belongs to Basidiomycetes and only two i.e *Xylaria* and *Hypoxylon* are Ascomycetes fungi. Class Basidiomycetes represented by 8 order namely *Auriculares, Agaricales, Bolateles, Hymenochetales, Polyporales, Phallales* and *Dacrymycetales*, while Class ascomycetes are represented by single order i.e.*Xylariales*. Order Agaricales is emerge as major order having 13 familes and 21 genus. Order Polyporales is second largest order which is represented by 4 families and 21 genus. Family polyporaceae is represented by 9 genus followed by Agaricaceae with 5 Genus. These entire studied genera are types of agraricus, boletales, jelly fungi, bracket fungi, puffballs, stinkhorns, coral fungi and bird's nest fungi. The present study is preliminary survey and further work is needed for ecological and economical assessment of macrofungi as they played important role in ecosystem management and human life.

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MOLLUSCANS DIVERSITY FROM RAILWAY STATION POND, AT GONDIA, DISTT. GONDIA

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ABSTRACT
Railway Station Pond was constructed in 1930 by the Railway Department to supply the water for steam engines and loco sheds. It is located in the heart of Gondia city and is surrounded on three sides by dense habitations and on one side by railway line, near the railway station. It has become highly polluted due to the receipt of untreated sewage, garbage and rubbish from railway station.

The present study was carried out to study the diversity of aquatic animals with reference to molluscans of Railway Station Pond during the period from June 2006 to May 2007. This pond is one of the large sources of aquatic animals including molluscans and other animals, which are very much economically important. The result of present investigation were reported the occurrence of 6 species of molluscans belonging to 3 orders and 6 genera. Among these, order Pectinibranchia and Eulamellibranchia was dominant followed by order Bassommatophora. The result of the study shows rich in molluscans biodiversity.

Keywords: Diversity, Molluscans, Railway Station Pond.

INTRODUCTION
India is having very rich sources of Inland water bodies in the form of ponds, lakes, reservoirs and rivers. The ponds and lakes form one of the most important; large number of living aquatic animals, which are economically important for nature as well as human being for their using as food. These also provide an excellent food for human and provide proteins, fats and vitamins and minerals; these are essential for the health of man. The variations in physico-chemical characteristics of pond water also have direct impact on prevailing organisms as well as on human being using such water. The pond receives domestic waste water throughout the year as the domestic waste water channels of the surrounding area are diverted into the pond. The considerable studies on diversity of aquatic animals from different water bodies of India have been carried out during the last few decades, Chandrashekhar and Kodarkar (1994), Anitha et al (2004) studied the aquatic animals in India.

Phylum Mollusca constitutes one of the dominant group of animals such as snails,slugs, freshwater mussels, clams etc. This is a wide spread group with about 45000 species and second large phyla after the phyla Arthropoda. In India about 3171 molluscans species belonging to 220 families and 541 genera are known in which 1900 species of Gastropods, 1100 species of Bivalvia, 210 species of Cephalopoda, 41 species of Scaphopoda.

The present investigations was undertaken to study the diversity of molluscans from Railway Station Pond which are commercially important.

MATERIALS AND METHODS
Railway Station Pond located at 21 27' and 39.18" N and 80 11' and 11.67" E and is about 1022 ft. above the mean sea level (MSL) with an area of 0.09 sq. km. Monthly water samples were collected and brought to the laboratory. It is an mesosaprobic in nature, but the present trend in expansion of urbanization on all sides of town may engulf this water body in very near future.

During the study period, monthly samples from three sites were collected for qualitative estimation of benthic fauna. The mud sample was collected with Ekmann dredge and was transferred to laboratory in polythene bags. Due to increase in the density in water, benthic organisms will float on the surface and were picked up and preserved in 4% formalin for identification upto species level by following the keys from Edmondson (1959), Pennack (1978), Tonapi (1988) and Mitra & Day (2005).

Identification of Molluscans was done by using standard tests and keys Edmondson (1959). The collected molluscans were identified with the help of key given by earlier workers.

RESULTS AND OBSERVATIONS
Table 1 . List of Mollusca found in Railway Station Pond from June 2006 to May 2007.

Phylum →	Mollusca	Phylum →	Mollusca
Class →	Gastropoda		
poda	Class →	Pelecypoda	
Subclass→	Prosobranchia	Order →	Eulamellibranchia

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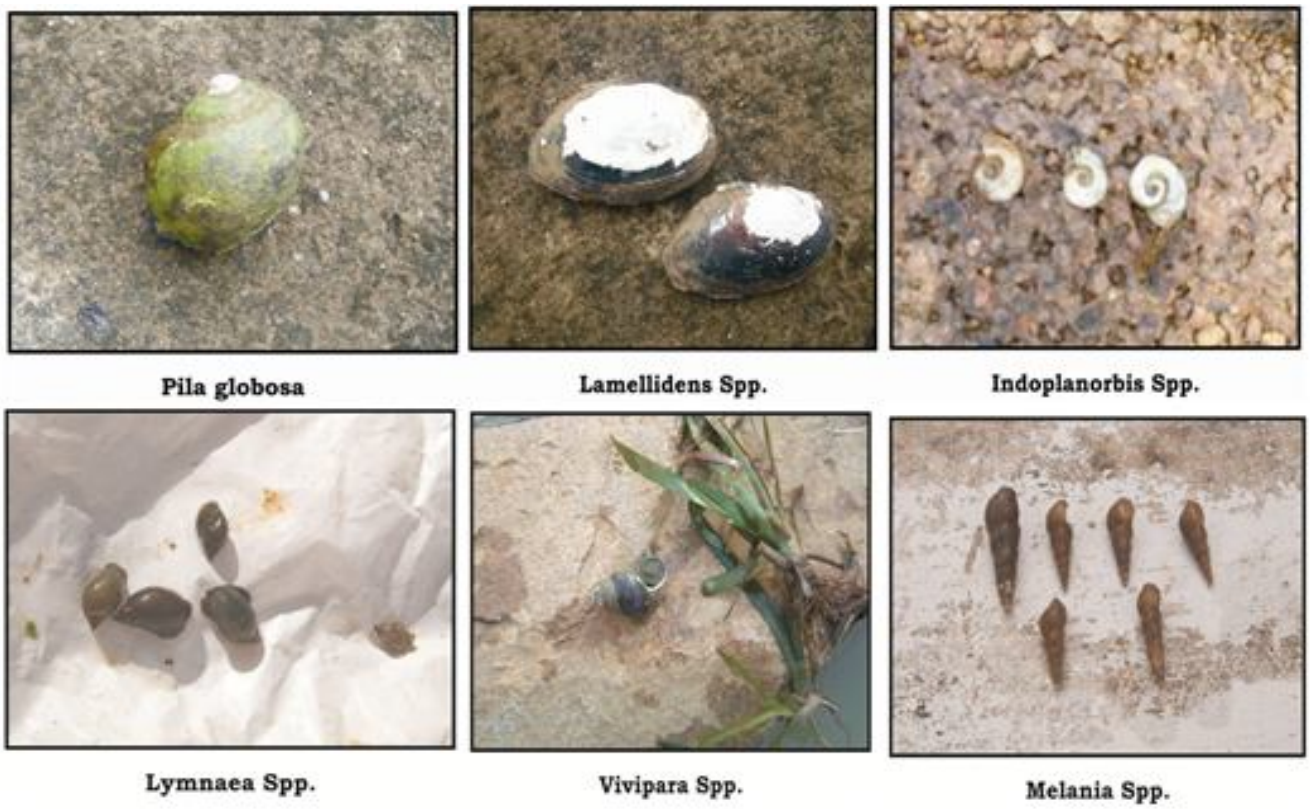
Order →	Pectinibranchia	Genus →	Lamelliden
Genus →	Pila	Species →	Marginalis
Species →	globosa	Subclass→	Pulmonata
Genus →	Vivipara	Order →	Basommatophora
Genus →	Melania	Genus →	Lymnaea & Indoplanorbis

The result of the present study has confirmed the occurrence of molluscans with 6 species belongs to 3 orders and 6 genera.



Pila globosa | Lamellidens Spp. | Indoplanorbis Spp.

Lymnaea Spp. | Vivipara Spp. | Melania Spp.

DISCUSSIONS

The molluscans species like snails, Pila globosa, Vivipara bengalensis, Indoplanoebis spp.Melania spp. were recorded more in Railway Station Pond during the monsoon season and less in summer season. Lymnaea spp, Vivipara spp, Cyclophorus Spp.,Georissa Spp. Melania spp. were recorded moderate in number during monsoon and summer season, which indicates the pollutional status of the pond. Among the Pelecypods, Lamellidens marginalis were recorded more in Railway Station pond. Batt (1959) has reported 59 speecies of Gastropoda and 31 species of bivalve. D. Annadurai (2006) was recorded 115 species of Gastropoda.

Arvind kumar (1999) also reported Melania spp. From Santhal Pargana, Bihar and reported it an indicator of sewage born heavy pollution and hyper eutrophication. The presence of Melania spp. in pond during present study is in conformity with his observation. Similar results also reported by Kamble et al (2009).

In the present study, Mollusca showed their dominance among other aquatic animals Railway Station Pond. This might be due to the adequate availability of Calcium. Tudorancea, (1972) regarded alkaline nature of water and high concentration of calcium as a contributory factor towards the dominance of Molluscs in the water bodies studied by him.

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GENETIC DIVERSITY STUDIES IN SOME CHILI HYBRIDS FROM KHANDESH REGION USING SDS - PAGE

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ABSTRACT
Present study was undertaken to estimate genetic diversity in 12 hybrids of chili (Capsicum annm L.)from Khandesh region,using SDS-PAGE. Storage seed protein banding pattern studied. Total seed storage protein ware extracted and separated on 10 % polyacrylamide gel using standard protocol. The data generated from scoring of bands of proteins separated in 12 chili hybrids ware analyzed using NTsys& UPGMA dendogram developed. Dendogram analysis provide 2 major clusters. Hybrid 12(Pikato green) & Hybrid 1(ARCH-82) Shows maximum similarity, indicates probable origin from same parent. Hybrids from clusterI & II shows considerable genetic distance.

Keywords: Capsicum annum L., Seed storage protein, SDS-PAGE, UPGMA dendogram

INTRODUCTION
Chili (*Capsicum annum L.*) Is the most important vegetable cum spice crop because of their pungency, flavor, color and aroma. This is belonging to the family Solanaceae.Number of capsicum species has been known as part of human diet science the beginning of civilization.There is little recorded genetic diversity among cultivated chili. However, general knowledge is that commercial verities and particularly hybrids verities of vegetable crops are based on increasingly narrower genetic base(Padma.J and Shiva K. 2013).Previously the data like color, shape, size, pungency, flavor and physiological traits are generally used to estimate the magnitude of genetic diversity present in chili germplasm. However with the increase in the number of verities in each crop, it is difficult to distinguish verities/ hybrids on the basis of data from morphological characters alone. Such data may not provide an accurate indication of genetic diversity because of environmental influences upon the expression of observed traits. This has leads to the development of new stable parameter such as use of genetic material (Nucleic acid and Proteins) as a tool to estimate genetic diversity. Recently genetic diversity in capsicum has been studied using cytological and biochemical system.(Gopinath et.al., 2006.) Seed storage protein used as genetic markers in the study of genetic variation because any change in coding sequence of a gene generally reflects the corresponding change in the primary structure of a protein(Srivilli et.al.,1999)Genetic and taxonomic relationship in the genus capsicum have been investigated with electrophoresis of seed storage protein banding patterns(Valdova et.al., 2000; Zubiada et.al., 2006).

The present work was carried out on total 12 chili hybrids. The 12 chili hybrids from Khandesh region of Maharashtra state were taken to evaluate seed storage protein variability and for their exploitation in successful crossing programs.

MATERIALS AND METHODS
Seed Material: Seed material used for present study includes 12 accessions (Hybrids) which ware locally available in Khandesh regionof Maharashtra. 10 seeds of each accession ware taken for total seed storage protein extraction.

EXTRACTION OF SEED STORAGE PROTEIN
10 seeds of each accession ware powdered separately. 10 mg seed powder of each line along with 5 ml of 0.01M Tris.HCL buffer (pH 7.5) ware taken & vortex thoroughly to homogenize. The resulting homogenate was centrifuged at 15,000 rpm for 10 min. at 4°C. The supernatant was collected and used as soluble protein for SDS-PAGE.

SDS-PAGE analysis: Extracted soluble protein ware separated by one dimension SDS-PAGE. Percent of running and stacking gel was kept 10% &% respectively. Electrophoresis was conducted at a constant current 85mA until the tracking dye reached the bottom of the gel. After electrophoresis the gel was stained overnight in 0.25% Coomasie Brillent blue R-250, followed by de-staining in Methanol and Acetic acid solution for 45 min.The gel was further de-stained until the background was clear enough for band scoring. Protein marker of Hi-Media was used as standard to score the sample bands. Molecular weight of protein band were estimated by their relative mobility. After de-staining the gel were photographed using gel documentation system 'UVtech'.

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Data analysis: For Genetic diversity analysis, every scoreable band was considered and scored 1 for presence and 0 for absence. The bivariate 1-0 data was used to estimatethe pair-wise genetic distancefollowing UPGMA procedure for dendrogram (Nei and Li., 1979).

RESULT & DISCUSSION

Genetic diversity among cultivars are pre-requisite to identify high performing parents (Padma J. and Shiva S. 2013). Similarity matrix was subjected to UPGMA clustering to generate dendogram. Cluster analysis of UPGMA is extensively used for genetic diversity studies in important plants.Electrophoresis analysis of 12 chili genotypes reveal not much more variation in the banding pattern of proteins (Figure 1). Twelve Capsicum hybrids ware characterized on the basis of seed storage protein using SDS-PAGE (Figure2). Studied cultivars were group into 2 major clusters. Cluster I corresponding 4 genotypes where as cluster II includes 8 genotypes. Dendogram depicted by UPGMA shows low genetic diversity as most of verities belong to single cluster. This may be due to genotype homozygosity (Odeigah P.G.et.al., 1999)which causes the narrow genetic base.Valdova et.al., (2000) and Zubiada et.al., (2006) also studied chili verities of India using seed storage protein. Our results shows less variability in among the studied samples except for some lanes (L1,L4,L8)where considerable variation observed. There line specific bands shows variation between 12 chili genotypes and themselves. This observation suggests that SDS-PAGE technique can be used to differentiate this genotypes from the rest of the genotypes. Pikato green and ARCH 82 were found to be closely similar. This may attributed to the same genetic background of them. Whereas Sizziling hot, Shama, Shimla red, Omega, Sitara and Local genotyps formed separate cluster in cluster II. This may due to their morphological differences between them. Also, cluster pattern of these genotypes revealed that these genotypes may be developed from same parental genotypes.

CONCLUSIONS

The present study exploited seed storage protein for identification of better parents. Hybrid 12(Pikato green) and Hybrid1 (ARCH-82) shows maximum similarity indicates probable origin from same parents.Parents of cluster I & cluster II hybrids can be used to produce improve hybrid from Khandesh region.

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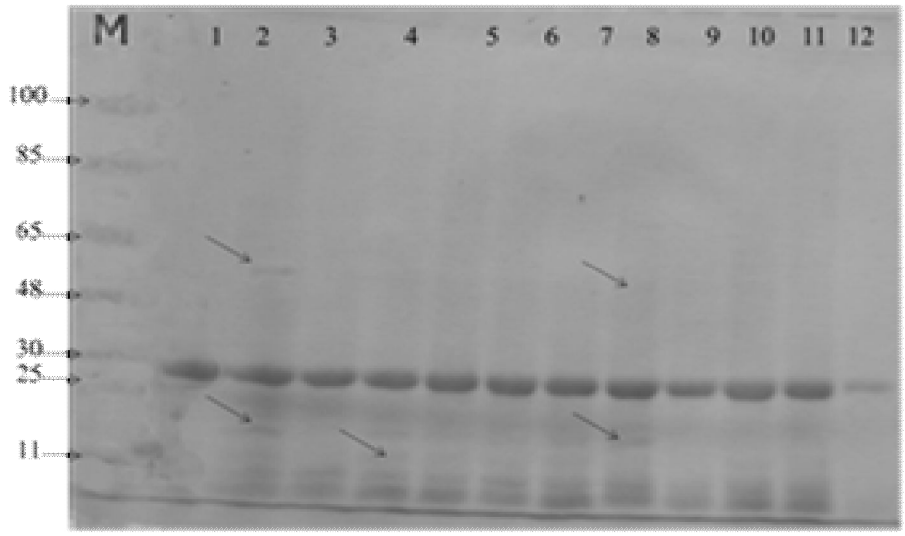

Figure – 1: Total seed storage protein profile of 12 Chilli hybrids. M= Molecular weight marker; 1-12 chili hybrids.

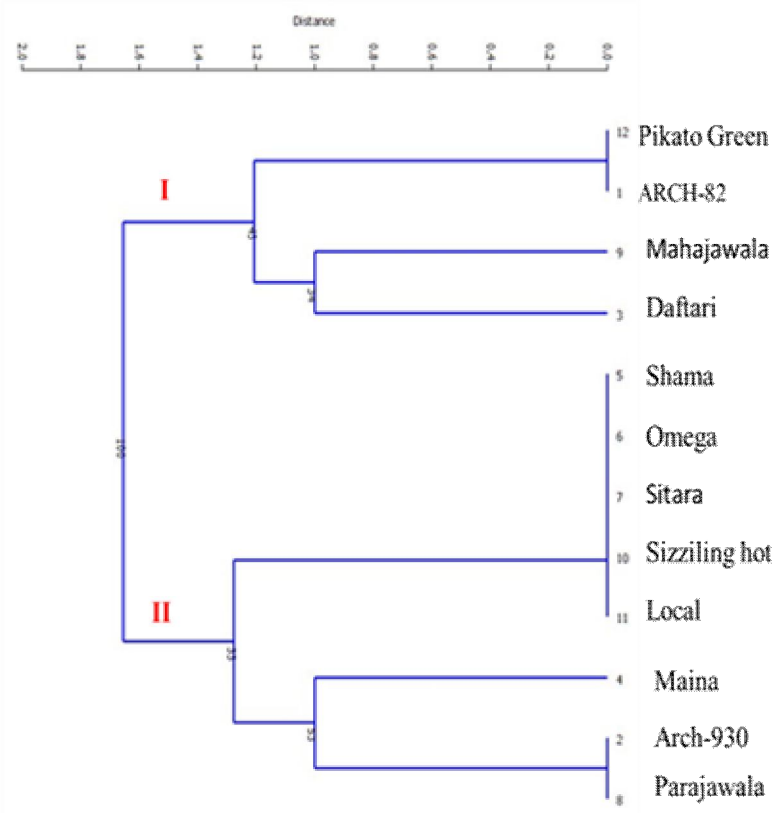

Figure - 2: UPGMA dendrogram of 12 Chili hybrids based on seed storage protein.

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SYNTHESIS, CHARACTERIZATION AND THERMO-LUMINESCENCE STUDIES OF CARBON DOPED ALUMINA PREPARED BY CONVENTIONAL METHOD

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ABSTRACT
The carbon doped alumina prepared by solution combustion (SCS) route followed by conventional ceramic techniques. The nano-alumina prepared from SCS was used for the synthesis of Al_2O_3:C (1%, 2%, 3% carbon content). This alumina was sintered at 1200^oC to obtain transparent α-alumina phase confirmed from XRD and SEM. The two-valent carbon ions replace the three-valent cations of Al, which leads to introduce oxygen vacancies during the crystals growth process. The oxygen vacancies combine with one or two electron formed F or F^+ centres. The sample was irradiated with the radiation dose of 10 Gy (radiation from ^{90}Sr β). The measurement was taken at the heating rate of 2 K/s in the temperature range of 298–773 K. The α-Al_2O_3:C ceramics shows three TL glow peaks centered at 405, 493 and 610 K for 1 % carbon content.

Keywords: Thermoluminiscence, Alumina, Solution combustion synthesis.

1. INTRODUCTION

According to the World Health Organization (WHO), more than 11 million people are diagnosed with cancer every year with an estimated 1.1 million people in 2005 for Europe alone [1, 2, 3]. The incidence of cancer is increasing with our increased lifespan and by the year 2020, the number of people diagnosed with cancer is estimated to be 16 million per year, an increase of about 50% relative to the present level. In Denmark (2007), roughly 30000 people are annually diagnosed with cancer and despite extensive research only about 45% of the cancer patients are successfully cured, i.e. survives for more than five years without further symptoms. Around 22% of diagnosed cancer patients are cured through surgery alone, 18% by radiation therapy alone or in combination with either surgery and/or chemotherapy, and the remaining 5% by chemotherapy alone or in combination with surgery [4, 5, 6]. The objective of radiation therapy is the destruction of cancer tissue by means of radiation. Thermoluminescence (TL) and Optically Stimulated Luminescence (OSL) dosimetry, play an important role in the measurement of doses from external radiation source, received by individuals working in radiation environment such as nuclear reactors, industrial radiography, space and diagnostic radiology applications. Conventionally, radiation monitoring has been carried out using Thermally Stimulated Luminescence (TSL) technique.

Conventional technique of making α-Al_2O_3: C phosphor, by growth of single crystals in reducing environment, has limitations of: (a) limited control of parameters for incorporation of desired concentration of carbon into lattice and control over nature of defects as crystal growth occurs at a fixed temperature and growth rate etc. and (b) slow growth process using expensive equipment, that increases cost of material. Compared with single crystal, ceramic materials have many advantages: they are easy to fabricate under melting point for a short period and low cost, and they can be mass-produced. Ceramics not only can be produced in large volumes but also can be heavily and homogeneously doped with active ions. They can also be made a multilayer or multifunctional structure.

2. SYNTHESIS OF COMPOUND

The starting materials for the synthesis were alumina powder and graphite powder. Specimens were fabricated by weighing the starting powders to achieve the C content of 1%, 2% and 3% by weight in the pure alumina powder. The mixed powders were weighed to the desired composition, ball milled together with distilled water and ZrO_2 ball for 24 h. The milled slurry was dried at 150^o C. The pellets with 6.5 mm in diameter and 5-7 mm in thickness were isostatically pressed at 200 MPa and sintered at 1500–1600^o C for 15 h. In this process, carbon is diffused into the crystals, leading to creation of F centers. The heating was carried out in vacuum furnace with base vacuum of 10^{-6} Torr, with uniform heating and cooling rates of 20°C/min. All samples were irradiated with a 10 Gy gamma radiation (radiation from ^{90}Sr), for characterization of the radio induced luminescent signal.

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3. RESULT AND DISCUSSION

To investigate the phase of the prepared samples, X-ray diffraction technique is employed, using a powder X-Ray diffractometer with Cu- K_α source. All the scan were recorded in the 2θ region of 15- 95^0 at a scan rate of 0.02^0 per second. The following **figure 1** shows X-ray diffraction pattern of carbon doped alumina (carbon 1 % wt.). Crystalline phases diffract x-rays according to the Bragg law, $n\lambda = 2d.\sin\theta$, where θ is the diffraction angle for a lattice spacing d, λ is the wavelength of the x-rays, and n is an integer. Powder or polished polycrystalline specimens are used, and the diffraction 2θ angles were recorded. The identification of a phase is accomplished by comparing the d-spacing and relative intensities of the sample material with reference data for known materials.

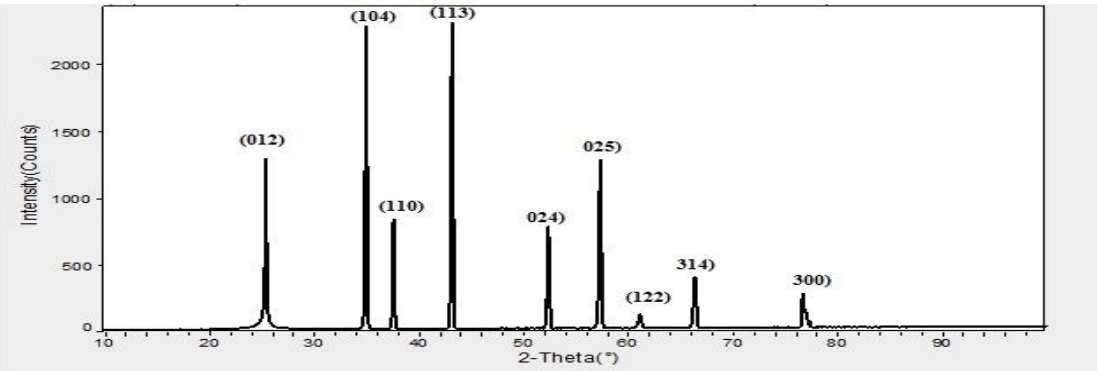

Figure 1: X-ray diffraction pattern of sintered Al_2O_3:C (1% wt. Carbon)

Figure 5.45 shows the XRD results obtained for the α-Al_2O_3:C powder, and it can be seen from table 5.10 that this material presents only the alpha phase. The starting materials used for this study were sample of pure nano-particles of alumina in the crystalline alpha phase which was prepared via solution combustion synthesis. The alumina described in the literature as having great photo-luminescent and thermo-luminescent signals is the carbon doped ones, in the crystalline alpha phase. Therefore, we have sintered nano alumina before using in the present synthesis in order to achieve crystalline alpha phase. It can be seen from the XRD pattern of the carbon doped alumina (figure 1), it exists in alpha-phase which is very similar with XRD pattern. We also can see that the crystalline Bragg reflections are well defined, with narrow peaks, indicating a higher crystalline order. The crystalline size calculated from Scherer formula was found to be 250 nm. This indicates the increase in grain growth compared pure nano alumna which is due to high temperature conventional ceramic process.

The crystal structure of α-alumina can be described by a slightly distorted arrangement of O^{2-} ions in a hexagonal closed packed sublattice. Between the oxygen layers there are sites for cations octahedrally coordinated by six O^{2-} ions, however only two third of the available positions are filled with Al^{3+} ions. Groups of three O^{2-} ions form a common face of two neighboring octahedral and thus the groups are linked to a pair of Al^{3+} ions. The shorter Al^{3+}-O^{2-} distance is 1.86 Å and the longer distance is 1.97 Å. The point group symmetry of the O^{2-} ions are C_2 while the Al^{3+} ions are situated in distorted octahedral sites of O_h point group symmetry. [Deer, Summer et al [7].

The external morphology of the carbon doped alumina was studied by scanning electron microscopy. **Figure 1** shows SEM micrograph of sintered carbon doped alumina Al_2O_3:C (1% wt. Carbon). From the **Figure 1,** it shows the microstructures of carbon doped *α*-Al_2O_3 is transparent ceramics. Due to the transparent nature of α-Al_2O_3 ceramics, it makes suitable material for luminescence study. It can also be seen from the SEM image, the Al_2O_3:C ceramic almost have no pores and the grain boundaries. It also been noted that the particle are agglomerated and formed micro-size clusters due to high temperature sintering.

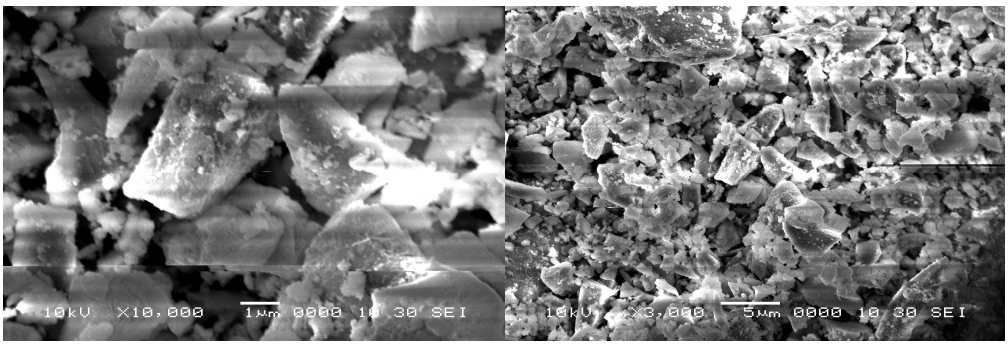

Figure 1: SEM micrograph of sintered Al_2O_3:C (1% wt. Carbon)

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Dosimetric properties of α-Al_2O_3: C can be considerably improved by generating oxygen vacancies into its structure. It was suggested that two-valent carbon ions replace the three-valent cations of Al, which leads to introduce oxygen vacancies during the crystals growth process. Oxygen vacancies combine with one or two electron formed F or F^+ centres.[8]

The sample was irradiated with the radiation dose of 10 Gy (radiation from ^{90}Sr β). **Figure 3** shows the TL curves of α-Al_2O_3:C ceramics with the concentration of carbon 1%, 2% and 3% respectively. The measurement was taken at the heating rate of 2 K/s in the temperature range of 298–773 K. The α-Al_2O_3:C ceramics shows three TL glow peaks centered at 405, 493 and 610 K for 1 % carbon content. It can be seen from **figure 3**, the intensity of TL peak increases with increasing carbon content. The addition of carbon leads to induce in the material high concentrations of oxygen vacancies, F and F^+ centres [9] , and the intensity of luminescence is directly proportional to the concentration of vacant sites.

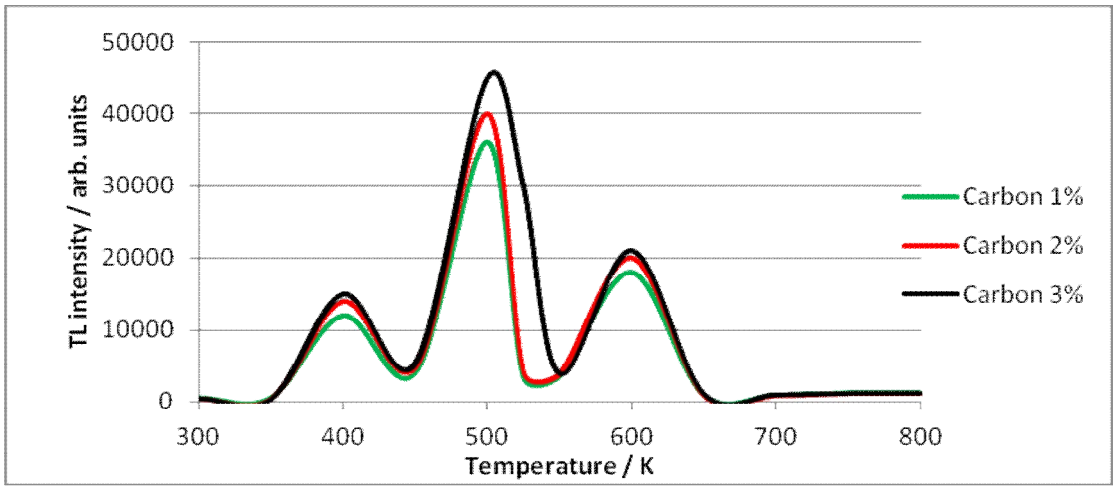

Figure 3: The TL curve for α-Al_2O_3: C ceramic with carbon content 1%, 2% and 3%

The addition of carbon also leads to the TL peaks moving to higher temperatures. However, the sensitivity of 493 K TL glow peak is much higher than the others. This emission spectrum consists of radiation at 420 nm and 330 nm. The emission at 420 nm has been explained to be due to the result of recombination of thermally released electron with F^+ centre, leading to the formation of an excited F centre, which undergoes a radiative relaxation to ground state [10,11]. Appearance of peak at 330 nm has been explained in terms of hole traps. The thermally released holes may recombine with F centres resulting in the formation of excited F^+ centres which emit at 330 nm or transfer energy to F centres yielding emission at 420 nm as well [12]. A generalized model used [13] to describe the TL process of α-Al_2O_3:C crystal is shown in Fig. 4.

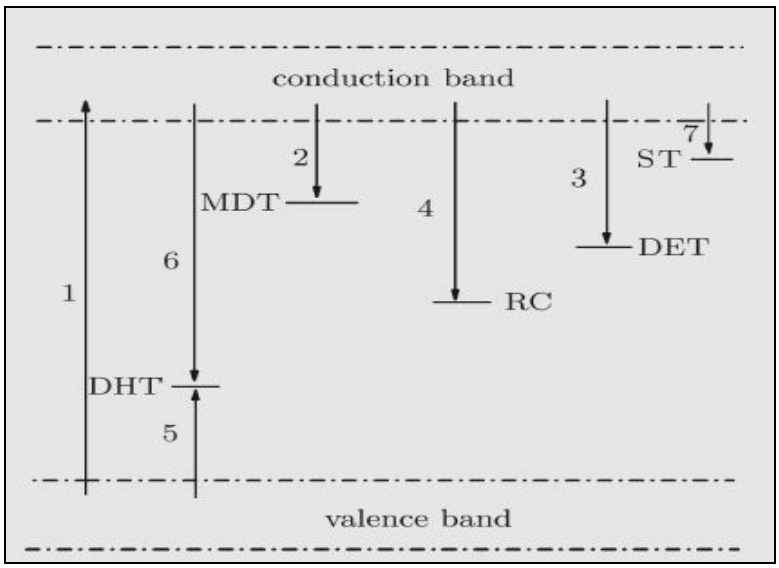

Figure 4: Energy band model describing charge transitions through the delocalized bands in α-Al_2O_3:C

The observed TL curve may be described by considering only the levels associated with the main dosimetric trap (MDT) and the recombination centre (RC). Irradiation creates electron-hole pairs (transition 1). The electrons are either trapped at the MDT (transition 2) or recombine with F^+-centres at RC (transition 4), creating

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an F-centre. The free holes generated during irradiation are captured by the F-centres, increasing the concentration of F^+-centres. The electrons are freed from the MDT and recombine with the F^+-centres, resulting in 420 nm emission by heating or optical stimulation.

In order to explain the TL spectra, three other levels, deep electron traps (DETs), deep hole traps (DHT) and shallow traps (ST), are introduced. The free holes can be captured by DHT (transition 5). The electrons can also be trapped by DET (transition 3) and ST (transition 7) or combine with the holes at DHT (transition 6). Two STs have been identified in α-Al_2O_3:C, one at 260 K and another at 310 K, but only the latter has relevance at room temperature. [13] Empty DETs act as competitors, capturing electrons excited to the conduction band during irradiation (or illumination) or electrons stimulated from the MDT during the recombination stage. As the DETs are filled, the competition becomes less important and more electrons can be trapped at the MDT during the irradiation, resulting in increased sensitivity.

4. CONCLUSION

The carbon doped alumina is synthesized by standard ceramic technique using graphite powder and nano alumina which was prepared in present work. The Al_2O_3:C shows typical α-phase which is suitable for thermo-luminescence study with average crystalline size of 250 nm. This increase in size was attributed to high temperature sintering. In thermo-luminescence study, the Al_2O_3:C shows maximum intensity peak at 493 K when irradiated with 10 Gy dose. The TL peak at 493 K shows dossimetric peak with highest TL intensity. The intensities of the TL peaks increases with increase in carbon content, the addition of carbon also leads to the TL peaks moving to higher temperatures. The addition of carbon can effectively increases the concentration of oxygen vacancies in α- Al_2O_3 ceramic.

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EFFECT OF TEMPERATURE, PRESSURE ON L-LEUCINE DOPED AMMONIUM DIHYDROGEN PHOSPHATE CRYSTALS

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ABSTRACT
Pure ammonium dihydrogen phosphate (ADP) with L-Leucine doped has been grown by slow solvent evaporation method at room temperature. The grown crystals were characterized by X-ray diffraction, FTIR . The X-ray diffraction analysis of the grown ADP crystals showed that it possess tetragonal structure having lattice parameters a = 7.626 Å and c = 7.715 Å. FTIR spectral analysis was performed to identify various functional groups in the crystal.

Keywords: ADP, L-Leucine, X-ray diffraction, FTIR, Vickers's Microhardness ,TGA/DTA etc.

1. INTRODUCTION
Ammonium Dihydrogen Phosphate (ADP) is a representative of hydrogen bonded materials that possesses excellent dielectric, piezoelectric, anti-ferroelectric, electro-optic and nonlinear optical properties. Growth and studies of ammonium dihydrogen phosphate is a centre of attention to researchers because of its unique properties and wide applications. Single crystals of ADP are used for frequency doubling and frequency tripling of laser systems, optical switches in inertial confinement fusion and acoustic-optical Devices [1]. ADP crystallizes in a body centered tetragonal structure with the space group I 4 2d and has tetra molecular unit cell [2] with unit cell parameters a = b = 7.6264 Å and c = 7.7151 Å. ADP has been the subject of a wide variety of investigations over the past decades. Reasonable studies have been done on the growth and properties of pure ADP [3-4]. In recent years, efforts have been taken to improve the quality, growth rate and properties of ADP, by employing new growth techniques, and also by the addition of organic, inorganic and semi organic impurities [5, 6]. Organic nonlinear optical materials have large optical susceptibilities, inherent ultrafast response times, and high optical thresholds for laser power as compared with inorganic materials. Amino acids are interesting materials for NLO applications as they contain a proton donor carboxyl acid (-COOH) group and proton acceptor amino (-NH2) group in them [7]. Amino acids, when added as impurities, have improved material properties [8]. Amino acid, L-leucine has formed several complexes, which are promising materials for second harmonic generation [9, 10]. In the light of research work being done on ADP crystals, to improve the properties, it was thought interesting and worthwhile to investigate the effect of L-leucine on ADP. In this work, the structural spectral and nonlinear optical behaviour of single crystals of L-leucine added ADP against pure ADP has been studied and reported.

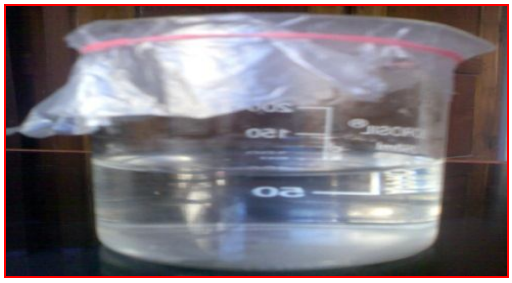

Fig 1. : Polythene covered beaker ADP solution for slow evaporation

Fig 2 : Pure ADP

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2. EXPERIMENT

Ammonium dihydrogen phosphate and L-leucine (Merck-Germany) along with de- ionised water were used for the growth of single crystals. ADP was mixed with L-leucine in the ratio 1:0.04 to prepare 300 ml of saturated solution at 35°C The solution was stirred for four hours using magnetic stirrer and filtered using Whatman filter paper. The filtered solution was transferred to borosil glass beaker. It was porously sealed and placed in a dust free atmosphere for slow evaporate n. 100 ml of saturated solution of pure ADP was also prepared with de-ionised water at 30°C.

The solution was stirred for four hours using magnetic stirrer. It was then filtered using Whatmann filter paper, transferred to borosil glass beaker, porously sealed and kept in a dust free atmosphere for slow evaporation . The grown Pure and 0.4 mol% L-leucine added ADP crystals were harvested after a period of 30 days.

Crystals growth and characterization of ADP and doped ADP crystals were grown from an aqueous solution by slow evaporation and slow cooling techniques. Good quality crystals of reasonable size (40 mm X8 mmX 7 mm) are obtained for a particular concentration shown in fig 1 and 2.

3. RESULT AND DISCUSSIONS

3.1 Powder X-Ray diffraction (PXRD) Analysis: Powder of grown pure ADP and L-Leucine doped crystals were analyzed by XRD studies. The powder sample were loaded into X-Ray diffractometer with radiation (λ=1.5406 Å) with an operating voltage 40kV and current 35mA. Scanning rate was maintained at 32.8s over a2θ range of 10-800.From this measurement we found the lattice parameters as a=b= 7.4854 Å and c= 7.5377 Å for pure ADP and lattice parameter of L-Leucine doped crystals are well matched with the result reported[12], having symmetry space group I42d and result shows that L-Leucine entered into ADP lattice. No additional peaks are present in the XRD spectra of doped ADP crystal, showing the absence of any additional phases besides the tetragonal system, due to doping. The observed prominent peaks of all L- Leucine doped crystals are (101), (200), (112), (202), (301), (213), (114), (204), (323), are shown in fig. (2).The variation in intensity of diffracted peaks is found. The differences in the peak amplitude can be ascribed to the different sizes and orientation of the powered grains. The degree of sharpness of peaks indicates the crystallinity of the grown crystals. There is small variation in lattice parameters with concentration.

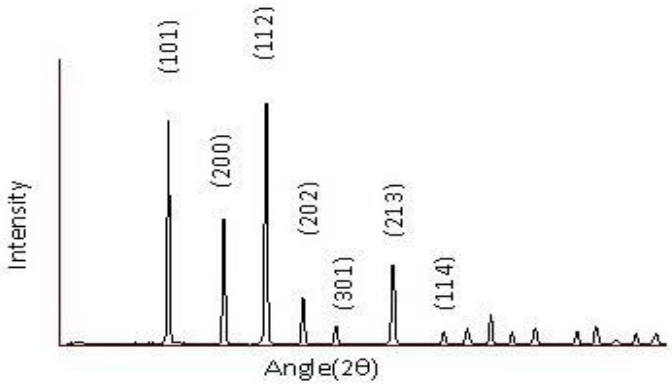

Fig 3: PXRD of pure ADP

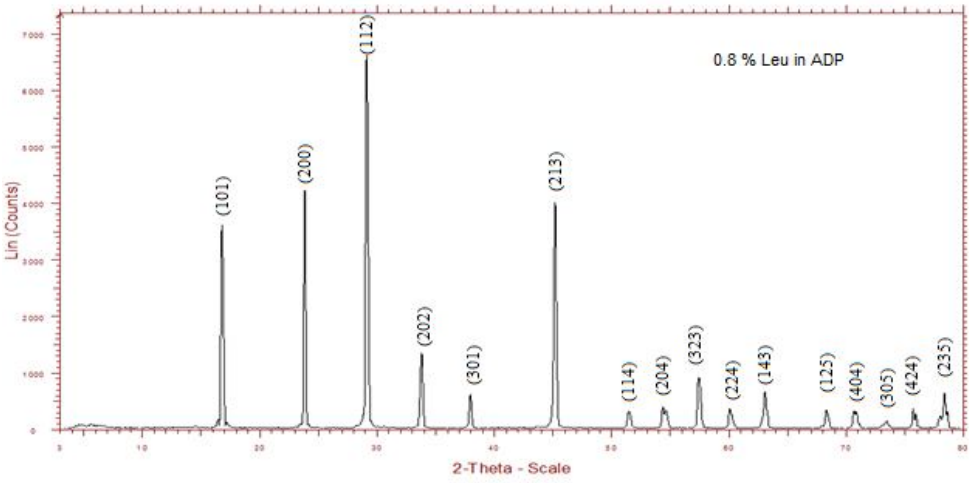

Fig 4: PXRD of 0.8 % Leucine doped in ADP

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FOURIER TRANSFORMS INFRARED (FT-IR) ANALYSIS

The powdered samples of L-Leucine doped ADP were also attempted to Fourier Transform Infrared (FT-IR) investigation. The spectrum was observed from VARIAN resolution pro FTIR spectrometer in the range 400-4000 cm $^{-1}$ by KBR pallet technique. The prominent peaks in the FT-IR pattern for different concentration of L-Leucine doped ADP crystals are shown in the fig. 5.The FT-IR spectra of pure ADP and L-Leucine doped ADP shows that band in the high energy region is due to free O-H stretching of water, P-O-H group of pure and L-Leucine doped ADP[13]. Graphs of pure ADP and L-Leucine doped ADP have high similarities which indicate pure ADP peaks are predominant over L-Leucine peaks due to very small doping of L-Leucine From FT-IR spectrum of pure and L-Leucine doped ADP it is been observed that all major peaks have shifted towards the higher wave number region, which indicates that dopant L-Leucine has brought about this changes.

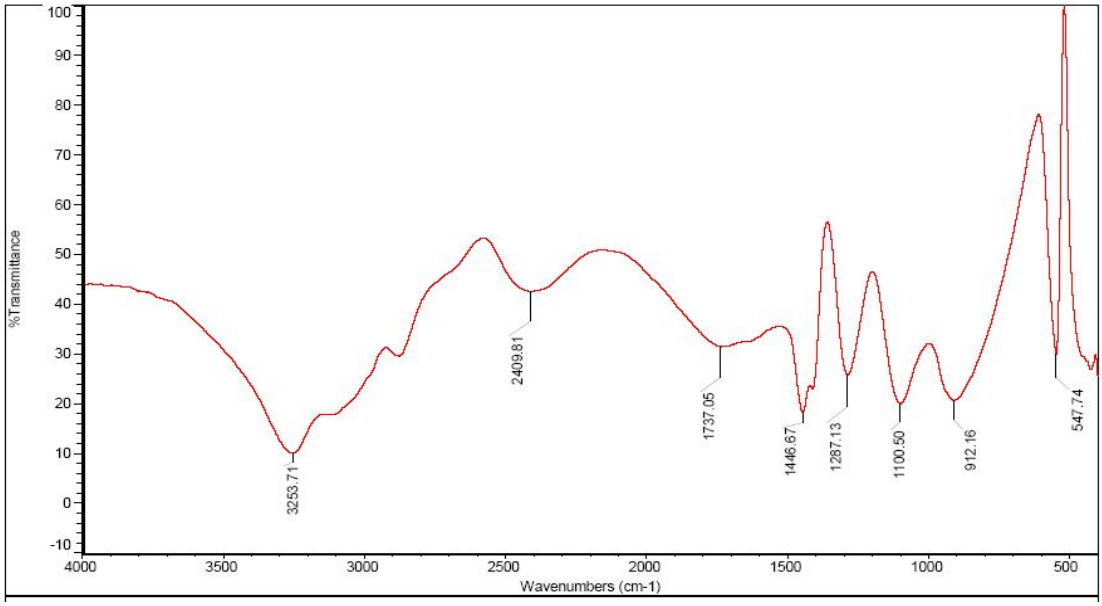

Fig 5: FTIR of 0.8 % Leucine doped ADP

The characteristics absorption frequencies of various functional groups are given in the following table no. 1.

Table No – 1: Bond assignments of various frequency

Sr. No	Frequency Range	0.8 mole%+ADP	Bond Assignments
1	3700-3100	3235.81	O-H-O Stretching
2	2800-2400	2861.81	P-O-H Asymmetric Stretching
3	1450-1200	1446.67	Bending vibration of NH2
4	1200-900	1100.50	P=O Stretching
5	550-430	433.34	PO_4 Vibration

VICKERS'S MICROHARDNESS ANALYSIS

Hardness is a measure of a materials resistance to localized plastic deformation. The mechanical property of the materials is useful for determination of device fabrication and it is directly related to its bonding and crystallographic orientation. Vickers indentation test studied by Mitutoyo Microhardness tester on cut and polished plate of (100) plane of thickness 5 mm in size with load using Vickers hardness tester with diamond indenter attached to an incident light microscope and the indentation time was kept as 20 sec for all loads. Crystals with flat and smooth faces, microscopically free from signs of any damage are selected for indentation studies. The indented impressions are approximately pyramidal in shape. The distance between two indentation points was maintained to be more than three times the diagonal length, in order to avoid any mutual influence of indentations

Table the Vickers hardness (Hv) for the 0.8 mole%, of L-Leu doped ADP crystals at constant load, that at 50 g the Hv of doped ADP are in the range 66 to 79 Hv. This shows that as the concentration of dopant increases the hardness property of crystals.

Variation of Hv for constant load

Sample	Micro hardness number	Load used
0.8%L-eu+ADP	67.3 Hv	50 m

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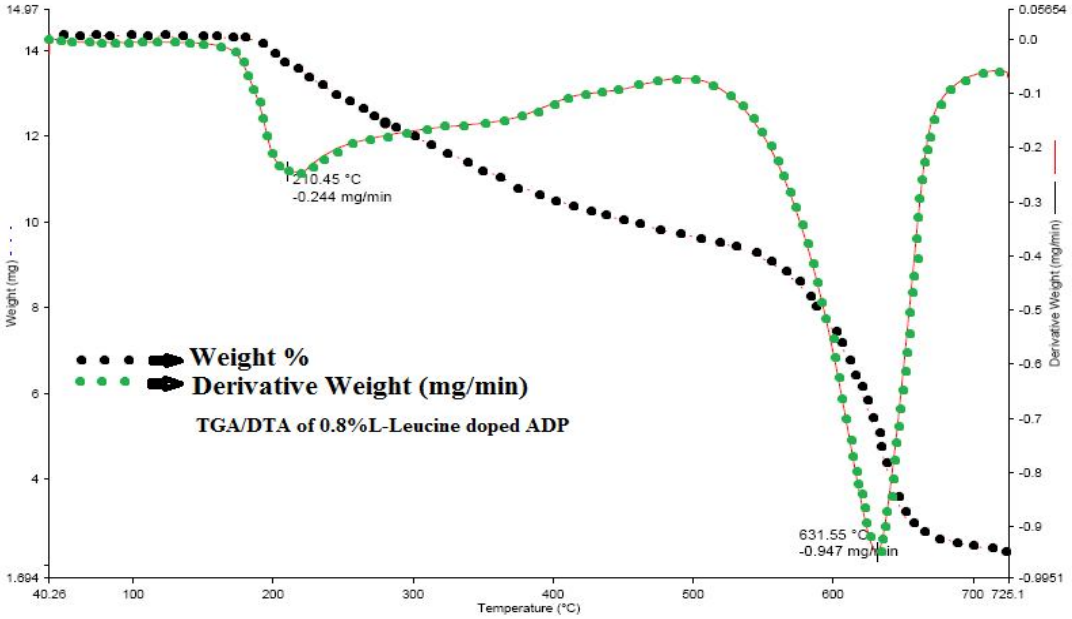
THERMAL STUDY OF L-LEUCINE DOPED ADP SINGLE CRYSTAL

Thermo gravimetric analysis (TGA) and Differential thermal analysis (DTA) gives information regarding phase transition, crystallization and different stages of decomposition of the crystal system. Thermal stability is an important parameter of single crystals. TGA/ DTA studies can be exploited for routine quality control measurements, where automation capability and simple operation is the exothermal curing reaction of an epoxy resin allows the determination of the kinetic parameters. They are used to predict the reaction at other curing temperatures. Thus, valuable information on the application of thermo sets is obtained which is in research, where high sensitivity and flexibility are important aspects. TGA /DTA are powerful tool to investigate the melting behavior, Glass Transition, Crystallization, Oxidation Stability, Kinetics, Purity, and Specific Heat. TGA graph of L-Leucine doped ADP is shown in fig.

Perkin Elmer Diamond instrument was used for measurement of TGA /DTA in the variable temperature range 30-1550 ^{0}C. The measurement can also be carried out in nitrogen gas atmosphere at the rate of flow 20 ml/min. Thermal analyzer has carried out measurements at the heating rate 10 ^{0}C/ min ranging from 30 to 300 ^{0}C in the inert nitrogen atmosphere. Crystal is thermally stable up to 190-195 ^{0}C as shown in figure after this temperature crystal starts decomposition around 330 ^{0}C and completely decomposes at 670 ^{0}C.



FT-IR spectra of (0.8%) Leucine doped ADP

CONCLUSION

Optical quality, colorless and pure and 0.8 mole%, L- Leucine doped ADP crystals were grown by slow evaporation technique at room temperature. The powder X-ray diffraction studies of pure and L-Leucine doped ADP showed that crystal posses tetragonal structure having I42d symmetry space group, with lattice parameter in good agreement with JCPDS data card no. 850815. Even after doping crystal system remains unchanged. Intensity peaks of L- Leucine doped ADP crystal resembles with diffraction angle of pure ADP crystal with negligible small variation, while intensity variation observed. The FT-IR spectrum confirms the presence of all functional group of L-Leucine. the concentration of dopant increases the hardness property of crystals. Crystal is thermally stable**.**

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ANDREAOSPOROGONITES OF FAMILY ANDREACEAE REPORTED FROM THE DECCAN INTERTRAPPEAN BEDS OF MOHGAON KALAN, MADHYA PRADESH

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ABSTRACT
The Paper reports a fossil bryophytic sporogonium belonging to family Andreaceae from the Deccan Intertrappean beds of Mohgaonkalan, Madhya Pradesh. The bilaterally symmetrical sporogonium based on pseudopodium having foot, seta and capsule with perichaetial leaf. The affinities of the sporogonium are assessed with Andreaea of the family Andreaceae.

Keywords: Fossil, Deccan Intertrappean.Late Cretaceous, bryophytic sporogonium, Andreaceae.

INTRODUCTION
The flora of the Deccan Intertrappean beds is considered to be unique in the sense that it consists of various kinds of plants representing all major groups of the plant kingdom vig. algae, fungi, bryophytes, pteridophytes, gymnosperms and angiosperms. They were deposited in the sediments between successive lava flows over a vast area in central India, also known as the Deccan plateau, during the Late Cretaceous period.

It is now established that majority of the Deccan Intertrappean fossils are assignab'e to extant genera and species, the evidence of fossil plants from the Deccan trap area has already been analysed to reconstruct the palaeoclimate in Central India during Early Tertiary. It has been postulated that at the time of Deccan Intertrappean sedimentation this area was covered by forests similar to the extant evergreen to semi-evergreen forests of western Ghats and northeast India. (Lakhanpal, 1970; Prakash, 1973; Bande and Prakash, 1982; Bande et al, 1988).The area enjoyed a humid tropical climate with almost uniform temperature throughout the year. Various plant types viz. fresh water algae - *Chara, Nitella;* water ferns - *Marsilea, Azolia, Rodeites, sparganium;* manyruve -*Sonneratia* and *Nipa;* coastal - Cocas; pond angiosperms - *Bamngtonia, syzyguim;* strerams and marshes - *Aeschynomene* etc. are recorded from these area. The bryophytic sporogonium which are reported from the Deccan Intertrappean beds at Mohgaonkalan are *Notothylus* (Gupta, 1956); *Shuklanites deccanii* (Singhai 1964); *Bharadwajia mohgaonse* (Yawale, 1975); *Notothylites nirulaii* (Chitaley and Yawle, 1980); *Mohgaonities indica* (Karanjekar, 1985); *Andreaites ramanujami* (Kapgate, 1986); *Pelliaites deccanii* (Karekar, 1990); *Nagpurites jungermanii* (Sheikh and Kapgate, 1998). The present sporogonium is being different from the above reported sporogonium having its special features.

***Material*:** A piece of black silicified fossiliferous chert have been collected (by Kapgate) from the village Mohgaonkalan in March 1998, Chhindwara District, Madhya Pradesh. On breaking the chert a longitudinal section of sporogonium is distinctly seen. The identification of material is based on single specimen.

SYSTEMATIC DESCRIPTION
Order- Andreales

Family - Andreaceae

Genus - *Andreaea* Hedw.

ANDREAOSPOROGONITES DECCANII GEN. ET SP. NOV
Description *:* The sporogonium is 1.65 mm long and 520 to 750 urn broad. It is bilaterally symmetrical shows foot, seta and capsule. It is based on an elongated pseudopodium with laterally placed perichaetial leaf. Sporoginum having thick, elongated conducting strand. Capsule bears two spore sacs and central errect columella. (PI. fig. 1 Text fig. 1). Spores numerous, 10 to 15 um in diameter.

Foot: Foot is embeded in the pseudopodium (PI. figs. 1 & 4; Text fig. 1). It is an expanded globular, bulbous mass of parenchymatous cells, 130 um in length and 250 um in breadth. The foot wall has two zones, outer thin and inner thick walled parenchymatous tissue. Central tissue of the foot bears narrow, elongated, thick-walled cells which might be conducting strand of the foot comming through the pseudopodium (PI. fig 1 & 4; Text fig. 1).

Seta: Seta is a short stalk, 550 um long and 230 um broad. It has an elongated, compactly arranged parenchymatous cells. Central tissue of the seta bears narrow, elongated, thick walled cells which are radially arranged, might be conducting strand of the seta. (PI. fig. 1 & 4; Text fig. 1). Thus the channel of conduction is provided to the sporogonium from the foot up to the center of capsule through seta (Bower, 1988).

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Capsule *:* The capsule is more or less cylindrical, ovoid, 1 mm in length and 750 um ;n breadth, tappering little at the base and apex. It has multilayered jacket measuring 90 um thick, made up of 5 to 6 layered parenchymatous cells. Outer most layer is unilayered epidermis followed by one to two layered thin walled hypodermis, 20 to 30 um thick. It is followed by two zones, outer thin walled parenchymatous zone, 40 to 50 um thick and inner thick walled parenchyrnaious zone 18 to 20 um thick. (Pi. figs. 1, 2, 3; Text figs. 1 & 7). Calyptra absent. Operculum indistinct but shows some thickenings in the apical cells of the capsule wall. Peristome absent, apophysis indistinct (PI. fig. 3). Centrally placed calumella, 55 to 66 um thick, appears as a solid mass of narrow, thick parenchymatous cells (PI. figs. 1, 3 & 4; Text figs. 1 & 6). Columella appears from the base of the capsule and runs upto the apex.. It is surrounded by elongated, ovoid spore sacs. The spore sacs are, 200 um broad and 750 um long surrounded by parenchymatous mass. Numerous spores with sterile tissue filled up inside the lumen of the spore sacs. The spore sacs are joined to the columella and capsule wall (PI. figs. 1,2 & 5; Text figs. 1 & 2).

Spores *:* Numerous small, rounded to crescent shaped spores are filled inside the sterile sporogenous tissue of the spore sacs, might be the nutritive tissue (Parihar, 1977). The spores are 10 to 15 um in diameter. Few spores are immature, light brown in colour whearas mature spores are dark brown in colour. Exine is thick, smooth and without any ornamentation. The inline is thin and smooth. Spores are without triradiate mark, elaters absent. (PL figs 5 to 8; Text figs. 1.2&5).

Conducting Strand: The center of the sporogonium an elongated, narrow, thick parenchymatous mass of tissue is present measures 55 um to 66 um thick. It runs from the foot and seta and then enters into the capsule upto the apex in the form of columella which may act as a conducting strand of the sporogonium (PI. figs. 1, 3 & 4; Text figs. 1 & 6).

Pseudopodium : The swollen foot embedded in the tissue of pseudopodium forming a cup like bulbous mass, act as a vaginulla (PI figs. 1 & 4; Text fig 1). Pseudopodium is a slender stalk, 500 um in length and 170 um in breadth. It shows outer epidermis and one of two layered hypodermis, 15 to 20 um in thick. Cortex is 50 to 60 um thick having thick walled parenchymatous compact cells. Thick and narrow conducting strand is present in the center of the pseudopodium (PI. figs 1 & 4; Text figs. 1 & 3).

Perichaetial leaf: Basal portion of the sporogonium bears perichaetial leaf cut in longitudinal manner. It appears laterally at the foot (PI. fig, 1; Text fig. 1). The leaf is ovate to lanceolate, narrow at the apex and broad at the base, 650 um in length and 150 um in breadth. Midrib is more than one layer thick measures 15 to 20 um. The tissue of the leaf is heterogenous, upper tissue with thin walled elongated, sub-rectangular parenchymatous cells, 8 to 11 um in size. Basal tissue is with thick walled rectangular parenchymatous cells, 8 to 10 um in size (PI. fig. 1; Text fig. 4). Stalk of the leaf is short, 110um long and 30 um broad.

DISCUSSION

The reported fossil sporogonium is not comparable with the said sporogonium. The other fossil bryophytes from Lower Devonian Sporogonites (Andrews, 1960; Stewart & Rothwell, 1993) has a long stalked sporogonium terminated in an ovel sporongia with dome shaped spore sac on columella, also does not comparable with the present sporogonium.

COMPARISON WITH THE EXTANT TEXA

The characters like thick wall of the sporogonium, centrally placed conducting strand like tissue, presence of pseudopodium and perichaetial leaf belong to the order Andreales. *Neuroloma* and *Acroschisma* are monotypic genera of family Andreaceae shows many differences, hence cannot be comparable with the present sporogonium (Parihar, 1977). Presence of short seta, cylindricai, ovoid capsule with central columeiia, multilayered wall, thick conducting strand, shape and size of the spores (10 to 15 mm in diameter), presence of pseudopodium and vaginulla, perichaetial leaf, indistinct apophysis and operculum make the above sporogonium comparable with the genus *Andreaea* of family Andreaceae but the absence of calyptra, shape and size of the capsule, club-shape columeiia and dome-shape spore-sac are shows some miner differences. From the above discussion, the present sporogonium shows closest resemblances with the genus *Andreaea* of family Andreaceae, it is described as *Andreaosporogonites deccanii* gen. et sp. nov. The generic epithet is after the family Andreaceae and specific epithet is after the Deccan trap.

Distribution **:** The genus *Andreaea* Hedw of family Andreaceae includes about 125 species. Most of them grow in regions with clod climate. They are thus abundant in the arctic, Antarctic and the temperature region. Majority of the species occur in alpine, subalpine habitats in extremely xeric substrates inhabiting exposed siliceous mountain rocks. For this reason *Andreaea* is popularly called the "granite moss". A few species such as *A. Nivalis* grow on endocyte rocks submerged in the water of streams. (Vashista, 1993).

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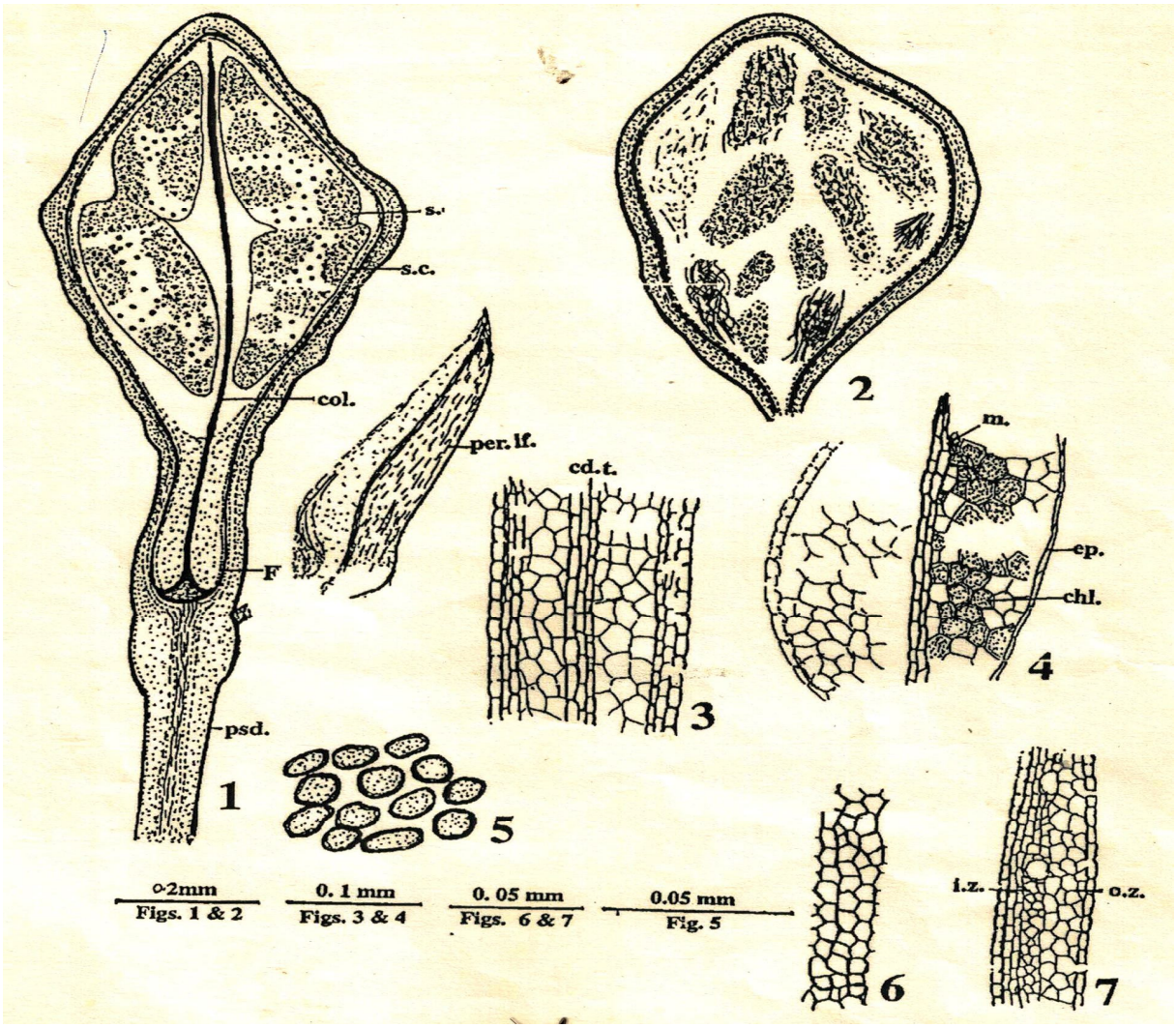

Text fig.1 – Sporogonium exposed on chert. Fig.2- Capsular part of the sporogonium. Fig.3- Tissue of Psudopodium. Fig.4- Tissue of foot & seta. Fig.5- Spores in enlarged view. Fig.6- Tissue of collumela, Fig.7- wall of Capsule.

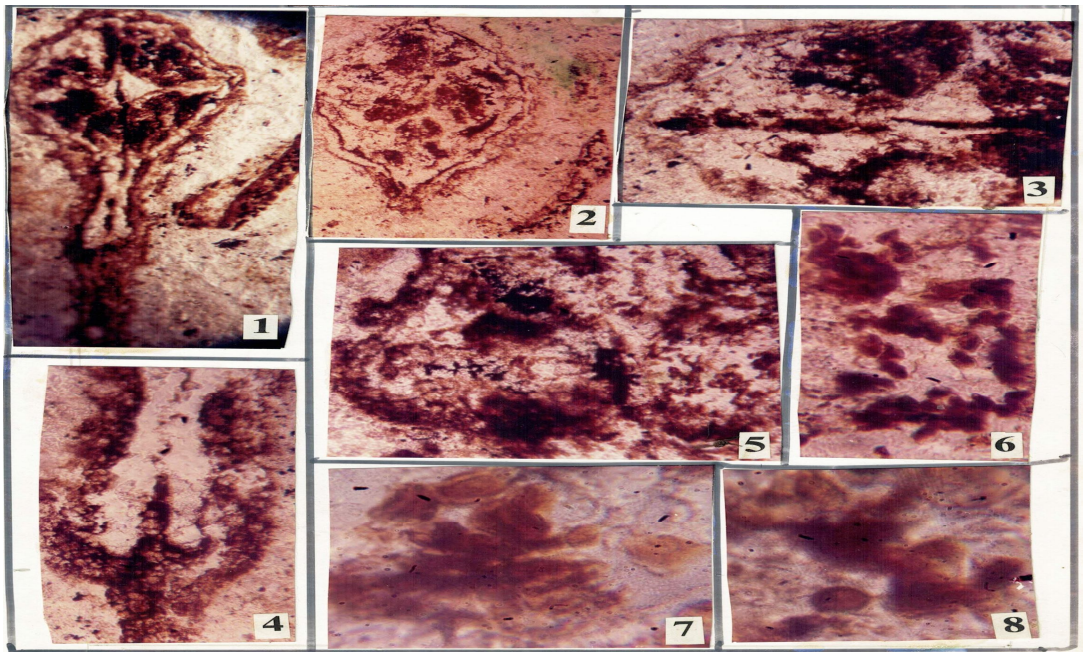

Plate fig.1 – Sporogonium exposed on chert. Fig.2- Capsular part of the sporogonium. Fig.3- Capsule showing collumela & spores. Fig.4- Lower part of sporogonium showing Psudopodium, foot & Seta. Fig.5- Sporogenous tissue showing some of the spores. Figs.6-8, few spores in enlarged view.

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EFFECT OF DIFFERENT CONCENTRATION OF BIOCHEMICAL SALT (NATRUM MURIATICUM) ON A ACOUSTIC PROPERTY OF GLUCOSE

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ABSTRACT
In present investigation the value of adiabatic compressibility of infinite dilute [ϕk(s)] specific acoustic impedance (Zn) and relative association (R_A) for glucose and sodium chloride solution at different concentration determine at room temperature in aqueous solution.

Keyword: Glucose, Ultrasonic velocity, Biochemical salt solution

INTRODUCTION
Glucose $C_6H_{12}O_6$ having importance in our daily dietary factor, As it is the carbohydrate present in fruits, cereals, pulses and many more product.

Glucose present in blood in our body's main fuel. It provide 60% of the energy required for the functioning of body . Normal body glucose level in fasting 60-90 mg/dl and post prandial 90-120 mg/dl. Insulin produced in pancreas regulate glucose level in blood this glucose metabolism involves harmonious equilibrium of number of physicochemical process. The deficiency of its action causes persistence rise in glucose level in blood and urine that normal limit developing diabetes a common malady recognize since from older time.

Diobetes can cause serious deterioration quality of life, causing immune deficiency high and low BP, cardiac diseases and other diseases. The Biochemical cell salt (Biochemical medicine or tissue remedy) like Natrum mur, Natrum phos, Natrum sulph, Calcaria phos, Kali phos etc. Have shown brilliant cures of diabetes.[5]

Biochemical medicine are nontoxic immuno chemic having no side effect maintain equilibrium in physio-logical chemical processes cure major diseases and provide improvement in other minor oilment as bonus.

Mather et al[6] have studied molecular velocity and molecular compressibility.

From ultrasonic data. Miss Pankati[7] have investigated the adiabatic compressibility and hydrogen number of amino acid in water solvent and water dioxane mixture. Sawalakhe et al[8] have studied the adiabatic compressibility, apparent molar volume of diketone, pyrazole and pyrazoline in water dioxane, water tetrahydrofuran and water acetone mixture.

Nikam et al[9] have investigated the [ϕk(s)] ,Bs, Z_A, R_A intermolecular free length and solvation number of mono-chloroacetic acid in aqueous acetone mixture.

MATERIAL AND METHODOLOGY
1) Distilled water - Carbon dioxide free double distilled water used with pH 7.4.
2) Balance - One pan electronic balance with reading up to 5^{th} place of decimal point is used for weighing.
3) Ultrasonic interferometer model F-80 with accuracy of 0.03 %. Frequency 2MHz is used for measurement of ultrasonic velocities in different solutions.
4) The concentration of solution prepared in the following manner.

Test Tube	Concentration of glucose solution	Concentration of salts solution	Volume of glucose solution	Volume of salt solution
1	0.009	0.001	9	1
2	0.008	0.002	8	2
3	0.007	0.003	7	3
4	0.006	0.004	6	4
5	0.005	0.005	5	5
6	0.004	0.006	4	6
7	0.003	0.007	3	7
8	0.002	0.008	2	8
9	0.001	0.009	1	9

The salt used is Natrum muriaticum i. e. sodium chloride.

By using ultrasonic interferometer the various parameter are observed and determined.

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Table No. 1: Determination of density of solution

Sr No.	Wt. of density bottle (gm)	Wt. of distilled water (gm)	Volume of D. B. (cc)	Density of water (gm/cc)
1	5.952	12.2430	12	1.02
2	5.952	12.2430	12	1.02
3	5.952	12.2430	12	1.02
4	5.952	12.2429	12	1.02
5	5.952	12.2428	12	1.02

Average density=1.02 gm/cc

Table No 2: Determination of density of glucose at temperature 29^{o}c

Sr No.	Wt. of density bottle (gm	Wt. of glucose (gm)	Volume of D. B. (cc)	Density of glucose (gm/cc
1	5.952	11.5010	12	0.95
2	5.952	11.5010	12	0.95
3	5.952	11.5010	12	0.95
4	5.952	11.5008	12	0.95
5	5.952	11.5008	12	0.95

Table No 3: Determination of density of Glucose-water solution at temperature 29^{o}c

Sr No.	Wt. of density bottle (gm	Conc. Of Glucose (mol/lit)	Wt. of solution (gm)	Volume of D. B. (cc)	Density (gm/cc)
1	5.952	0.009	10.9810	12	0.915
2	5.952	0.008	10.9920	12	0.916
3	5.952	0.007	10.9700	12	0.914
4	5.952	0.006	10.9680	12	0.914
5	5.952	0.005	10.9760	12	0.914
6	5.952	0.004	10.9890	12	0.915
7	5.952	0.003	10.9850	12	0.915
8	5.952	0.002	10.9870	12	0.915
9	5.952	0.001	10.9580	12	0.913

Table No. 4: Determination of density of Glucose-NaCl solution at temperature 29^{o}c

Sr No.	Wt. of density bottle (gm	Conc. Of Glucose (mol/lit)	Wt. of solution (gm)	Volume of D. B. (cc)	Density (gm/cc)
1	5.952	0.009	12.1660	12	1.0138
2	5.952	0.008	12.1830	12	1.0152
3	5.952	0.007	12.1390	12	1.0155
4	5.952	0.006	12.1640	12	1.0136
5	5.952	0.005	12.1610	12	1.0134
6	5.952	0.004	12.1670	12	1.0139
7	5.952	0.003	12.1650	12	1.0137
8	5.952	0.002	12.1630	12	1.0135
9	5.952	0.001	12.1700	12	1.0141

DETERMINATION OF ULTRASONIC VELOCITY OF SOLUTION

Table No 5: Ultrasonic velocity in double distilled water

Sr No	No. of maxima	Average distance travelled (mm)	Distance travelled by screw for 1 maxima (D) in mm	Ultrasonic velocity m/s (U^0)=$\lambda x \nu$
1	5	1.25	0.25	2.5×10

Table No 6: Ultrasonic velocity for pure Glucose solution

Sr No	No. of maxima	Average distance travelled (mm)	Distance travelled by screw for 1 maxima (D) in mm	Ultrasonic velocity m/s
1	5	1.32	0.264	2.6×10

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Table No 7: Ultrasonic velocity for Glucose-water solution

Sr No.	No. of maxima	Average distance travelled (mm)	Distance travelled by screw for 1 maxima (D) in mm	Us x 10^{-5} m/s
1	5	1.28	0.25	2.56
2	5	1.19	0.23	2.38
3	5	1.18	0.23	2.36
4	5	1.28	0.25	2.56
5	5	1.26	0.25	2.52
6	5	1.22	0.24	2.44
7	5	1.25	0.25	2.50
8	5	1.21	0.24	2.42
9	5	1.20	0.24	2.40

Table No 8: Ultrasonic velocity for Glucose-NaCl solution

Sr No	No of maxima	Average distance travelled (mm)	Distance travelled by screw for 1 maxima (D) in mm	Us x 10^{-5} m/s
1	5	1.24	0.24	2.48
2	5	1.26	0.24	2.46
3	5	1.23	0.24	2.46
4	5	1.37	0.27	2.74
5	5	1.21	0.24	2.42
6	5	1.28	0.25	2.56
7	5	1.27	0.25	2.54
8	5	1.26	0.25	2.52
9	5	1.20	0.24	2.40

DETERMINATION OF ADIABATIC COMPRESSIBILITY OF SOLUTION

Table No. 9: Adiabatic compressibility of water

Sr No	Uo x 10^{-5} m/s	d_o gm/cc	Bo x 10^{10} Bar^{-1} ($Bo = 100/Uo^2do$)
1	2.5	1.02	15.68

Table No. 10: Adiabatic compressibility of Glucose-water solution

Sr No	Conc. Of Glucose (mol/lit)	Us x 10^{-5} m/s	D_s gm/cc	Bs x 10^{10} (Bar^{-1})
1	0.009	2.56	0.915	16.67
2	0.008	2.38	0.916	19.27
3	0.007	2.36	0.914	19.64
4	0.006	2.56	0.914	16.69
5	0.005	2.52	0.914	17.22
6	0.004	2.44	0.915	18.35
7	0.003	2.50	0.915	17.48
8	0.002	2.42	0.915	18.66
9	0.001	2.40	0.913	19.01

Table No. 11: Adiabatic compressibility of Glucose-NaCl solution

Sr No	Conc. Of Glucose (mol/lit)	Conc. Of NaCl	Us x 10^{-5} m/s	D_s gm/cc	Bs x 10^{10} (Bar^{-1})
1	0.009	0.001	2.48	1.0138	16.03
2	0.008	0.002	2.46	1.0152	16.27
3	0.007	0.003	2.46	1.0155	16.36
4	0.006	0.004	2.74	1.0136	13.14
5	0.005	0.005	2.42	1.0134	16.84
6	0.004	0.006	2.56	1.0139	15.04
7	0.003	0.007	2.54	1.0137	15.29
8	0.002	0.008	2.52	1.0135	15.53
9	0.001	0.009	2.40	1.0141	16.67

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DETERMINATION OF ϕK(S) OF SOLUTION

Table No. 12: Determination of ϕk(s) for Glucose-water solution

Sr No	Conc. of Glucose (mol/lit)	Us x 10^{-5} m/s	Bs x 10^{10} (Bar^{-1})	Bo x 10^{10} (Bar^{-1})	ϕk(s) x 10^{8} cm^3 mol^{-1} bar^{-1}
1	0.009	2.56	16.67	15.68	2988.44
2	0.008	2.38	19.27	15.68	5915.63
3	0.007	2.36	19.64	15.68	6705.33
4	0.006	2.56	16.69	15.68	3021.74
5	0.005	2.52	17.22	15.68	3622.79
6	0.004	2.44	18.35	15.68	4891.64
7	0.003	2.50	17.48	15.68	3901.04
8	0.002	2.42	18.66	15.68	5181.14
9	0.001	2.40	19.01	15.68	5682.18

Table No. 13: Determination of ϕk(s) for Glucose-NaCl solution

Sr No	Conc. of Glucose (mol/lit)	Conc. Of NaCl	Us x 10^{-5} m/s	Bs x 10^{10} (Bar^{-1})	Bo x 10^{10} (Bar^{-1})	ϕk(s) x 10^{8} cm^3 mol^{-1} bar^{-1}
1	0.009	0.001	2.48	16.03	15.68	463.41
2	0.008	0.002	2.46	16.27	15.68	679.32
3	0.007	0.003	2.46	16.36	15.68	796.04
4	0.006	0.004	2.74	13.14	15.68	-2394
5	0.005	0.005	2.42	16.84	15.68	1272
6	0.004	0.006	2.56	15.04	15.68	-516.98
7	0.003	0.007	2.54	15.29	15.68	-273.75
8	0.002	0.008	2.52	15.53	15.68	-20.963
9	0.001	0.009	2.40	16.67	15.68	1155

DETERMINATION OF ACOUSTIC IMPENDENCE OF SOLUTION

Table No. 14: Determination of Z values for water

Sr No	Uo x 10^{-5} m/s	Do (gm/cc)	Z x 10^{-8} $Kgm^{-2}s^{-1}$
1	2.5	1.02	2.55

Table No. 15: Determination of Z values for Glucose

Sr No	Uo x 10^{-5} m/s	Do (gm/cc)	Z x 10^{-8} $Kgm^{-2}s^{-1}$
1	2.6	0.95	2.47

Table No. 16: Determination of Z values for Glucose-water

Sr No	No of maxima	Us x 10^{-5} m/s	Ds (gm/cc)	Z x 10^{-8} $Kgm^{-2}s^{-1}$
1	0.009	2.56	0.915	2.34
2	0.008	2.38	0.916	2.18
3	0.007	2.36	0.914	2.15
4	0.006	2.56	0.914	2.33
5	0.005	2.52	0.914	2.30
6	0.004	2.44	0.915	2.23
7	0.003	2.50	0.915	2.28
8	0.002	2.42	0.915	2.21
9	0.001	2.40	0.913	2.19

Table No. 17: Determination of Z_A values for Glucose-NaCl solution

Sr. No	Conc. of Glucose (mol/lit	Conc. Of Nacl	Us x 10^{-5} m/s	Ds (gm/cc)	Z x 10^{-8} $Kgm^{-2}s^{-1}$
1	0.009	0.001	2.48	1.0138	2.5114
2	0.008	0.002	2.46	1.0152	2.4973
3	0.007	0.003	2.46	1.0155	2.4882
4	0.006	0.004	2.74	1.0136	2.7772
5	0.005	0.005	2.42	1.0134	2.4524

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6	0.004	0.006	2.56	1.0139	2.5955
7	0.003	0.007	2.54	1.0137	2.5747
8	0.002	0.008	2.52	1.0135	2.5540
9	0.001	0.009	2.40	1.0141	2.4338

DETERMINATION OF RELATIVE ASSOCIATION OF SOLUTION

Table No. 18: Determination of R_A of the Glucose-water solution

Sr No	Conc. of Glucose (mol/lit	d_s (gm/cc)	d_0 (gm/cc)	Us x 10^{-5} m/s	Uo x 10^{-5} m/s	R_A x 10^3
1	0.009	0.915	1.02	2.56	2.5	-1.03
2	0.008	0.916	1.02	2.38	2.5	6.39
3	0.007	0.914	1.02	2.36	2.5	7.47
4	0.006	0.914	1.02	2.56	2.5	-3.07
5	0.005	0.914	1.02	2.52	2.5	-1.03
6	0.004	0.915	1.02	2.44	2.5	3.1
7	0.003	0.915	1.02	2.50	2.5	00
8	0.002	0.915	1.02	2.42	2.5	4.2
9	0.001	0.913	1.02	2.40	2.5	5.2

Table No. 19: Determination of R_A of the Glucose-NaCl solution

Sr No	Conc. of Glucose (mol/lit	Conc. Of NaCl	d_s (gm/cc)	d_0 (gm/cc)	Us x 10^{-5} m/s	Uo x 10^{-5} m/s	R_A x 10^3
1	0.009	0.001	1.0138	1.02	2.48	2.5	0.9
2	0.008	0.002	1.0152	1.02	2.46	2.5	1.99
3	0.007	0.003	1.0155	1.02	2.46	2.5	1.98
4	0.006	0.004	1.0136	1.02	2.74	2.5	-13.18
5	0.005	0.005	1.0134	1.02	2.42	2.5	4.0
6	0.004	0.006	1.0139	1.02	2.56	2.5	-3.3
7	0.003	0.007	1.0137	1.02	2.54	2.5	-6.85
8	0.002	0.008	1.0135	1.02	2.52	2.5	1.14
9	0.001	0.009	1.0141	1.02	2.40	2.5	5.8

RESULT AND DISCUSSION

The various parameter observed from study are given in tabular form-

1) Determination of Z value for water
2) Determination of Z value for glucose
3) Determination of Z value for Glucose - water
4) Determination of Z_A value for Glucose-NaCl
5) Determination of R_A value for Glucose-water
6) Determination of R_A value for Glucose-NaCl

CONCLUSION

In present investigation, the values of adiabatic compressibility (Bs), apparent molar adiabatic compressibility ϕk(s), limiting molar adiabatic compressibility at infinite dilution [ϕ^ok(s0, Specific acoustic impedance (Z_A) and relative association (R_A) for glucose solution, glucose-sodium chloride solution at different concentration and determined at room temperature in aqueous solution. The values of Bs and ϕk(s) are represented in table 9 - 11

The values of ϕk(s) are represented in table 12 - 13

The values of Z_A are represented in table 14 - 17

The values of R_A are represented in table 18 - 19

The adiabatic compressibility (Bs)of glucose solution and apparent molar adiabatic compressibility ϕk(s) is greater than pure water, this indicate the presence of solute-solvent interaction in glucose solution with increase in concentration of glucose. This loss in adiabatic compressibility may be attributed to electrostriction of solvent by the ions. In case of glucose-sodium chloride solution Bs and ϕk(s) solution values are lower than that of glucose solution indicating loss in adiabatic compressibility. This may be due to strong electrostatic force of sodium ion on water molecules. Hence sodium chloride is acting as structure breaker. With decrease in the

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concentration of glucose and increase in the concentration of sodium chloride both Bs and ϕk(s) values are found to be increased up to their equal concentration, showing increase in intermolecular interactions. Therefore the ϕk(s) values are found to be negative. This may be due strong alignment of water molecules around sodium cation.

Both Bs and ϕk(s) values of glucose-sodium chloride solutions are lower than that of glucose solution showing loss in compressibility due to electrostatic force of sodium ion on water molecules.

Relative association is the property of understanding the interaction which is influenced by two factors. (i) The breaking up of the solvent molecule on addition of electrolyte to it and (ii) the solvation of ion that are simultaneously present. The former results decreased and later results are increased in R_A. For glucose solution the irregular variation in R_A values with decrease in concentration of bio-chemic salt confirm that there two effects are occurring simultaneously in aqueous solution.

The specific acoustic impedance is highest in case of glucose-sodium chloride, this may be due to decrease in thickness of oppositely charged ionic atmosphere. With increased in the concentration of sodium chloride in the solution the values are found to be decreased up to equal concentration of glucose and sodium chloride in the solution. The values are further decreased indicating increase in the thickness of oppositely charged ionic atmosphere, which in term is due to increase in ionic strength.

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GREEN CHEMISTRY – A SUSTAINABLE TECHNOLOGY FOR FUTURE PERSPECTIVES

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ABSTRACT
Green chemistry is the eco-friendly approach for the design of chemical products and processes that reduce or eliminate the use and regeneration of hazardous materials. A plethora of articles describing a variety of new chemical reactions performed with green approach have appeared recently. Green chemistry is finding innovative solutions to the real world problems and now innovations are moving from the lab to market place. This review documents the in depth description of the wide range of approaches and applications of green chemistry and its potentiality for future demands.

Keywords: Green chemistry, sustainable technology, catalysis, chemical synthesis.

INTRODUCTION
"Industrial vomit…..fills our skies and seas…..pesticides and herbicides filter into our foods. Twisted automobile carcasses, aluminium cans, non-returnable glass bottles and synthetic plastics form immense middens in our midst as more and more of our detritus resists decay. We do not even begin to know what to do with our detritus resists decay, we do not even begin to know what to do with our radioactive wastes – whether to pump them into the earth, shoot them into outer space, or pour them into the oceans. Our technological powers increase, but the side effects and potential hazards also escalate."

-Alvin Toppler, Furture Shock 1970

ALVIN TOPPLER, FURTURE SHOCK 1970
Chemistry is a very prominent part of our daily life. It has brought a revolution in almost every field, from life to laboratory making the quality of life on earth much better than before. This is due to the discovery of drugs, antibiotics, dyes, plastics, paints, paper, cosmetics, detergents and various other commodities. The world's food supply also increased rapidly due to use of fertilizers, insecticides and herbicides. Clearly, there is a social demand for chemistry as it provides almost everything, right from energy to pharmaceutics. However, with such a huge demand there is a social complain too. With the advancement and so many advantages, chemistry had opened the gateway to many serious challenges to the environment. This is all because of the pronounced ill-effects of chemistry in the 20^{th} century due to hazardous products like Chlorofluorocarbons (CFC's), DDT, Endocrine disruptors, Thalidomide, bioaccumulating and non-biodegradable substances. Chemistry leads to atmospheric pollution which results in green house effect and energy consumption, ozone layer depletion, photochemical smog and smoke containing oxides of nitrogen and sulphur. In addition, it creates aqueous pollution due to fertilizers, pesticides, insecticides, industrial waste water, urban waste water, toxic solvents, detergents etc. it also causes solid pollution which occurs due to chemical residues, nuclear and radioactive wastes and industrial solids. The situation became worse in past few decades. Chemical developments also bring new environmental problems and harmful unexpected side effects, which result in the need for 'greener' chemical products.

Thus, it is the need of the hour to shift to a judiciously planned practice in chemistry and to prioritize our future research on alleviation of the environmental sustainability. In the present economically expanding world new sustainable concepts have to be developed to overcome the growing problems of resource availability. In this review article we have focused on the different shades of green chemistry and its prominent role in sustainable development[1] which means meeting the needs of the current generation without compromising the ability of future generations to meet their own needs. This review summarizes the trends in this field and demonstrates its advantages and future demands.

GREEN CHEMISTRY – BENIGN BY DESIGN
The term Green Chemistry was first coined by Paul T. Anastas[4] in 1991 and the concept was initiated by Trevor Kletz[36] where he proposed that chemists should look for alternative processes to those involving more dangerous substances and conditions. Over the last few decades, green chemistry has been recognized as a culture and methodology for achieving sustainable development[9]. Green chemistry[2-10] is a sustainable technology that provides commodities being environmentally friendly. It is based on the concept of "Enviro-economics" that involves eliminating the waste materials at source and avoiding the use of toxic reagents and solvents in the manufacture and application of chemical products. Present major scientific challenge is to design a method to identify which chemical compound is non-toxic after finishing its intended function and enter into

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environment. The basic problem is that we designed chemicals to be stable to prevent degradation and this stability of compound after entering to the environment makes them difficult to degrade. Green chemistry assumes benign disposal and focuses on the Reuse/Recycling and significant reduction of chemicals and energy usage. In addition, it prevents pollution by replacing hazardous materials, inefficient processes and non-sustainable components. A reasonable and valid definition of Green chemistry[11] is as follows -

"Green Chemistry efficiently utilizes (preferably renewable) raw materials, eliminates waste and avoids the use of toxic and/or hazardous reagents and solvents in the manufacture and application of chemical products."

PRINCIPLES OF GREEN CHEMISTRY

The guiding principle as pointed out by P. Anastas[5] is the design of environmentally benign products and processes which can be paraphrased as the 12 principles of Green chemistry[2,5] as –

1. **Waste/by-product prevention instead of remediation**
   Design chemical syntheses to prevent waste, leaving no waste to treat or clean up, after it is formed.
2. **Design safer chemicals and products**
   Design chemical products to be fully effective in their function yet have little or no toxicity.
3. **Design less hazardous/toxic chemical syntheses**
   Design chemical synthetic methods to use and generate substances with little or no toxicity to humans and the environment.
4. **Use of renewable feedstocks**
   Use raw materials and feedstocks that are renewable rather than depleting. Depleting feedstocks are made from fossil fuels (petroleum, natural gas or coal) or are mined whereas Renewable feedstocks are often made from agricultural products or are the wastes of other processes.
5. **Avoid chemical derivatives**
   Avoid using blocking group, protection, deprotection or any temporary modifications of the processes if possible, as it uses additional reagents and generates waste.
6. **Use catalytic rather than stoichiometric reagents**
   Minimize waste by using catalytic reactions. Catalysts are used in small quantity and can carry out a single reaction many times and therefore are preferable to stoichiometric reagents, which are used in excess and work only once.
7. **Use safer solvents and reaction conditions**
   Avoid using solvents, separation agents or other auxiliary chemicals and if necessary make innocuous when used.
8. **Maximize atom economy**
   Design syntheses so as the final product contains the maximum proportion of the starting materials. There should be a few wasted atoms, if any.
9. **Increase in energy efficiency**
   Run chemical reactions at ambient temperature and pressure whenever possible.
10. **Minimize the potential for accidents**
    Design chemical substances and their forms (solid, liquid or gas) to minimize the potential for chemical accidents including explosions, fires and releases to the environment.
11. **Design chemicals and products to degrade after use**
    Design chemical products in such a way to break down to innocuous substances after use so that they do not accumulate in the environment.
12. **Analyze in real time to prevent pollution**
    Includes in-process real-time monitoring and control during syntheses to minimize or eliminate the formation of hazardous by-products.

In these environmentally conscious days, the developments in the technology are directed towards environmentally sound and cleaner procedures. Hence as green chemistry involves pollution prevention and energy conservation it is good for industry as well as for the environment. To complement Anastas and Warner's 12 principles and to address Glaze's concerns, 12 more green principles have now been suggested[12].

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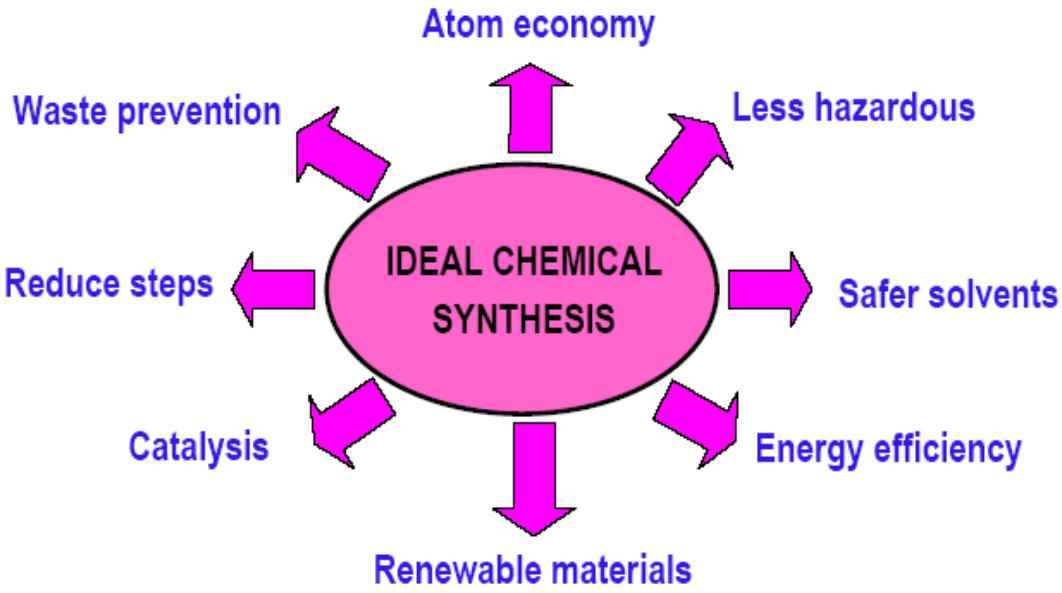

Figure 1: The role of Catalysis

Catalysis[13] is considered as one of the most promising fields of green chemistry by providing atom economical, selective and energy efficient solutions to many challenging problems that are industrially important. Modern society has an ever-increasing demand for environmentally friendly catalytic processes because catalytic reagents are undoubtedly superior to stoichiometric reagents. Implementation of "clean" and "green" chemical technology in industries may help to address the problem of environmental degradation besides producing useful chemicals[14-17]. During the last decade industrial manufacturing and laboratory synthesis changed into catalyst-free reactions and later into catalyst-free reactions in-water and on-water. Various named reactions, multi-component reactions and the synthesis of heterocyclic compounds are some typical examples of this. The widespread substitution of classical mineral and lewis acids by recyclable solid acids, such as zeolites and acidic clays, and the introduction of recyclable solid bases, such as hydrolatcites (anionic clays) have resulted in a dramatic reduction of inorganic waste. Catalysis (including enzyme catalysis, heterogeneous catalysis, and organocatalysis, in particular) is identified to be at the heart of greening of chemistry[18] because this branch of science is found to reduce the environmental impact of chemical processes[19]. The current focus on the use of atom efficient catalytic methodologies for the manufacture of various chemicals and fine pharmaceuticals is the outcome of the growing awareness of the pressing need for greener and more sustainable technologies. Homogeneous catalysis is generally preferred to heterogeneous catalysis because it offers greater rates and selectivities. However, the drawback of this methodology is the difficulty in separating products. Heterogeneous catalysts are vital to many industries including chemical manufacturing, energy-related applications and environmental remediation[20]. The fundamental aim of heterogeneous catalysis research is to understand mechanisms at the molecular level, and then to design and synthesize catalysts with desired active sites[21]. Heterogeneous catalysis which takes place between different phases has now grown into an important branch of science[14-17, 22-23].

SOLVENT REPLACEMENT IN GREEN CHEMISTRY

One of the key areas of Green chemistry is the elimination of solvents in chemical processes or the replacement of hazardous solvents with environmentally benign solvents[24]. The best solution for this is the development of solvent free alternative processes. Selection of the right solvent has always had the power to increase competitiveness, but environmental benefits and user safety will be the main objectives to product differentiation and better margins as the industry enters into the era of improved environmental awareness. Maintaining process compatibility and solvent functionality will continue to be the top priority when selecting a green solvent replacement, but financial performance and environmental performance need not be mutually exclusive. Greener organic syntheses under non-traditional conditions have been reported[37]. Volatile organic solvents are the normal media for carrying out organic syntheses and extractions. They are also used in various products like paints, varnishes, cleaning agents, adhesives etc. causing considerable environmental concerns such as Global warming and Ozone Depletion. Benzene, Dichloromethane (used in synthesis and extraction; extraction of Caffeine from coffee) and Perchloroethylene (used in dry-cleaning, also found in printing inks, typewriter correction fluid and shoe polish) are excellent solvents but are genotoxic human carcinogens. A

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possible alternative for the use of organic solvents is the extensive utilization of water[25] as a solvent or reaction media. Traditionally, water is not a popular reaction medium for organic reactions due to the limited solubility of many substrates and also to the fact that a variety of functional groups is reactive towards Water. But recently, there has been a revival of interest in water as a solvent[26, 27] and chemistry in aqueous medium, as it offers many advantages for a clean and green chemistry. The addition of surfactants can strongly modify the attitude of water to solubilize organic molecules. Synthetic organic chemistry in academic laboratories and in industry changed drastically in the last few years by designing methodologies for organic synthesis in aqueous media under catalyst-free conditions and in water[38].

Organic solvents with inherent toxicity and high volatility were replaced over the past two decades by ionic liquids (ILs) that have gained enormous attention from the scientific community, but their greenness is often challenged, due to their poor biodegradability. An alternative type of solvents, representing green chemistry principles are deep eutectic solvents (DES). Deep eutectic solvents are defined as a mixture of two or more components, which may be solid or liquid and that at a particular composition present a high metling point depression becoming liquids at room temperature. DES can be used for biocatalysis, electrochemistry and extraction[39].

The use of supercritical fluids (SCFs) in chemical processes is becoming more and more prevalent[28-32]. An important incentive for the use of supercritical fluids (SCFs)[13] in synthetic chemistry comes from this increasing demand for environmentally and toxicologically benign processes for the production of high value chemicals. Although Supercritical fluids[33] were discovered more than 100 years ago, it wasn't until the 1970s that they were used commercially to decaffeinate coffee. Since then, Supercritical Fluid media have been used successfully to extract analytes from a variety of complex compounds through manipulation of system pressure and temperature. Brennecke and Beckman[34] have shown that environmentally benign carbon dioxide, which has been used extensively, both commercially and in research for the extraction of heavy organic solutes, can be used to extract nonvolatile organic compounds from room temperature ionic liquids. They found that extraction of a material into carbon dioxide represents an attractive means for the recovery of products from ionic liquids because:

(a) CO_2 dissolves in the ionic liquid to facilitate extraction, and

(b) the ionic liquid does not dissolve appreciably in the CO_2, so that the product can be recovered in pure form. The research groups of Professors Brennecke and Beckman have shown that ionic liquids (using 1-butyl-3-methylimidazolium hexafluorophosphate as a prototype) and CO_2 exhibit extremely unusual, and very attractive, phase behavior. The solubility of CO_2 in ionic liquids is substantial, reaching mole fractions as high as 0.6 at just 8 MPa. Yet the two phases do not become completely miscible, so CO_2 can be used to extract compounds from the ionic liquids. Supercritical Fluids extraction has also been applied to environmental remediation such as removing PCBs and other organics from water and soil. Carbon dioxide as a supercritical fluid is most frequently used as medium for reactions. Its application saves considerable energy as the critical point is easy to reach due to a low heat of evaporation of CO_2. Carbon dioxide as a supercritical fluid dissolves non-polar compounds and some polar (e. g. methanol, acetone) like fluorocarbon solvents. Supercritical carbon dioxide is an attractive alternative because it is inexpensive, inflammable, easily available and poses no threat to the environmental or human health[35]. In Supercritical CO_2 based processes, simple pressure release leads to the isolation of solvent free clean products and the non-toxic CO_2 can be readily recycled. Furthermore, the replacement of potentially hazardous organic solvents with Supercritical CO_2 can help to increase the inherent safety of a process as the risk of explosion or ignition is greatly reduced in the presence of large amounts of inert CO_2. However, depending on the application, a variety of other Supercritical fluids have been used for diverse applications such as extraction, chromatography, inorganic and organic synthesis, catalysis, materials, processing and even dry cleaning. The use of Supercritical Fluids for catalytic processes has also been shown to overcome many of the chemical engineering and environmental difficulties associated with conventional process. By comparison, reactions involving Supercritical Fluids offer the best opportunity for separation of reaction products and removal of solvent from the system accomplished through simple system depressurization.

Procter & Gamble and Cook Composites and Polymers created a mixture of soya oil and sugar that replaces fossil-fuel-derived paint resins and solvents, cutting hazardous volatiles by 50 %. Chempol® MPS paint formulations use these biobased Sefose® oils to replace petroleum-based solvents and create paint that is safer

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to use and produces less toxic waste. Chempol® MPS is an innovative, Sefose(R)-based alkyd resin technology that enables formulation of paints and coatings with less than 50% of Volatile Organic Compounds, of traditional, solvent-borne alkyd coatings. The "Presidential Green Chemistry Challenge Award for Designing Greener Chemicals" for 2009 was awarded in the P&G Company for the formulation and manufacture of Chempol MPS technology, which was collaboratively developed and commercialized[40].

RENEWABLE RESOURCES

Governments and scientific communities throughout the world recognize that the availability of fossil fuels (petroleum, coal, natural gas) will eventually dwindle, becoming too expensive or too environmentally damaging. In contrast, various types of renewable energy resources such as wind, solar, geothermal, hydroelectric, biomass, and ocean energy are constantly replenished and will never run out. We may hope that future sustainable development and increasing the supply of renewable energy at global scale will replace carbon-intensive energy sources and significantly reduce global warming emissions. It is obvious that the practice of Green Chemistry not only leads to a cleaner and more sustainable earth, but also is economically beneficial with many positive social impacts, especially in the acceptance and application of renewable energy resources. These benefits encourage worldwide governments and industries to support the development of sustainable energy processes. In the last decade there are many examples of green chemistry accomplishments in the fields of renewable energy such as biomass, biorefineries etc[41-44]. The replacement of oil with biomass as raw material for fuel and chemical production is an interesting option for the development of biorefinery complexes. In biorefinery, almost all the types of biomass feedstocks can be converted to different classes of biofuels and biochemicals through jointly applied conversion technologies. This technological change needs an integration of Green Chemistry into biorefineries, the use of low environmental impact technologies, future sustainable production chains of biofuels and high value chemicals from biomass[45-46]**.** Biofuels are an immediate means of reducing the environmental impact of vehicle emissions, particularly heavy vehicles (like buses, trucks, etc), as the global trend is to continue the transition to an electric vehicle future. Biomass (especially woody biomass, forest residues, agricultural residues and energy crops) is by far the most widely used raw material for the production of renewable energy fuels. Woody biomass is preferred material in thermochemical processes due to its low ash content and high quality bio-oil produced. Thermal conversion by fast pyrolysis converts up to 75% of the starting material into renewable biofuel suitable for transportation. A recent review summarized the results of numerous research papers that have been published in the last decade projecting the current state of knowledge regarding the effect of feedstock and pretreatments on the yield, product distribution, and upgradability of bio-oil[47]. The sustainability of these renewable resources can be achieved through the synergistic coupling of micro algae propagation techniques with CO_2 sequestration and bioremediation of wastewater treatment[48].

Recycling of waste is an important dimension of waste management. Waste management is an area where we can help ourselves. The food of single cell protein manufactured from refuse, chemicals from cellulose wastes, alternative fermentation products and single cell protein [SCP] production have been explored and examined. The production of genetically engineered microorganism for waste utilization is now an attainable objective. The waste of biological or chemical process can be the feed stock of the next process, so that energy, carbon content and water are fully conserved. The new approach of the development of alternative recycling strategies are being encouraged under the domain of Green Chemistry, to ensure resources for the future. The best way to minimize waste and to avoid the burdensome costs associated with waste was to produce and design safer chemicals as end products. One of the renewable energy sources that attracted a lot of attention is biodiesel, obtained by converting the fats and oils in agricultural products into a burnable diesel fuel. New biochemical advances are paving the way for advanced biofuels of the future. The development of efficient fuels from sustainable sources has the potential to not only revolutionize the struggle against climate change, but also completely transform the fuel supply chain forever. The huge implications of biofuel are reflected in predictions concerning the future health of the green chemistry and biofuels markets. A recent trend has been to prepare a fuel to replace petroleum-based diesel from vegetable oils. This fuel is commonly called biodiesel and can be used either straight or in varying mixtures with petroleum diesel. The advantages to biodiesel are that the sources of the oil is renewable, it burns more cleanly, and is less hazardous to the environment. Although engines running on biodiesel produce less particulate matter, the engines do produce more nitrogen oxides. It is probably not possible to supply sufficient biodiesel to replace diesel in all uses because of the large amount of land necessary to produce enough oil. Research to find more land-efficient ways to produce plant-based oils includes farming oil-producing algae. Biodiesel is produced from a variety of plant oils such as soybean, canola oil or palm oil. The oils are reacted with an alcohol in the presence of a base catalyst. The oils contain triglycerides, which have a glycerin backbone and three attached alkyl groups. The reaction to produce

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biodiesel breaks the bond between the glycerin (also called glycerol) and the alkyl groups, which react with an alcohol to produce an ester. Glycerol is a byproduct of the reaction.

Green Chemistry and Oil-Based Paints Vegetable oils are generally considered to be the most important class of renewable resources, because of their ready availability and numerous applications, including oil-based paints. Recently, a variety of vegetable oil-based polymers have been prepared by free radical, cationic, olefin metathesis, and condensation polymerization. The polymers obtained display a wide range of thermophysical and mechanical properties from soft and flexible rubbers to hard and rigid plastics, which show promise as alternatives to petroleum-based plastics and oil paints[49]. The chemical industry treats vegetable oils as one of the most important renewable platform chemicals due to their universal availability, inherent biodegradability, low price, and superb environmental credentials (i.e., low toxicity and ecotoxicity). These natural properties are now being taken advantage of in research and development, with vegetable oil derived polymers and composites being used in numerous applications including paints and coatings, adhesives, and biomedicine[50]. A recent review described the importance of 21 Vegetable oils as raw materials for the production of materials such as alkyds, polyesteramides, polyetheramides, polyurethanes, epoxies, polyols, and their applications as protective coatings[51]. Oil-based "alkyd" paints give off large amounts of volatile organic compounds (VOCs). These volatile compounds evaporate from the paint as it dries and may have one or more environmental impacts. The utilization of benign, renewable feedstock is needed for addressing the global depletion of resources. Bio-based products hold great promise for achieving the goals of sustainable development and implementing the principles of industrial, ecological and Green Chemistry. Achieving a sustainable chemical industry dictates switching from depleting finite sources to renewable feed stock. Research has focused on both, the micro and molecular levels. Polylactic Acid which is manufactured from renewable resources like Corn or wheat can be an agricultural waste in future. A new thermoplastic polymer family based on Polylactic Acid is developed by Cargill Dow (144,000 tpa plant built in Nebraska USA, Potential market approaching 500,000 metric tons per year). It uses 20-50% fewer fossil fuels than conventional plastics. Moreover, PLA products can be recycled or composted.

ENERGY CONSERVATION

In many synthetic reactions alternative energy input systems are used presently, such as microwave and ultrasound irradiation. Microwave synthesis has proven to be an energy and time efficient process and it offers a fast and easy route to organic synthesis. Recently microwave synthesis is being applied in polymer chemistry, photochemical, electrochemical process, enzyme mediated protein-mapping, biocatalysts and material science applications. Microwave-assisted organic synthesis (MAOS) is a method by which the laboratory chemist can achieve clear goals in fraction of time as compared to traditional conductive heating methods. Reaction times in the best cases have been reduced from hours or days to minutes. The microwave irradiation is considered as an important approach towards green chemistry, because this technique is much environmentally friendly. The technique offers simple, clean, fast, efficient, and economic for the synthesis of a large number of organic molecules.

CONCLUSION

The term “green chemistry” is defined as the invention, design and application of chemical products and processes to either reduce or eliminate the use and generation of hazardous substances. It is a new philosophical approach which through application and extension of the principles of green chemistry can contribute to sustainable development. Green chemistry can rule out the need for other approaches to environmental protection. Ideally, the application of green chemistry principles and practices renders regulation, control, clean-up, and remediation of the environment. Green chemistry is placed in the frontier areas of research and has been focused for considerable recent research. Thus its benefits can be expressed in terms of economic impact. To summarize, the growing need for the atom efficiency, energy efficiency, and environmental concerns stemming from the increase in chemical products demand necessitate the development of the “sustainable or environmentally benign” production methods. The success of green chemistry depends on the training and education of the new generation of chemists and researchers for innovation as well as application. It also depends on recognizing the important role that green chemistry plays in enhancing the attractiveness of chemistry as a discipline and appreciation of the value of green chemistry by educationalists in teaching. Much is still to do but Green Chemistry provides a focus for a pro-active approach to the increase in legislation (e.g. emissions, Green House Gases taxes, restricted chemicals list). It has a competitive advantage in industry as well, like it is beneficial in reducing costs as well as risks and provides greater manufacturing flexibility of various substances. Green strategies include the replacement of organic solvent by water, altogether elimination of a solvent, the substitution of environmentally

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benign substances to replace toxic heavy metals, development of solid support reagents and catalysts for synthesis, launching of eco-friendly methods of organic synthesis, designing of products, which can be recycled or safely disposable, use of dry media reactions and many other important aspects. Presently we find in the literature, many interesting examples of the use of green chemistry rules. While many exciting new greener chemical processes are being developed, it is clear that a far greater number of challenges lie ahead.

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IMPACT OF BmNPV AND BACILLUS SP. ON VARIOUS TISSUES AND ECONOMIC PARAMETERS OF SILKWORM, BOMBYX MORI L.

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ABSTRACT
Pathological effect causing multilation of various tissues due to infection with pathogens BmNPV and Bacillus sp. during development of 5th instar larvae of silkworm Bombyx mori have been investigated. Infected tissue samples of the fat body, midgut and silk gland during fifth instar were investigated histopathologically. The study revealed no significant changes occurred upto third day of the post inoculation. On fifth day vacuoles containing polyhedral bodies of BmNPV were observed in the nuclei of the fatbody cells while heavily infected Bacillus fatbody cells destroyed and group of cells scattered. BmNPV infected epithelial cell borders of the midgut filled with polyhedra started degenerating where as in bacterial infection midgut shows deterioration of epithelial cells and irregularization of brush border. On the fifth day OBs of BmNPV were noticed in the nuclei of silk gland cells of middle region. The silk gland with bacterial infection of v instar larvae shows ruptured silk gland and heavily damaged after severe infection. The histopathological observation revealed that extensive hypotrophy in silk gland cells infected with virus OBs in nuclei; while due to bacterial infection cells of midgut and silk gland were deteriorated later degenerated completely.

The economic parameters such as Cocoon weight, shell weight, shell ratio were reduced as compared to control larvae. The moderately infected larvae reach the moth stage but show low percentage of fecundity as compared to control ones.

Keywords: Silkworm, BmNPV, Bacillus sp., histopathological studies, Fatbody, midgut, silk gland.

INTRODUCTION
The success of sericulture industry primarily depends on the successful harvest of cocoon crops. Perhaps the major problem for sericulture in a tropical country like India is the high incidence of the diseases. In India almost all the major pathogenic microbes infect and cause disease to silkworm (Rajsekhar *et al*., 1992: Doreswamy *et al*., 2004). The most common diseases of silkworm are Grasserie caused by a virus nuclear polyhedrosis, Flacherie, caused by bacteria: *Streptococcus* and *Staphylococcus* in association with *Flacherie* virus, Muscardine, Aspergilosis, caused by fungal infection, and pebrine, a protozoan disease caused by a parasitic microsporidian, *Nosema bombycis.* The diseases prevail throughout the year, and in tropics they are significantly high (Srivastava and kumar, 2009).

Silkworm, Bombyx mori L. is prone to different types of infectious diseases caused by various pathogenic microbes. Nuclear polyhedrosis (grasserie) disease caused by *Bombyx mori* nuclear polyhedrosis virus (BmNPV) is reported to be the most common cause for low cocoon yield and cocoon crop loss in India (Chisti and Sahaf, 1990; Nataraju, *et al*., 1998). This disease is synonymed differently in different countries. In France, it is called as grasserie or jaundice while in Italy it is known as giallume or polyhedra. However, in India, it is commonly referred to as grasserie. Although, the disease may appear at any stage of the larva, its manifestation is rampant in late larval and pupal stages (Patil *et al*., 1993) and hence it is generally called as old age disease of silkworms. In India, the crop loss due to NPV has been reported to the extent of 32.9-55.3 % among the total silkworm diseases (Nataraju *et al.*, 1998). Viral and bacterial infection will affect cocoon production, resulting in substantial economic loss to the sericulture farmers. The progress of the pathogen in the host tissue is often revealed by the gradual changes in the infected tissues like cuticle, midgut, silkgland, fatbody etc.

The silkworm egg received from NSSO, National Silkworm Seed organization are screened only for the infection of protozoan pathogen, Nosema bombycis where as no screening is done for BmNPV and bacterial infection. The transmission of BmNPV and *bacillus sp.* was not known till recently, Khurad *et al*., (2004) reported the transmission of BmNPV virus and Rai *et al*., (2010) *Bacillus sp.* transmission from infected parent through embryo to the next generation. Various studies have been carried out by many workers on effect of BmNPV and *Bacillus sp* on various tissues and economic parameters in tasar silkworm, *Antheraea mylitta* D. No such studies have been carried out on BmNPV and *Bacillus sp.* in mulberry silkworm, *Bombyx mori*. Hence, the present study was carried out to study the impact of BmNPV and *Bacillus sp.* on various tissues and economic parameters of Silkworm, *Bombyx mori* L.

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MATERIAL AND METHODS

For present study PMxCSR2 silkworm strain were selected. Silkworms were reared by following the metholodology suggested by Dandin (2003).About 300 newly moulted fourth instar larvae were selected from the rearing stock and grouped into three sets. Larvae were placed individually in plastic cups. The doses of BmNPV and *Bacillus sp*. were prepared with the help of standard counting using Neaubur's chamber to count the NPV particles and spectrophotometer for Bacillus sp. The occlusion bodies (OBs) of nucleopolyhedrovirus were isolated and purified by diluting with distilled water and modified repeated centrifugation method and as suggested by cantwell (1970). The larvae were starved for about 10-12 h before inoculation then they were inoculated with *BmNPV* and *Bacillus sp.* Smear applied on $1cm^2$ mulberry leaf, air dried and fed individually to early fifth instar larvae. One set of larvae was treated with *BmNPV* suspension with sub lethal concentration ($1.5x10^6$OBs/ml @ 10 µl/100 worms. Similarly one set of larvae was treated with suspension of *Bacillus sp.* with concentration ($5x10^7$ particles/ml @ 2.5 µl/100 worms) and another set of larvae were treated with distilled water and used as control.(fig1)Those larvae who consumed entire leaf were further fed with fresh mulberry leaves and were reared up to cocoon formation. The parameters such as larval weight, economic characters, and symptoms were recorded. For histopathological studies larvae form both sets of silkworm larvae were randomly selected i.e. from 1^{st} day of treatment to 7^{th} day of treatment and dissected in ice cold insect ringer solution and collected the fatbody, silkgland and midgut for day to day histopathological studies. The tissues were fixed in cornoy's fixative and were dehydrated using ethyl alcohol cleared in Xylene embedded in wax. The sections were cut at 5 µ and stained using Azain stain (Humason, 1962). The stained tissues were observed to trace out the route of infection.

RESULTS

Effect of BmNPV and Bacillus sp. on rearing performance

BmNPV and Bacillus inoculated larvae have reduced weight as compared to control one. In control group, early fifth instar was 1.34 g which was increased to 3.15 g in late fifth larva, whereas the larvae infected with NPV reached upto 2.06 g from initial 1.05 g. But bacteria infected larvae exhibited lower weight in early (0.96g) and late (1.92g) fifth instar larvae which was quite lower as compared to the control group. (Table1).

In fifth larval stage viral infected larvae showed symptoms such as sluggishness, translucent appearance and swelling of inter segmental region, vomiting and oozing turbid milky fluid indicating destruction of internal organs due to NPV particles (Fig 2). Few survivals spun the flimsy cocoon with abnormal size but many died during spinning. The heavily bacterial infected larvae does not feed after moulting and its body shrinks and later body becomes black (fig 3). Survivals spun cocoons, which were flimsy and unreelable. The economic characters recorded were also found reduced for the cocoon spun by the NPV and bacillus infected larvae cocoon wt (0.80g) and (0.71g), shell wt (0.12g) and (0.11g), shell ratio (15.18g) and (14.15g) while cocoon spun by healthy larvae shows high cocoon wt (1.24g), shell wt (0.27g), and shell ratio (21.61g) which was the highest as compared to infected group (table 2).The weight of pupa formed from the infected larvae also reduced (0.68g and 0.64g) as compared to healthy (0.91g). Moth with deformed emerged out from the infected cocoon (fig 4) weighing 0.250 and 0.230 in male and female respectively. Other parameters such as, length and weight of filament and denier are always higher in control group than the treated groups (Table2).

The moderately infected larvae reached adult stage but they laid less number of egg in NPV (309) and Bacillus (290), the number of hatching egg was also less (323) and (309) with lower hatching percentage (80 and 71.03) as compared to the control, where number of eggs were (723) hatched egg were(471) and has more hatching (91.02%) (Table3).

Histopathological changes in the fat body, midgut and silkgland Fatbody (Control)

In silkworm, bands of soft white tissues are present under the integument called fat body. The cytoplasm of the cells of these tissues contains large amount of fat globules, in addition to protein, glycogen and other metabolites. Usually, a single nucleus is present in each cell. The cells undergo morphological changes during different stages of larval growth and size of the cells show changes. In young larvae, the fat body cells are smaller in size, but in late-age ones, they become very large (Fig.5). The nuclei are compact. The cytoplasm contains lipid vacuoles. The cells are compactly arranged.

Fatbody (Virus Infected)

In the inoculated larvae, four days post-inoculation onwards the polyhedral inclusion bodies (PIBS) started appearing in the nuclei of the fatbody cells and by the 7^{th} day post-inoculation, the nuclei were compactly filled with a large number of PIBs. The heavily infected fat body exhibited disruption of cell and starts putrification within an hour and body turn black.(Fig 6)

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Fatbody (Bacterial Infected)
The fat body cells are large and arranged in groups with single compact nuclei in normal fat body cell. After the heavy infection of *Bacillus* sp. the fat body cells destroyed and could not maintain the cell arrangement due to destruction of cell wall and group of cells are scattered.(Fig 7)

Midgut (Control)
After the ingestion of the PIBs coated piece of leaf by the larva, the PIBs enter into the lumen of the midgut which is the largest part of the alimentary canal of the larva; it is situated between the 2nd and 9th body segments. The wall of the midgut is composed of muscular layer, basal membrane, epithelium and peritrophic membrane. The epithelium is composed of columnar, cylindrical, goblet and regenerative cells. The columnar cells are involved in the enzyme secretion and absorption of products of digestion, while the goblet cells carry out only secretary function. The regenerative cells replace the older and exhausted cells by the new ones. The peritrophic membrane lies over the epithelium of the midgut (Fig. 3). It is principally composed of chitin and protein. This membrane probably acts as a barrier to microorganisms to reduce the infection of the tissues.(Fig 8)

Midgut (Virus Infected)
In the inoculated larvae, the columnar epithelial cells of the midgut exhibited hypertrophy of the nuclei after two hours post-inoculation. No other changes were observed in the goblet cells and the regenerative cells. At 12 hr post- inoculation, hypertrophy was distinct in most of the columnar cells. Subsequently, the progression of infection continued in the midgut cells and most of the columnar cells were infected with virus, showing few PIBs in their nuclei. The NPV infection was not observed in the goblet cells. However, a few regenerative cells and the basal membrane cells became infected with the virus showing PIBs in the nuclei 7 days post-inoculation (fig 9).

Midgut (Bacterial Infected)
The midgut of the larvae exposed to Bacillus sp. shown some cells presenting an irregularly structured brush border. The cells begin to be swollen by a slight vacuolization and increase secretion of vesicles. It shows increase morphological changes in epithelium with most of the cells swollen, vacuolated and destroyed, with irregularly disposed brush border.(Fig 10)

Silk gland (Control)
The silk gland is an important organ, which produces liquid silk, as the source of cocoon fiber. The major portion of this gland lies just below the alimentary canal. A gland has a specific shape and is broadly divided into the anterior, middle and posterior parts. Of these, the middle part is the largest and twisted in the shape of letter 'S'. Anteriorly the gland terminates in a spinneret located in the head of the larva and at the point, where the left and right anterior parts of the gland unite; there is a pair of Filipi's gland. The posterior part of the silk glands is tubular, long and coiled. The nuclei in the cells of silk glands undergo changes as the larvae develop from the younger age to the late age. Initially, the nuclei of middle silk gland cells are more or less circular in shape, but in the late 5th instar stage, there is a branching of the nuclei (Fig.11).

Silkgland (Virus Infected)
The infection of NPV occurred in the middle silk gland cells about four days post-inoculation. The nuclei of the cells are filled with PIB's in the middle part of the gland. By 7th day post-inoculation, infection was spread in the nuclei of posterior silk gland cells (Fig. 12).

Silkgland (Bacterial Infected)
The nuclei of middle silk gland cells are oval and compact at early ages but become branched during late instars stages. In inoculated larvae the cells of silk gland ruptured and damage due to the effect of *Bacillus* (fig 13)

DISCUSSION
In the present study the occurrence of severe infection of BmNPV and *Bacillus* might be due to the prolonged duration of larval development in *B. mori*. Further the inoculation of BmNPV and *Bacillus* reduced larval weight, and economic characters as compared to the control. Such infections also affect the economic character as well as the fecundity of the female moth as reported by the earlier workers in other lepidopterans (Wilson, 1982; Han and Watanabe, 1988).

The histopathological observation revealed that the appearance of a replicative stages of BmNPV and *Bacillus sp.*in the midgut clearly indicate that the infection starts at the site, midgut and continued by penetration through midgut wall into haemocoel infecting haemocytes, fat body, and silk gland, etc. The degree of infection in the tissues can be defined as light, heavy or poor infection in contrast to uninfected individuals depending on the

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severity of infection. In Lepidoptera, the dissolution of ingested OBs is believed to be controlled by the action of highly alkaline gut juices, pH 9.5 to 11.5 and possibly by some enzymatic degradation (Tinsley and Harrap, 1978).

The damage done by the pathogens recorded was the highest in bacterial infected tissues as compared by BmNPV infection. The *Bacillus* sp. exhibited in the form of damage to the tissues. In fat body tissues due to high intensity of infection, nucleus and cell walls are completely disintegrated and had no basic demarcation among the cells and tissues. In *B. mori,* formation of OBs in the basal membrane cells occurred late and was prominent at 7 days post inoculation (Khurad *et al*., 2006). Recently, Khurad *et. al*. (2004) reported that in addition to all the tissues, larval gonadal tissues both, testes and ovaries also become infected at varying degrees.

In the present study the initiation of infection after the ingestion of OBs and bacterial spores revealed that the remaining active released virus might have infected the midgut cells and penetrated the peritrophic membrane before they come into contact with columnar cells of the midgut. The production of flimsy cocoons by infected larvae and their smaller size than the healthy cocoons might be attributed to inadequate synthesis of silk in the virus infected silk glands. The adults emerged from these cocoons exhibited deformities and less active as compared to healthier ones which might be attributed to the insufficient food reserve for morphogenesis of adult organs as most of the infected fat body tissues were exhausted by replication of virus. The silk glands in *B. mori* occupy most of the body cavity but the pathogens mainly infect the middle and posterior regions thus disrupting the silk synthesis and ultimately the silk production. Species specificity and the effect on specific organ due to pathogen infection have been reported earlier (Raina *et. al*., 1987). Further, debilitating effects of viral diseases of Lepidoptera include slower development rate, lower pupal and adult weights, reduced reproductive capacity and shorter longevity.

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Table 1: Weight recorded during developmental in control and BmNPV and Bacillus inoculated groups of B.mori.

		Weight (g)		
Instar	**Stage**	**Control**	**BmNPV**	**Bacillus sp**
V	Early	1.34±0.03	1.05±0.02	0.96±0.03
	Middle	3.07±0.05	2.01±0.07	1.56±0.06
	Late	3.15±0.07	2.06±0.13	1.92±0.02
Adult	Male	0.26±0.12	0.14±0.02	0.13±0.04
	Female	0.73±0.03	0.25±0.02	0.23±0.03

Tables-2: Effect of BmNPV and Bacillus inoculation on cocoon characters of B.mori.

Sr.No	**Avg. weight (g)**		
	Control	**BmNPV**	**Bacillus sp.**
Cocoon	1.24±0.02	0.80±0.02	0.78 ±0.03
Shell wt	0.271±0.01	0.120±0.01	0.115±0.02
Shell ratio	21.6±0.22	15.18±0.26	14.15±0.22
Pupa	0.91±0.05	0.68±0.04	0.64±0.03
Filament Length (m)	697±22.0	432±15.0	402±13.0
Filament wt (g)	0.18±0.12	0.09±0.08	0.08±0.03
Denier Scale	2.32±0.03	1.24±0.14	1.10±0.11

Tables-3: Effect of BmNPV and Bacillus inoculation on fecundity of B.mori.

Average	**No. of eggs**		
	Control	**BmNPV**	**Bacillus sp.**
Laid	723±22.7	309 ±25.6	290±22.7
Hatched	471±26.0	323±20.3	309±15.6
Unhatched	41.0±12.0	30.0±11.0	26.3±9.0
Hatching %	91.02±5.0	79.00±3.0	71.03±2.5

Fig : Inoculuation of bBmNPV and Bacillus Sp.

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Fig 1: Healthy fifth instar larva of *B. Mori.*

Fig 2: Viral infected fifth instar larva of *B. Mori* showing swelling of inter segmental region.

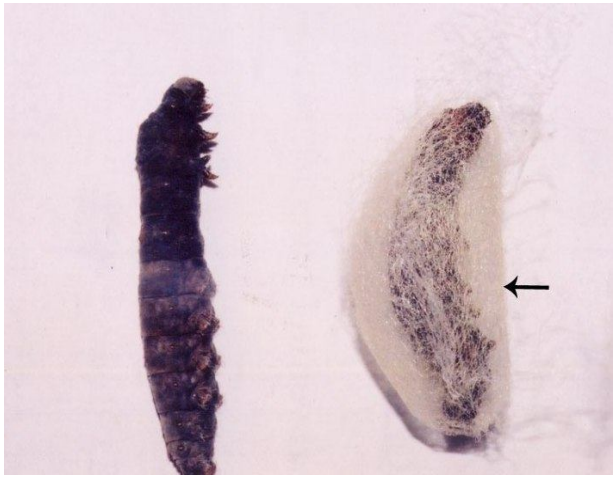

Fig 3: Bacterial infected fifth instar larva of *B. Mori* showing black body and unreelable cocoon.

Fig 4: Healthy adult moth of B.mori and with infected moth showing deformed wings.

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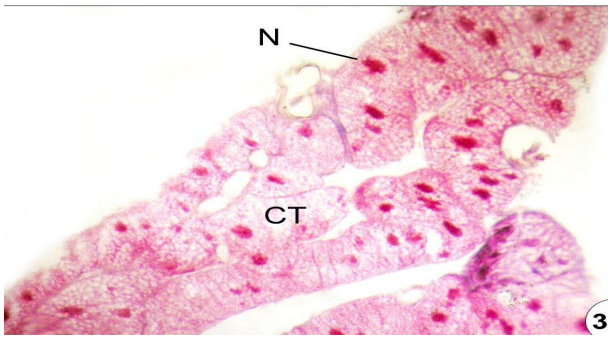

Fig 5: T.S passing through fat body of healthy fifth instar larva of B.mori showing normal nucleus and cytoplasm of fat body cell. (Azan Stain).

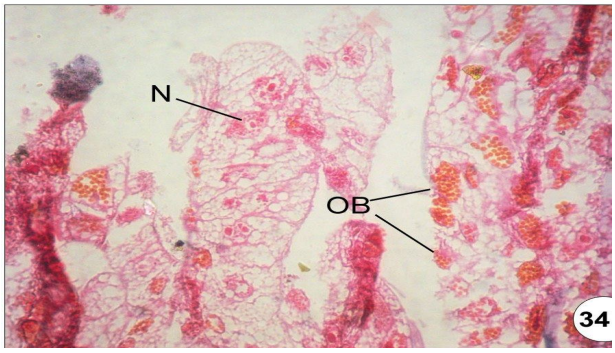

Fig 6: T.S passing through fat body tissue of BmNPV infected fifth instar larva of B.mori showing nucleus filled with OBs (→).

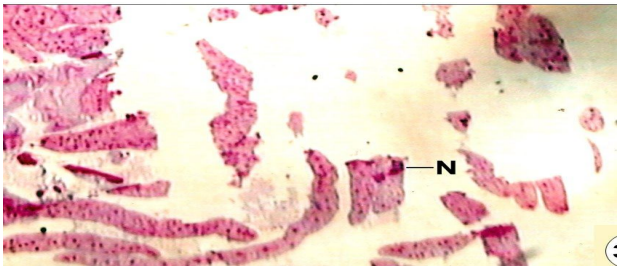

Fig 7: T.S passing through fat body tissue of bacterial infected fifth instar larva of B.mori showing disintegration of fat body tissue (→).

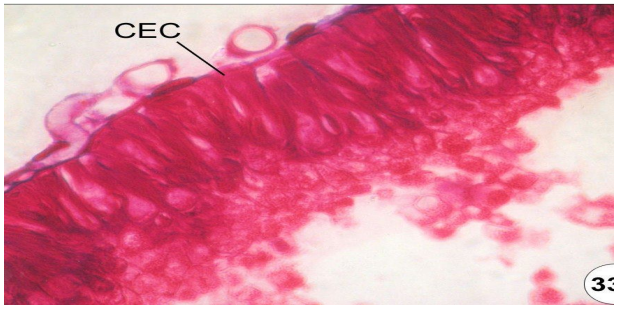

Fig 8: T.S passing through midgut of healthy fifth instar larva of B.mori showing columnar epithelial cell.

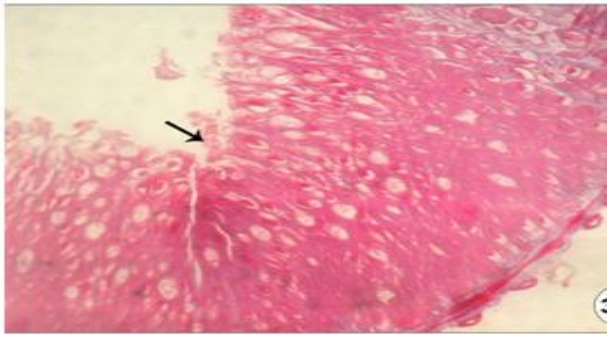

Fig 9: T.S passing through midgut of viral infected fifth instar larva of B.mori showing OBs (→).

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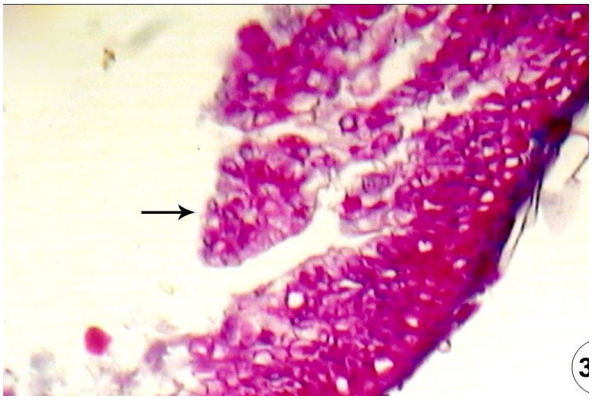

Fig 10: T.S passing through midgut of bacterial infected fifth instar larva of B.mori showing atrophy of columnar epithelial cells (→).

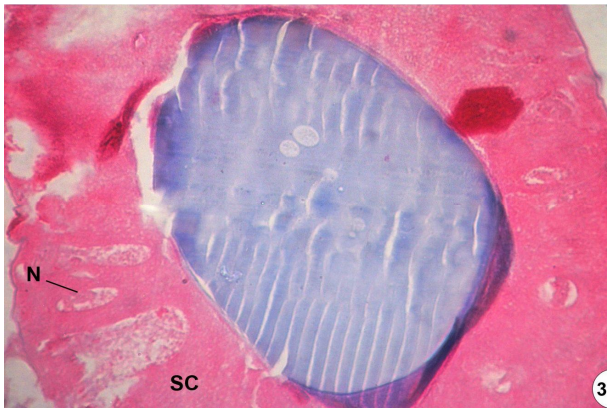

Fig 11: T.S passing through Silkgland of healthy fifth instar larva of B.mori showing normal nucleus and silk gland cells.

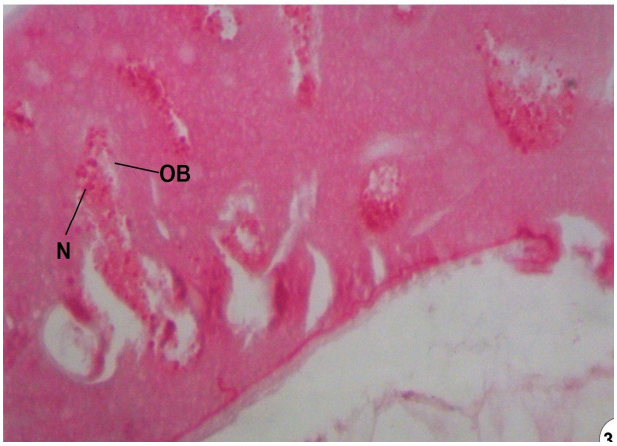

Fig 12: Section passing through silkgland tissue of viral infected fifth instar larva of B.mori showing nucleus filled with OBs.

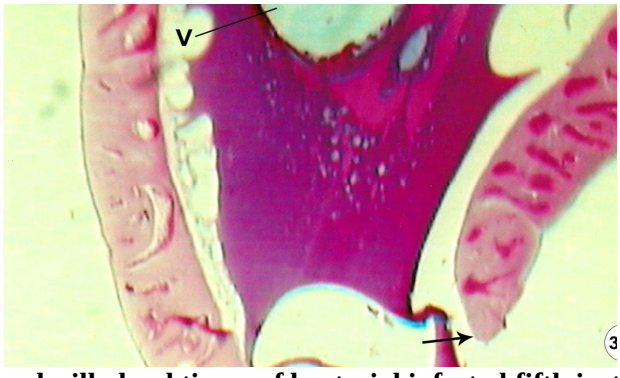

Fig 13: Section passing through silkgland tissue of bacterial infected fifth instar larva of B.mori showing disintegration of silk gland tissue.

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INFLUENCE OF MICRO AND MACRO ELEMENTS OF BG-11 MEDIUM ON GROWTH OF CHARACIUM AMBIGUM

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ABSTRACT
Algae, the groups of phototrophic organisms have been observed widely in many natural habitats. Algae obtained all the nutrients from the water in which they live but, they need a proper supply of these nutrients for their successful growth in the culture medium. Nutrients are the substances or certain elements which are essential for life processes in aquatic organisms.

The influences of macro and micro elements of BG-11 medium on the growth of Characium ambigum were studied and constituted the modified BG-11 medium. The auxenic culture was made in the Advanced Phycology and Hydrobiology research laboratory of Botany Department at RTM Nagpur University, Nagpur. The growth of Characium ambigum (O.D.) was higher in modified BG-11 medium (2.135 OD) than the basic BG-11 media (1.715 OD).

Keywords: Algae, BG-11 medium, Modified BG-11 medium.

INTRODUCTION
The environment is to be conditioned to meet their requirement for the successful growth of an organism. Many attempts have been made to understand the ecological condition suitable for their growth (Ketchum, 1954). The studies on the nutritional requirement of algae are quite similar to higher plants. Nutrients are the substances or certain elements which are essential for life processes in aquatic organisms. Major nutrients include carbon, nitrogen, phosphorus, calcium, sodium, magnesium, potassium, sulphur, nitrogen and iron. Micronutrients those required by plants and animals in very small quantity, might include manganese, copper, zinc, cobalt and molybdenum (Horne and Goldman, 1994). In certain algae some additional elements are required such as silica for diatoms.

The absolute requirement of element can be established only by culture. However, many media have been suggested the culture for the growth of algae in media, a few guidelines have also been suggested by Watanabe, *et.al* (2000) and Warren, *et.al*. (2002). several other media are designed to produce a large population by different authors. Rodhe (1948) and Chu (1942) media designed for growth of algae in artificial condition based on the physiological experiment on forms like *Ankistrodesmus falcatus, Pediastrum boryanum* and others. Gerloff, *et. al.*, (1950) used media and B.G.11 (Rippka, *et al.,* 1979) for blue green algae.

Nutrient requirement must be absolute normal, minimum or optimum. Ketchum (1949) used several media for growth of *Anacystis nidulans.* Allen (1968); Hirano, *et. al*. (1981); Sorensen, *et. al*.(1977); Stein (1966); Ohad, *et. al.* (1967) for Chlorophyceae, Chrysophyceae, Cyanophyceae and Rhodophyceae.

In considering the requirement of nutrients for the growth of individual alga, at sampling sites maximum concentration of elements are present therefore, an attempt has been made to study the individual element and combination of all elements to assess the requirement of nutrients for *Characium ambigum.*

MATERIALS AND METHODS
Algae from different sites were collected, identified and algal cultures were grown in Advanced Phycology and Hydrobiology Laboratory of the Botany Department. From this mixed population a pure unialgal culture was isolated for the study of nutritional requirement of alga. In this investigation *Characium ambigum* is isolated and made auxenic in liquid BG-11 medium. For study of nutritional requirement of algae, BG-11 medium was chosen as it is considered as a basic or control medium for the Cyanophycean and Chlorophycean algae. For nutritional study elements were selected, carbon, nitrogen, calcium, magnesium, sodium, potassium, sulphur and chloride. The growth was estimated in terms of optical density at 678nm of cell suspension with UV spectrophotometer for *Characium ambigum* for an influence of individual element on growth of *Characium ambigum.* Modified medium was made with combination of all elements for individual algal species and observed the growth as compared to basal medium.

RESULT AND DISCUSSION
Carbon is constituent of all organic compounds, protoplasm and enzyme of living system. It is derived from carbon dioxide, carbonates, bicarbonates or organic compounds. In fact some of these investigators depicted role of bicarbonate and carbon dioxide in *Spirulina, Chlorella* and marine diatom *Phaeodyctulum tricoruntum*

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(Dixon and Merrett, 1988). Boggess and Naylor (1975) noted that in red alga *Gracilaria* the greatest percentage of carbon was found in cationic fraction representing amino acids. Hiwale (2008) recorded the maximum growth of *Oocystis* at 4 mgl^{-1} of carbon. The maximum growth of *Characium ambigum* was recorded at 2.28 mgl^{-1} which is similar to the concentration of carbon in basal medium (Table 1).

Blue green algae need higher value of nitrogen compare to Diatoms. Many workers reported different concentration of nitrogen required for maximum growth of algae. Rodhe (1948), Chu (1942), Gerloff, *et. al*. (1950) reported comparatively low concentration of nitrogen 10.2, 5.0, 13.6 mgl^{-1} respectively. Whereas Myers and Clark (1944), Tanda (1951), Hiwale (2008) reported higher requirement i.e. 305, 87 and 300 mgl^{-1} of nitrogen respectively.In the present investigation the maximum growth of *Characium ambigum* at 38.814 mgl^{-1} (Table 2).

The minimum requirement of calcium for the *Chlorella* has been observed by earlier workers (Walker, 1953). The requirement of calcium for *Chlorella* and *Chlorococcum* was16 mgl^{-1} (Shaheen, 1996 and Khapekar, 2006) and for *Kirchnerialla* was 8 mgl^{-1} (Hiwale, 2008). In present study maximum growth of *Characium ambigum* was recorded at 12.99 mgl^{-1} concentration of calcium which is similar to the concentration of calcium in basal medium (Table 3). The requirement of calcium for *Phormidium* was 12.99 mgl^{-1} (Hiwale, 2008) resemble with the present study.

The blue green algae need higher concentration of magnesium for maximum growth. Hiwale (2008) reported the *Phormidium* needs lower concentration 10 mgl^{-1} of magnesium than the BG-11. In present investigation *Characium ambigum* was required more magnesium15.15 mgl^{-1} for better growth (Table 4).

The growth rate of algae maintained over a wide range of sodium concentration. Allen (1952) found the need for sodium for good growth of various blue green algae.It also necessary for the growth of *Nostoc mucorosum* (Kratz and Myers, 1955). The requirement for *Nitzchia frustulum* and *Chlorella* is 425 mgl^{-1} (Shaheen, 1996) and *Oocystis* require 405 mgl^{-1} of sodium (Hiwale, 2008). In present study *Characium ambigum* grows better at 356 mgl^{-1} concentration of sodium (Table 5).

In present investigation, the maximum requirement of potassium for *Characium ambigum was* 24 mgl^{-1} for normal growth (Table 6). Requirement of sulphur for algae carried out by various workers. Guillard (1973) noted low concentration of 4.8 mgl^{-1} in Wood Hole medium. Tanda (1951) reported 8.4 mgl^{-1} and 13.0 mgl^{-1} for growth of diatom and *Chlorella.* Shehata and Whitton (1982) noted the 32.3 mgl^{-1} for growth of *Spirulina.* In present study, maximum growth of *Characium ambigum* at 76.84 mgl^{-1} (Table 7).This result is higher than the result of Wu and Pond (1981); Hiwale (2008), they reported high concentration of sulphur was 32 mgl^{-1} for *Spirulina* and *Kirchneriella.*

Algae absorb chloride in the form of sodium chloride, which is play major role in the determination of kinds of algae which can grow in the water. Various workers showed different requirement of chloride for algae. Antarikanoda (1982) indicated 139.5 mgl^{-1} for Cyanophyceae whereas Whitton and Shehata (1982) reported 26.46 mgl^{-1} chlorides in ACM medium. Shaheen (1996) recorded 17.3 mgl^{-1} of chloride for *Spirulina* and *Chlorella.* In present study, *Characium ambigum* requires maximum 730 mgl^{-1} which is similar to the concentration of chloride in basal medium (Table 8). This results is higher than results of Guillard (1973), Shankhadarwar (2002), Hiwale (2008), noted that 17.35 mgl^{-1} for maximum growth.

In present study, optimum growth of *Characium ambigum* was recorded in modified BG-11 than normal basal BG-11 medium (Table 9). In this consideration, the present modified medium of BG-11 is more suitable for better growth of the species studied so far in this investigation.

Table 1 : Influence of Carbon on growth of *Characium ambigum*

Conc. in mgl^{-1}	2.28*	126	136	146	156	166	176
Optical Density	1.244	0.845	0.765	0.733	0.679	0.630	0.589

Table 2: Influence of Nitrogen on growth of *Characium ambigum*

Conc. in mgl^{-1}	0.8	8.814	18.814	23.7*	28.814	38.814	48.814
Optical Density	0.208	0.547	1.882	1.990	2.213	2.283	2.370

Table 3 ; Influence of Calcium on growth of *Characium ambigum*

Conc. in mgl^{-1}	12.99*	262	272	282	292	302	312
Optical Density	2.276	1.671	1.661	1.529	1.412	1.361	1.351

Table 4 : Influence of Magnesium on growth of *Characium ambigum*

Conc. in mgl^{-1}	15.15*	55	65	75	85	95	105
Optical Density	1.766	1.574	1.497	1.449	1.408	1.301	1.258

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Table 5: Influence of Sodium on growth of *Characium ambigum*

Conc. in mgl^{-1}	40.65*	316	326	336	346	356	366
Optical Density	2.112	2.144	2.158	2.173	2.258	2.355	2.053

Table 6: Influence of Potassium on growth of *Characium ambigum*

Conc. in mgl^{-1}	9*	14	24	34	44	54	64
Optical Density	0.745	0.833	1.119	0.976	0.913	0.856	0.862

Table 7: Influence of Sulphur on growth of *Characium ambigum*

Conc. in mgl^{-1}	19.85*	76.84	86.84	96.84	106.84	116.84	126.84
Optical Density	2.087	2.470	2.388	2.293	2.247	2.207	2.051

Table 8: Influence of Chloride on growth of *Characium ambigum*

Conc. in mgl^{-1}	22.99*	730	740	750	760	770	780
Optical Density	1.396	1.760	1.634	1.589	1.578	1.467	1.463

Table 9: Growth of *Characium ambigum* in BG-11 and modified medium.

Medium	Growth in BG-11 medium (OD)	Growth in modified medium (OD)
25 ml	1.715	2.135

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INVESTIGATION ON POLLINATORS OF SARPAGANDHA (*RAUVOLFIA SERPENTINA*) FROM SADAK-ARJUNI OF GONDIA DISTRICT (M.S.), INDIA

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ABSTRACT
Pollination, the transfer of pollen grains from anther to the stigma of flower is a vital step in the sexual reproduction of flowering plants. The majority of flowering plants depend on animals for the transfer of pollen. Rauvolfia serpentina (Linn.) Benth., ex Kurz, is an important medicinal plant, hence it is essential to study pollination effects. Scan sampling method were carried out to notice the insect pollinator diversity from 7.00am to 5.00pm. Visiting frequency of pollinators and their behaviour were studied by focal sampling. Total 15 species of pollinators observed during study belonging to – Lepidoptera, Hymenoptera, Passeriformes, Coleoptera and Diptera. Out of these lepidopteran insects found to be common due to high visitation rate.

Keywords: Pollination, Pollinators, Medicinal plants, Diversity

INTRODUCTION

The transfer of pollen grain from anther to stigma of flower is called as pollination. Pollination is the first step for sexual reproduction in plants. The flowers purpose is to result in sexual reproduction. On the basis of types of agent involved, there are two types of pollination, abiotic and biotic. Pollination is facilitated without the involvement of other organisms denotes to abiotic pollination. Only 10% of flowering plants are pollinated without animal support. Pollination is intervened the involvement of other organisms refers to biotic pollination.

Plants depend on pollen vectors, such as wind, insects and birds, to transport their pollen to another individual. Several insects carried out pollination are – bees, butterflies, ants and flies (Wilson, 1999). These visitors must be attracted to the same species repeatedly to bring about pollination. For this the visitor must be attracted, collect pollen accidentally by brushing floral parts, or purposefully collect pollen to take back to a nest, and then visit another flower of the same species and brush up against the stigma, effecting pollination. Flowers attract pollinators by providing ample nectar of the right composition, and by advertising this nectar by deep shape and recognizable floral patterns, by providing excess pollen as food, or by providing shelter or a place to raise and feed young - or by at least looking as if they do (Faegri and van der Pijl 1971).

For study we have selected *Rauvolfia serpentina* (Linn.) Benth., ex Kurz (Sarpagandha) plant belonging to family Apocyanaceae. The plants have enormous medicinal properties. Various parts of this plant are used to treat human ailments (Farooq 2005; Ebadi 2007) in ayurvedic medicine. A large number of alkaloids have been isolated from *R. serpentina* and other species of *Rauvolfia* – Reserpine. Reserpinine, deserpidine, deserpideine, serpentine, serpentinine, ajmaline, ajmalinine and rauwolfinine.

This type of study has got definite economic value because the pollination of Sarpagandha (*Rauvolfia serpentina*) depends upon insect pollinators.

MATERIAL AND METHODS

Study Sites

A study was conducted at self-maintained small field situated in Sadak Arjuni town of Gondia district of Maharashtra state from October 2015 to September 2017. Sadak Arjuni is located at 21.10°N 80.15°E. It has an average elevation of 256 metres (843 feet). It is located near the Maharashtra-Chhattisgarh border on Mumbai - Kolkata National Highway 6. The major crop of this area is rice, that's why Gondia is called as 'Rice City'. The climate in this area remains dry and hot throughout the year with moderate rainfall from June to middle of October months. The experimental field located in close vicinity to residential area and paddy field.

Flower Morphology

The structure of flowers, their position in the inflorescence and morphology of separate floral parts were assessed.

Flower Phenology

It was determined by visual observations commenced at the beginning of flowering and continued until fruiting (Mark and Francoise, 2005). The time of anthesis initiation and termination in flowers, flowering period of inflorescence and entire flowering period were observed.

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Pollination Syndrome
Pollination syndrome study included the colour, form, shape, size, pollen tract, odour or scent of flower to attract different pollinators.

Pollinators visiting frequency
Observation of pollinators visiting frequency was conducted by scan sampling method.(Martin and Bateson, 1993).

RESULTS
Plants were grown in self-maintained small field in Sadak Arjuni town of Gondia district (MS). After the commencement of flowering observed regularly for insects and other visitors visited to flowers and carried out the process of pollination.

DESCRIPTION OF PLANT
Sarpagandha is small, erect and perennial shrub, ranges from 60 – 90cm. in height. Whorled phyllotaxy, 3 leaves at each node and about 7- 19cm long, lanceolate, acute or acuminate, glabrous.

Inflorescence is compact corymbose cymes arises from terminal and axillary in position. Flowers are small, pedicillate, fragrance-free, complete and hermaphrodite. Five fused, dark red, glabrous sepals. Petals 5, fused (gamopetalous condition) forming a long corolla tube which is inflated in the middle and white to pink in colour. The length of Corolla tube ranges from 13.5 to 22.2 mm & 2 to 3 mm in breadth / diameter. Nectar secretion takes place from nectary's found at a base of corolla tube. Stamens 5, epipetalous are enclosed within the enlarged portion of the corolla tube. Carpels 2, fused (syncarpous), with filiform style and large bifid stigma; bilocular ovary with two ovules in each locule.

FLOWER PHENOLOGY
The flowering in *R. serpentina* takes place throughout the year at climatic conditions of Sadak Arjuni, but inflorescence bears maximum flowers during the end of May to middle of July and from February to April. Flowers open early in the morning between 5.30 – 6.00 hr in summer season & 6.30 – 7.00hr in winter season. The flowers of Sarpagandha are Protogynous prevents the self-pollination and hence favours cross pollination.

Table 1: List of Flower Visitors species

Sr. No.	Species	Order	Pollinator/Nectar gatherer/Non-pollinator
1	*Papilio demoleus*	Lepidoptera	Pollinator + Nectar gatherer
2	*Papilio polytes*	Lepidoptera	Pollinator + Nectar gatherer
3	*Catopsila pyranthe*	Lepidoptera	Pollinator + Nectar gatherer
4	*Catopsila pomona*	Lepidoptera	Pollinator + Nectar gatherer
5	*Borbo cinnara*	Lepidoptera	Pollinator + Nectar gatherer
6	*Eurema hecabe*	Lepidoptera	Pollinator + Nectar gatherer
7	*Junonia lemonius*	Lepidoptera	Non-pollinator
8	*Junonia almanac*	Lepidoptera	Non-pollinator
9	*Amegilla* spp.	Hymenoptera	Pollinator + Nectar gatherer
10	*Xylocopa fenestrate*	Hymenoptera	Pollinator + Nectar gatherer
11	*Camponotus* spp.	Hymenoptera	Pollinator
12	*Cinnyris asiaticus*	Passeriformes	Pollinator
13	*Cinnyris venustus*	Passeriformes	Pollinator
14	*Chrysomya megacephala*	Diptera	Non-pollinator
15	Bettles	Coleoptera	Non-pollinator

Table 2: Percentage of Flower Visitors species

Sr. No.	Taxon	Species	Percentage
1	Lepidoptera	8	53.33%
2	Hymenoptera	3	20.00%
3	Passeriformes	2	13.33%
4	Coleoptera	1	6.67%
5	Diptera	1	6.67%
	Total	15	100

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During the study it has been found that lepidopteran (Butterflies) species were mostly common pollinators of Sarpagandha. They were abundantly found during 7.00hr to 4.00hr. Sunbirds are also act as pollinators, occurs during the months of July to February also few hymenopteran species were reported during 7.00 to 5.00hr of the day. Maximum numbers of pollinators found during 9.00 to 3.00 hr of the day. Total 15 species of flower visitors were found, out of these 11 species acted as pollinators while 4 species were non-pollinators (Table-1).

DISCUSSION

Total 15 species of flower visitors like insect, bees, butterflies, birds, etc. were found during the study but not all of them act as pollinators, some of them visited for nectar while some for pollen or both. Certain characters are develops in combination by flowers including shape, size, colour, odour/scent, quantity of nectar, location and type of pollen to attract animal pollinators. Hence only Specific visitors like insects, butterflies, ants, birds, etc. attracted towards the specific flowers depends on the trait produce by the plants.

The flowers of *R. serpentina* (Sarpagandha) have highly narrow and long tubular corolla which makes them a perfect representative of psychophilous mode of pollination rejecting all other syndromes were reported by Barrows (1976); Schemske (1976); Faegri & van der Pijl (1979); Suzuki et al. (1987); Sihag & Kaur (1997). We have also found similar type of results. The numbers of animal visitors were found but among them butterflies are in rank first position followed by bees, similar type of result reported by Wadhawa and Sihag (2012).

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It was reported that the birds are attracted towards the red coloured and odourless flowers but we found birds specially sunbirds acts as pollinators of Sarpagandha. We observed that the highest visiting frequency of pollinators during the 9.00 – 3.00hr while Pollobi and Kalita (2013) found during 8.00 – 12.00hr.

Hardwicke (2003) and Faheem et al. (2004) found that the environmental factors such temperature and humidity affecting the insect pollinators and similar type of result also found in our study, during the hot days (middle of April to first week of June) of summer there is great decline in number of pollinators.

CONCLUSION

From the above study it is concluded that Butterflies (lepidoptera) were most effective pollinators of *Rauvolfia serpentina* due to their high visited frequency, percentage of occurrence and abundance. This investigation may serve as precursor for further research on topic like pollination ecology and conservation of pollinators.

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STRUCTURAL AND MAGNETIC PROPERTIES OF ZR-SUBSTITUTED NI ZN CO FERRITE NANOPARTICLE

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ABSTRACT
Zr-substituted Ni-Zn-Co ferrite nano-powders, Ni0.4-xZn0.5ZrxCo0.1Fe2.0O4 (0≤x≤0.20), were synthesized by the sol-gel auto-combustion method. The effects of Zr substitution on the structural and magnetic properties have been investigated. The X-ray diffraction patterns show that the lattice parameter and the average crystallite size increase with the increase of Zr substitution. The saturation magnetization increases with the increase of Zr substitution when x≤0.05, and then decreases when x>0.05. Meanwhile, the coercivity initially decreases with the increase of Zr substitution when x≤0.05, and then increases when x>0.05.

Keywords: Zr4+ substitution, Ni-Zn-Co ferrite nanoparticle, sol-gel auto-combustion process, structural property

1. INTRODUCTION
The unique properties of ferrite nano-powders have generated more interest in the science community because high surface to volume ratio resulting in novel phenomena's of nano-magnetism such as superparamagnetic, magnetic quantum tunneling and spin-glasslike behavior etc.[1] . It is well known that the ferrites MFe2O4 with the spinel structure are based on a face-center cubic lattice of the oxygen ions. Each spinel unit cell contains eight formula units. In each unit cell, there are 64 tetrahedral sites (A sites) and 32 octahedral sites (B sites). Therefore, the chemical, structural, and electromagnetic properties of ferrite are strongly influenced by their composition and microstructure, which are sensitive to the preparation methodologies [2]. They show various magnetic properties depending on the cation distribution. Various cations can be placed in the structure of AB2O4 in A site and B site to tune its magnetic properties. The chemical and physical properties of spinel ferrites can be varied systematically by changing the identity of the divalent cations without changing the spinel crystal structure [3]. The properties of cubic spinel ferrites can be modified by the tetravalent non-magnetic ions substitution and adding proper additives, such as Sn4+, Ti4+ and Zr4+ ions [4]. But to our knowledge, there are no reports on the Zr-substituted Ni-Zn-Co ferrite nano-powders. For the above-said reasons, Ni-Zn-Co ferrite nano-powders were prepared by the sol-gel auto-combustion method because it has advantages of being able to use inexpensive precursors, a simple preparation method and low sintering temperature that results in well dispersed homogenous, nano-sized and highly reactive ferrite powder in the present work [5].Accordingly, the effects of substitution on the structural, magnetic and electrical properties of Ni-Zn-Co ferrite nano-powders are investigated. And they obtained direct-current resistivity with temperature curves mainly divided into two stages, including the metallic conduction region and semi-conduction region.

2. EXPERIMENTAL PROCEDURES
2.1. Preparation of Zr-substituted Ni-Zn-Co ferrite nano-powders
The samples of Ni0.4-xZn0.5ZrxCo0.1Fe2.0O4 (x=0, 0.05, 0.10, 0.15, 0.20) ferrite nano-powders were prepared by using sol gel auto combustion method. Nickel nitrate, ferric nitrate, zinc nitrate, cobalt nitrate, zirconium Oxcynitrate and Urea in a certain molar ratio and then dissolved in distill water; here the Urea helps the homogenous distribution of the metal ions to get segregate from the solutions. The solution is later subjected to a continuous stirring for the duration of 4 hrs; under constant heating of 100 0C to condense it into a gel[6].Later on this drying up process a brown colored dried gel is held. The gel is further put in microwave oven to fire, crushed the burnt sample in a mortar pastel to obtain the homogeneous nano sized powders. Further the powder is subjected to sintering in a furnace. The grain size of the nano ferrite is determined from the peak of XRD using Scherer's equation.

2.2. Characterization and property measurements
The phase identification of the prepared nano-powders was performed by X-ray diffractometer (XRD) (Cu target, Kα radiation, λ=1.5406Å) at room temperature. The hysteresis loops of samples were measured at room temperature by using (VSM) vibrating sample magnetometer.

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3. RESULTS AND DISCUSSION

3.1. Structural properties

X-ray diffraction patterns of Ni0.4-xZn0.5ZrxCo0.1Fe2.0O4 ferrite nanoparticle are shown in Fig. 1, the patterns well match all the characteristic reflections of cubic spinel structure and without any extra peaks there for the structure is single phase. The lattice parameter (a) and average crystallite size (D) of all samples are calculated according to XRD data and the results are shown in Table 1. The lattice parameter and average particle size increase from 0.8359 nm to 0.84148 nm and 21.3nm to 25.4 nm, respectively[7].

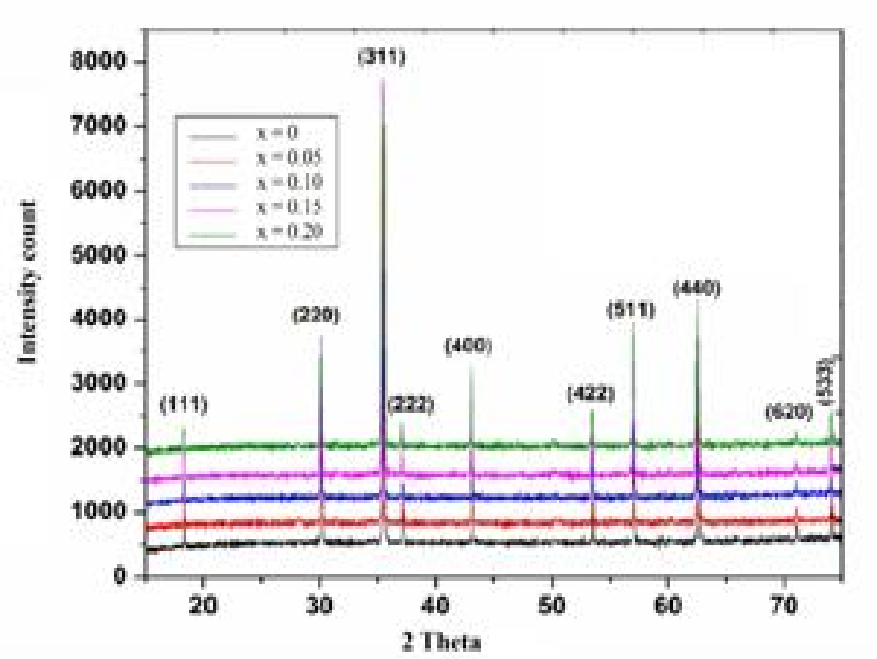

Fig. 1: X-ray diffraction patterns of $Ni_{0.4-x}Zn_{0.5}Zr_xCo_{0.1}Fe_2O_4$ ferrite nanopowders.

The lattice parameter (*a*) of the samples is calculated using the relation

$$a = d_{hkl}\sqrt{h^2 + k^2 + l^2} \qquad (1)$$

Where (*h k l*) are the Miller indices and d_{hkl} is the inter-planar spacing. The average crystallite size is calculated according to Debye-Scherrer equation[8].

$$D = \frac{0.9\lambda}{\beta \cos\theta} \qquad (2)$$

Where λ is wavelength of the X-ray radiation, β is the full width at half maxima in radian and Θ is the Bragg's angle. It is well known that Zr^{4+} ion is nonmagnetic ion which first enters A-site for lower concentration and then subdivides between A and B sites for higher concentration [9]. Therefore the lattice parameter increases with the increase of Zr substitution as shown in Table 1. when the ions are large ionic radii like Zr^{4+} (0.079 nm), which leads to increase lattice parameter. And the variation of lattice parameter with Zr substitution is similar to that in the Ni-Zn ferrite of reference 12. The average crystallite size increases with the increase of Zr substitution can be explained in terms of the increased pore mobility due to the creation of excess cation vacancies. The increased pore mobility model suggests that any tetravalent ions in solid solution with spinel ferrite should increase the grain boundary mobility[10].

Table 1 Variations of lattice parameter (*a*) and average crystallite size (*D*) of $Ni_{0.4-x}Zn_{0.5}Zr_xCo_{0.1}Fe_2O_4$ ferrite nano-powders.

X	0.00	0.05	0.10	0.15	0.20
a (nm)	0.83659	0.83739	0.83827	0.83949	0.84148
D (nm)	21.3	23.8	24.6	24.9	25.4

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3.2. Magnetic properties

Fig. 2 shows the hysteresis loops of $Ni_{0.4-x}Zn_{0.5}Zr_xCo_{0.1}Fe_{2.0}O_4$ ferrite nano-powders. The Saturation magnetization (*M*s) and coercivity (*H*c) of nano-powders as a function of Zr substitution (*x*) are shown in Fig 3 . *M*s gradually increases with the increase of Zr substitution when $x \leq 0.05$, and decreases when $x > 0.05$. Meanwhile, *H*c slightly decreases when Zr substitution (*x*) is 0.05, and increases when $x > 0.05$.

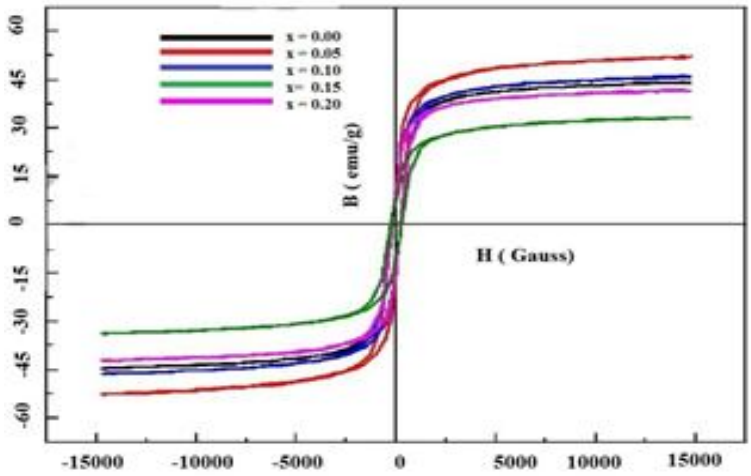

Fig. 2: Hysteresis loops of $Ni_{0.4-x}Zn_{0.5}Zr_xCo_{0.1}Fe_2O_4$ ferrite nano-powders.

Magnetic properties of ferrites are sensitively dependent on the structure, composition, defects, crystallite size, internal strain and cation distribution. According to Néel's two sublattice model of ferrimagnetisms [11], the magnetic moment of cubic spinel ferrite can be calculated by M B − M A , where MA and MB are the magnetizations of A and B-sites respectively. Since the substituting Zr4+ ion occupies A site when x≤ 0.05 (it is assumed that the Zr4+ ion entered A-site), as a result the magnetic moment decreases at A site, thereby Ms increases with the increase of Zr substitution[12]. Furthermore, the increased average crystallite size with Zr^{4+} substitution is another reason that results in the increase of *M*s. However, with the further increase of Zr substitution, the excessive nonmagnetic Zr^{4+} ions enter B site will result in the decrease of magnetic moment on B site which makes the net overall magnetic moment decrease. Furthermore, the larger radius cation enters the crystal lattice will result in the increase of internal stress due to the formation of lattice dislocation which also can make *M*s decrease[13]. Eventually, *M*s decreases with the increase of Zr substitution when $x > 0.05$. The slight decrease of *H*c with $x = 0.05$ mainly due to the increase of *M*s with small amount of Zr substitution. *H*c increases with the increase of stress, impurities concentration and the decrease of *M*s [14]. And the excessive larger ionic radius Zr^{4+} ion enters the crystal lattice will introduce the internal stress, impurities concentration and the decrease of *M*s which result in *H*c increase with the increase of Zr substitution when $x > 0.05$[15].

4 CONCLUSIONS

Zr-substituted Ni-Zn-Co ferrite nano-powders, Ni0.4-$_x$Zn0.5Zr$_x$Co0.1Fe2.0O4 ($0 \leq x \leq 0.20$), were synthesized by the sol-gel auto-combustion method. The effects of Zr substitution on the structural and magnetic properties have been investigated. The X-ray diffraction patterns show that the lattice parameter and average particle size increase from 0.83659 nm to 0.84148 nm and 21.3nm to 25.4nm, respectively. The saturation magnetization increases with the increase of Zr substitution when $x \leq 0.05$, and decreases when $x > 0.05$. Meanwhile, the coercivity initially decreases with the increase of Zr substitution when $x \leq 0.05$, and increases when $x > 0.05$

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STUDY OF NUTRITIONAL QUALITY OF OIL IN SOME CULTIVARS OF GROUNDNUT ARACHIS HYPOGEA L.

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ABSTRACT
Arachis hypogea L.Groundnut is one of the important legume crop belongs to family Fabaceae. Groundnut is third most important source of vegetable proteins and rich source of organic and inorganic compounds. To know the difference quantity of this compounds biochemical tests were carried out .In present study free fatty acid percentage, Iodine value, peroxide value were carried out and their inter relation studied.

Keywords: Arachis hypogea L., Nutritional quality of oil,Physiochemical tests.

INTRODUCTION
The Groundnut (Arachis hypogea L.) or Groundnut is one of the important legume crops of tropical and semiarid tropical countries, where it provides a major source of edible oil and vegetable protein (Prasad, Kakani & Upadhyay).

The cultivated Groundnut is originated in South America and it belongs to family Fabaceae. The term Groundnut is used in most countries of Asia, Africa, Europe and Australia, while in North and South America it is commonly referred to as groundnut. Groundnut is an allotetraploid with 2n = 4X (2A + 2B) = 40

Groundnuts are predominantly grown in developing countries (Asia and Africa), where the crops find the appropriate climates for optimum production. About 90% of the total world production comes from this region and about 60% of production comes from the semiarid tropics. In India, it occupies an area of 6.41 million ha with a production of 9.36 million tons, which accounts for a productivity of 1460 kg/ha during 2007-08 (D. Shobha, N. Manivanna & P. Vindhiyavarman 2010). In India, major Groundnut producing states are Gujarat, Andhra Pradesh Tamil Nadu, Karnataka, and Maharashtra.

Groundnut is the 3rd most important source of vegetable proteins and it contains 50% edible oil, 28% digestive protein and 20% Carbohydrates (Bhatti & Soonroo 1996, Christensen et.al 2004; Sah et.al 2012). It is a dietary source of Vitamin E, Phosphorus, Mg, Ca, Zn, Fe, Riboflavin, and Potassium. It also used as a diet of animals in the form of seed, fodder hay and straw (Smith 2012).

Recently; groundnut gained much attention as a functional food (Fransisco & Resurrecion 2008). Recent studies suggest that groundnut consumption might reduce the risk of heart diseases by lowering serum low-density lipoprotein (LDL) Cholesterol level and reduce the risk in the development of Type II Diabetes(Fraser et.al 1992). The health benefits of groundnuts attributed to the presence of minerals and vitamins, Fatty acids and bioactive compound (Griel et al; 2004).

Biochemical analysis is rapidly expanding field is a key component of modern drug discovery. Groundnuts are the rich source of organic and inorganic components. To know the different quantity of this components. Various biochemical tests were carried out for the parameter like Carbohydrates, Lipase, Phenol, Protein and total oil contents. All these components play a pivotal role in the daily nutrition diet of an organism.

The study of physiochemical properties of Groundnut oil is important as iodine value, peroxide value and free fatty acid percentage, because these parameters determine the shelf life, oxidative rancidity caused by microorganisms and air. Groundnut oil is high quality and can withstand higher temperatures without burning or breaking down (I. I. Nkafamia, et. al 2010). The nutritional values of the oil are however affected by the method and period of storage which consequently affects the acceptability of these oils (I. I. Nkafamia, et. al 2010). In this study we estimated three values such as Iodine value, Peroxide value and Free Fatty acids percentage of 20 Groundnut cultivars.

MTERIAL
Plant Material: Seeds of 20 different varieties of Groundnut (Arachis hypogea L.)

Check variety: SB-11
It is most popular variety in Maharashtra since 40 years but it is low yielding as per data provided therefore it is taken as check variety.

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METHODS

1. Estimation of Free Fatty Acids

Principle: The free fatty acid is an oil is estimated by titrating it against KOH in the presence of phenolphthalein indicator. The acid number is defined as the mg KOH required to neutralize the free fatty acids present in 1g of a sample. However, the free fatty acid content is expressed as oleic acid equivalents. The standard methods(S.sadadhivam, A.manikam: Biochemical Methods,2008)were used to estimate free fatty acids % for 20groundnut cultivars. The acid value ware calculated using following equation.

$$\text{Acid Value (mg KOH/gm)} = \frac{\text{Titrate value} \times \text{Normality of KOH} \times 56.1}{\text{Wight of the sample (g)}}$$

The free fatty acid is calculated as oleic acid using the equation 1 ml N/10 KOH= 0.028gm oleic acid.

2. Determination of Iodine Value of an Oil

The oils contain both saturated and unsaturated fatty acids. Iodine gets incorporated into the fatty acid chain wherever the double bond exist. Hence, the measure of iodine absorbed by an oil, gives the degree of unsaturation. Iodine value/number is defined as the 'g' of iodine absorbed by 100 g of the oil.

Calculation

The quantity of thiosulphate required for blank minus the quantity required for sample gives thiosulphate equivalent of iodine absorbed by the fat or oil taken for analysis.

$$\text{Iodine Number} = \frac{(B\text{-}S) \times N \times 12.69}{\text{g sample}}$$

Where, B = ml thiosulphate for Blank.

S = ml thiosulphate for sample.

N = normality of thiosulphate solution.

Determination of Peroxide value :Peroxide value is a measure of the peroxides contained in the oil. The peroxides present are determined by titration against thiosulphate in the presence of KI. Starch is used as an indicator.

Calculations

$$\text{Peroxide value (milliequivalent peroxide/kg sample)} = \frac{S \times N \times 100}{\text{g sample}}$$

Where, S = ml $Na_2S_2O_3$(test sample) and

N = normality of $Na_2S_2O_3$

RESULTS & DISCUSSIONS

Free Fatty Acid Percentage

The free fatty acid content is known as acid number/acid value and it increases during storage.

Table 1. Free fatty acid value of different oil samples.

FDR-ICG-020063 had the highest free fatty acid value which is 7.85. VG-9406 and LOCAL GERMPLASM had the same percentage of free fatty acid which is6.73 and AK-303 shows 5.61 percent of free fatty acid.These four varieties showa comparatively higher percentage of free fatty acids.JL-286 and TLG-45 hadthe lowest percentage of free fatty acid percentage which is 2.24. Iodine Value: Iodine value is a measure of unsaturation of oil.Table 2. Iodine value of 20 different oil samples.The higher the iodine value, the more unsaturated fatty acid bonds are present in oil and higher the oil stability. Peroxide Value:Primary oxidation processes in oil mainly form hydroperoxides, which are measured by the PV.Table 3. Peroxide value of 20 oil samples.Table 3. Shows PV values of 20 oil samples.In which TPG-41 shows higher PV value which is 1.60.JL-578and ISK-I-2014-18 show 0.92 and 0.90 PV value respectively. Whereas FDR-ICG-020063 and JL-501 show 0.36 and 0.40 which are lowest PV values.

CONCLUSIONS

Our study reveals the oil quality of 20 Groundnut cultivars on the basis of physiochemical properties which determines the stability, storability and shelf life. These parameters also affect the flavour of oil. JL-501, VG-9406, AK-303, FDR-ICG-020063, and LOCAL GERMPLASM shows outstanding results in oil stability.From

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an industrial point of view, oil producing industries can use these varieties for contract farming which can produce quality oil with high oleic acid content which is essential nutritional part of the oil. As per world's demand oil with high oleic content can be completed by this.From our result, we can conclude that JL-501 is an outstanding variety in all aspect as yield, nutrition and oil quality.

Table:1

Sr. No.	Variety
1	JL-501
2	JL-977
3	JL-24
4	JL-286
5	JL-220
6	JL-578
7	JL-776
8	JL-970
9	ICGV-003061
10	VG-9406
11	AK-303
12	FDR-ICG-020063
13	RHRG-6083
14	GHUGHARI
15	LOCALGERMPLASM
16	\ISK-I-2014-18
17	TPG-41
18	TAG-24
19	SB-11
20	TLG-45

Table:2

Sr. No.	Variety	FFA {Mean Value (%)}	IodineValue {Mean Value (%)}	Peroxide Value{Mean Value(%)}
1	JL-501	3.37	38.07	0.40
2	JL-977	4.49	30.46	0.52
3	JL-24	4.49	32.99	0.72
4	JL-286	2.24	**38.07**	0.72
5	JL-220	4.49	18.78	0.52
6	JL-578	3.37	12.69	0.92
7	JL-776	4.49	12.69	0.64
8	JL-970	4.49	40.15	0.60
9	ICGV-003061	4.49	27.97	0.72
10	VG-9406	**6.73**	**35.53**	**0.48**
11	AK-303	**5.61**	**38.07**	0.52
12	FDR-ICG-020063	**7.85**	22.84	0.36
13	RHRG-6083	4.49	22.84	0.44
14	GHUGHARI	4.49	12.69	0.76
15	LOCALGERMPLASM	**6.73**	15.23	0.48
16	\ISK-I-2014-18	4.49	21.23	0.90
17	TPG-41	4.49	22.84	1.60
18	TAG-24	3.37	25.38	0.76
19	SB-11	3.37	17.77	0.72
20	TLG-45	2.24	21.83	0.60

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Figure 1: Interrelation ship betweenFAA Content and Iodine value

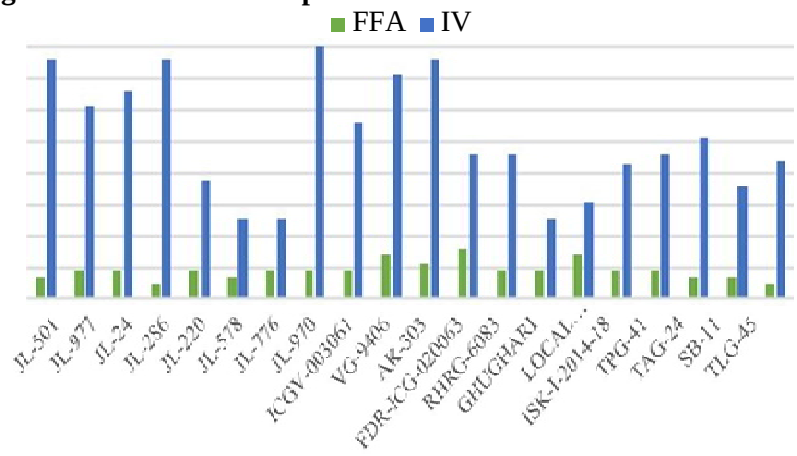
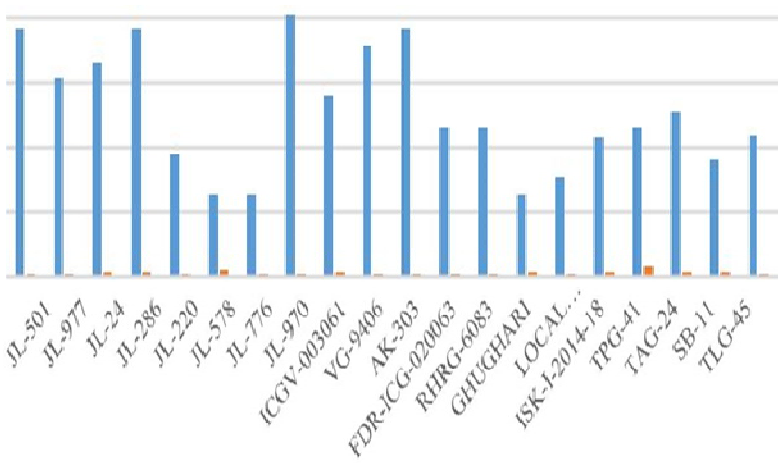


Figure 2: Interrelation ship between Iodine value and Peroxide value



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PHYTOSOCIOLOGICAL ASPECTS OF WEED FLORA IN J. M. PATEL COLLEGE CAMPUS BHANDARA (M. S.)

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ABSTRACT
Biodiversity provides a variety of environmental services from its species that are essential at the global, regional and local level. The production of oxygen, reduction of carbon dioxide, maintaining the water cycle and controlling soil, water and air pollution are some important services of plants.(Erach Bharucha,2006).Therefore, preservation and conservation of biological resources is essential for the well being and the long term survival of mankind. Therefore, there is a lot of demand for database of plants over the world especially from biodiversity rich countries as there are a number of economically and medicinally important plants available, which are untapped till now.

In view of this, I selected J.M. Patel college campus as an experimental area for studying the phytosociology of some weed flora of campus. This bio-rich campus covered with a continuous belt of seasonal beautiful, lush green weed flora.

The present survey is useful for the identification of weeds and distribution of dominant species. These weeds provide ample opportunities to study them critically for new drug development through chemical analysis without disturbing biodiversity. The probable reasons for the dominance of some specific weed species and their importance were discussed in the present investigation.

Keywords: Bio -rich, Dominant species, Medicinal value, Phytosociology, Weed flora.

INTRODUCTION
The over dependence on the use of tree roots ,leaves, seeds and bark in preparing medicine has detrimental effects on their sustainable supply since most trees are killed lead to scarcity of medicinal trees. Therefore, it is better to use weeds as medicinal plants instead of trees. On the other hand most of the weeds are annuals and treated as waste plants, may be fruitfully utilized to serve the medicinal purposes against diseases.

Plants are generally rich sources of many chemical substances which are useful for mankind. From the ancient period man has been used several different plants to cure different diseases. Many weeds in modern science have significant value in ethno botany. These weeds are physiologically resistant in adverse habitats. They can easily invasive in barren lands which are favorite ground for their quick growth.

MATERIAL AND METHODS
In the present study, survey was conducted in campus area (21,481 sq.m) during late rainy season (September), for ecological and ethno botanical aspects of weed flora.

The collected weed plants were photographed and properly identified with the help of available literature monograph and conformed from the authentic regional flora.

Data for fifty quadrate (1.0× 1.0 m) samples were taken randomly for the study of ecological aspects i.e. Abundance, Density, and Frequency by using the following principle as presented.

$$\textbf{Frequency (f)}=\frac{\textbf{number of qudrant in which species occurred}}{\textbf{total no of quadrt studies}}\times 100$$

$$\textbf{Abundance (A)}=\frac{\textbf{total number of individuals of species in all the qudrats}}{\textbf{number of qudrant in which the species occred}}\times 100$$

$$\textbf{Density (D)}=\frac{\textbf{total number of individuals of species in all the qudrats}}{(\textbf{total number of qudrant in species})\times(\textbf{area in m2 of a quadrate})}$$

OBSERVATION
1. WEED DIVERSITY IN JMPC CAMPUS
In the present study, a total of 30 weeds belonging to 17 families were recorded (Table:1.) In present study, dicotyledon species much outnumbered the monocots. Among monocots, Poaceae and Cyperaceae top the list and among dicots Asteraceae and Euphorbiaceae members were more frequent.

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Phytosociological observations revealed that, the species *Alterlathera sessilis* was dominant and which was always associated with *Sida acuta*. The most frequent species recorded in all localities of the campus were *Alteranthera, Tridax, Sida, Gomphrena, Euphorbia hirta.* On the other hand *Anagulus arvensis* and *Nicotiana* located only in few areas, which was very important observation from biodiversity point of view. Percent of species was highest (30.00%) in Frequency class-B and lowest (6.66%) in C-class category.

Table -1: Ecological aspects of some weed flora of rice field

Name of the species	TNI	TOI	Density	Frequency	F-class	Abundance
Acalypha indica L.	30	15	1.5	75	D	2
Achyranthes aspera L	28	7	1.4	35	B	4
Aerva lenata L.	54	15	2.7	75	D	3.6
Alterlathera sessilis L.	130	50	1.5	100	E	1.5
Amaranthus spinosus L.	12	5	0.6	25	B	2.4
Anagalus arvensis L.	2	1	0.1	5	A	2
Andrographis paniculata Wall.ex Nees.	10	3	0.5	15	A	3.3
Antigonon leptopus	35	12	1.77	60	C	2.9
Azeratum conysoides L.	10	6	0.5	30	B	1.7
*Blumea lacera (*Burn. E) L.	55	16	2.75	80	D	3.4
Boerhavea diffusa L.	31	7	1.55	35	B	4.4
Commelina bengalensis L.	25	5	1.25	25	B	5
Cynodon dectylon L.	10	4	0.5	20	A	2.5
Cyperus rotundus L..	87	18	4.35	90	E	4.8
Euphorbia hirta L.	96	50	4.8	100	E	4.8
Euphorbia maculate(L.)Poir	2	1	0.1	5	A	2
Gomphrena celosioides Mart.	120	45	12	100	E	6
Indigofera species L.	12	5	0.6	25	B	2.4
Nicotiana plumbaginifolia Viv.	25	8	1.25	40	B	3.1
Oxalis articulate viv Elerch	35	12	1.75	60	C	2.9
Parthenium hysterophorus L. .	20	8	1	40	B	2.5
Phyllanthus niruni(Ajry Shaw& G. L.) Webster	82	20	4.1	100	E	4.1
Portulaca oleraceae L	15	12	0.25	10	A	2.5
Ruellia tuberose L.	7	4	0.35	20	A	1.75
Senna tora (L.) *Roxb.*	50	16	2.5	80	D	3.1
Sida acuta Burmf.	115	20	5.75	100	E	5.7
Sphearanthus indicum L.	75	20	3.8	90	E	4.2
Spilanthus paniculata L	105	20	5.25	100	E	5.2
Tridax procumbens L.	6	3	0.3	15	A	2
Vernonia cinerea L.	7	4	0.35	20	A	1.75

Key: TNI- Total number of individual weeds; TOI- Total occurrence of individual weeds; D-Density; F-Frequency; A- Abundance

On the basis of percent frequency values as per above table, various species are then distributed into five frequency class (Raunkaier's life forms, 1934), observed values, % of species in each class were incorporated in Table: 2.

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Table- 2: Percent of species in frequency classes

Frequency %	Frequency class	Observed values	% of species in each class
0-20	A	7	7x100/30=23.33
21-40	B	9	9x100/30=30.00
41-60	C	2	2x100/30=6.66
61-80	D	4	4x100/30=13.33
81-100	E	8	8x100/30=26.66

Raunkier's frequency diagram of weed flora of paddy field is drawn by using the above data.

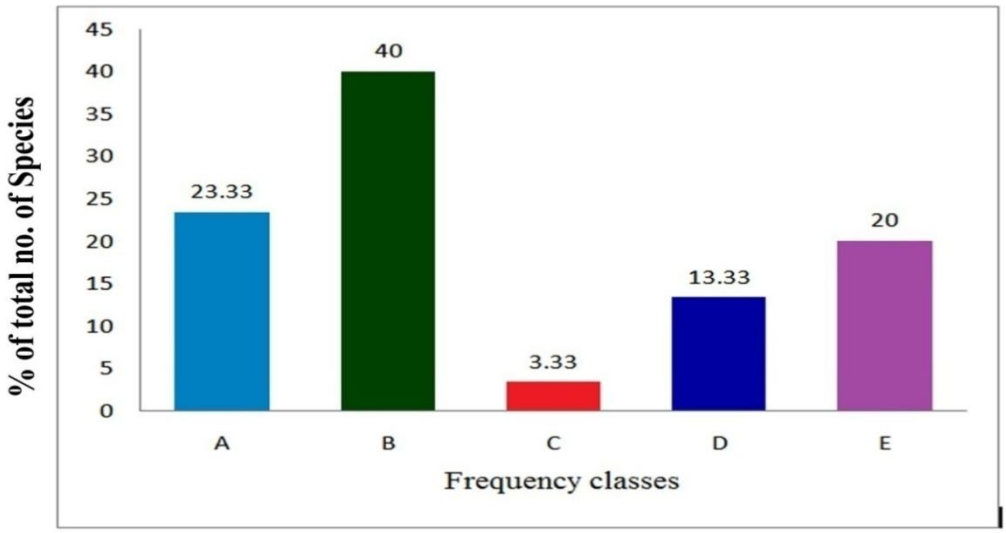

Fig. 1: Frequency diagram of weed community in JMPC Campus

II. ETHNOBOTANICAL ASPECTS OF SOME WEED FLORA

The harmful effect of weeds is greatest felt in gardens but weeds are also useful in many aspects especially medicinal value. Besides their use in traditional systems of medicines, they have applications in ethno- tribal and veterinary medicines and have also been exploited by modern research in drugs as sources of novel phyto-compounds.

DISCUSSION

Traditionally man has been utilized several plants for curing different diseases. Plants are generally rich source of many natural herbal products which have mostly used for human welfare especially to cure diseases. Now a day throughout the world several thousands of plants mostly weed plants are medicinal but very few drug plants are cultivated (Upma Dobhalet et.al.2006). Many weeds in modern science have significant role in Ayurveda. Weed is generally liable and resistant to draught and diseases, such characters enable them to pass through successfully in adverse habitats. Gardens and barren lands are favorite place for the vigorous growth of weeds. Many of the drugs used in modern medicine were initially used in crude from traditional uses and other biological activity. But the role of weed in ayurvedic medicine was described by Govindish (1981). Actually all weeds are not that much dangerous as they are projected to be, many weeds are really useful and extremely beneficial to mankind in many aspects. Most of the weeds are known to have medicinal attributes (Parrotta, 2001), traditional, ethno-and tribal-medicinal uses (Siddalingam andVidyasagar, 2013), and traditional and local veterinary medicinal usages (Tiwari and Tiwari, 2003) and sources of anti-microbial activities (Rathore, 2009). Yogesh et.al, in 2013, reported life saving phytochemical compounds from several weed species. On the other hand, Joshi et.al.(2012) have been indigenously developed anti-termite chemicals from weeds. In view of this, the present investigation is designed for the isolation of dominant medicinal weed species in college campus for further phytochemical study.

CONCLUSION

In view of recent demand on medicinal plants, most of the perennial plants (trees & shrubs) are exploited for their roots, stem, leaves and bark. To prevent this tree exploitation, it is essential to intensify the utilization of weeds as medicinal plants.

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The present survey is useful to study the phyto-sociological relationships of dominant weed species in the Campus. These weeds were further useful to develop new drugs in pharmaceutical research without disturbing biodiversity. On the other hand the weeds are disease and drought resistant, therefore, the commercial cultivation of these medicinal weeds will be more profitable than crop plants.

ACKNOWLEDGMENTS
We are immense pleasure in expressing our deep sense of gratitude and gratefulness to our Principal Dr. Vikas Dhomne for encouraging and providing library facilities in our college for completing this research work. Special thanks to our P.G. students for their help in field data collection.

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SURVEY OF INSECTIVORUS PLANT IN SALEKASA TALUKA OF GONDIA DISTRCT , MAHARASHTRA (INDIA)

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ABSTRACT
Insectivorous plants species represent the very small percentage in the world flora Insectivorous plants are among the curiosities of nature. They have ability to capture prey by special trapping mechanism and fulfill their nitrogen requirement by absorbing it. The present paper deals with the 11 species of carnivorous plants occurred in Salekasa Taluka. Out of these 9 species belong to the family Lentibulariaceae and remaining two belong to the family Droseraceae.. All the specimens are preserved in the herbarium. Department of Botany, Shankarlal Agrawal Science College, Dist. Gondia (M.S.)

Keywords: Insectivorus plants, Droceraceae, Lentibulariace, Salekasa.

INTRODUCTION
Carnivorous plants also called as insectivorous plants are among the curiosities of nature. There are about 400 species of the carnivorous plants, distributed all over the world except Antarctica. The species generally grow in nutrient poor water logged soil where water is continuously dripping. Occurrence of the genus indicated the nitrogen deficient soil in that particular area. In common with most carnivorous plants, they exploit ecological niches poor in dissolved minerals, where their carnivorous nature gives them a competitive advantage; terrestrial varieties of *Utricularia* can frequently be found alongside representatives of the carnivorous genera *Drosera* (sundews) and others in very wet areas where continuously dripping water removes most soluble minerals from the soil.

STUDY AREA
Salekasa taluka spread over 446.36.90 km^2 area of which tribal population is 21356. The total land area covered by the forest is 321.85 km^2, where reserved forest 68.29 Km., protected forest 82.06 Km., and unclassified forest is 54.21 Km. The aquatic vegetation of the taluka is supported by several lakes, wetlands, pond , ditches and Bhag river. For the present study lakes, pond and wetlands in different parts of the taluka is surveyed.

MATERIAL AND METHOD
The study is survey based and for this regular field visit to various villages and wetland area of taluka carried out during 2013-2016. The identification of the plants has been carried out with the help of available literature. The collected plants have been preserved in the form of herbarium and deposited to the Department of Botany, Shankarlal Agrawal Science College, Salekasa.

RESULT
Table 1: Distribution of aquatic species

Species	Lake studied											
	1	2	3	4	5	6	7	8	9	10	11	12
U. aurea	+	+	+	-	+	+	+	-	+	+	-	-
U. exoelata	-	-	-	+	-	-	-	-	-	-	+	-
U. stellaris	+	+	+	-	+	-	+	+	+	-	-	+

Table 2: Distributions of wetland terrestrial species

Species	Site studied											
	1	2	3	4	5	6	7	8	9	10	11	12
U. bifida	+	+	+	+	-	+	-	-	-	+	+	+
U. caerulea	+	-	-	+	-	+	+	-	+	+	+	-
U. foveolata	-	-	-	-	+	-	-	-	+	-	-	-
U. minutisima	-	-	-	+	-	-	-	-	-	+	-	-
U. polygaloides	+	+	-	+	+	-	+	-	-	+	-	+
U. scandens	-	-	+	-	-	-	-	+	-	-	-	-
D. burmannii	+	+	+	+	-	+	+	-	+	+	+	-
D. indica	+	-	+	+	+	+	-	-	-	+	-	+

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GENERIC AND SPECIES KEY FOR STUDIES SPECIES

1. Trap present…… Lentibulariaceae
   2. Plants aquatic; leaves dissected:
      3. Seeds prismatic; winged or not:
         4. Float ellipsoid, many; testa cell reticulate……. U. stellaris
         4. Float absent, if present, 4 in number, fusiform; testa cells isodiametric . U. aurea
      3. Seeds lenticular, corky, winged …… U. exoleta
   2. Plant terrestrial; leaves spathulate, orbicular or linear
      5. Raceme twining:
         6. Flowers yellow…… U. scandens
         6. Flowers blue …… U. foveolata
      5. Raceme erect:
         7. Bract medifixed……. U.caerulea
         7. Bract basifixed:
            8. Fruiting pedicel recurved; flowers yellow…… U.bifida
            8. Fruiting pedicel erect; flowers other than yellow:
               9. Raceme more than 10 cm in height, flowers blue…… U. polygaloides
               9. Raceme not more than 5 cm in height; flower pure white… U. minutissima

1. Trap absent…… Droseraceae
   10. Leaves in basal rosettes; style 5…….D. burmannii
   10. Leaves born along the stem; styles 3…….D.indica

DISCURSION

The occurrence and distribution of Insectivorous species in the taluka shows presence of 11 species which belongs in two families namely Droseraceae and Lentibulariaceae. The family Droseraceae is represented by monotypic genus Drosera. The prominent habitat of the Drosera is wetlands were the water is continuously dripping. Generally in most of the habitat both species i.e *D. indica* and *D. burmanni* coexist together and share the habitat. The family Lentibulariaceae is represented by 9 species out of which 3 are free floating submerge and other six are terrestrial wetland species. The distribution of *Utricularia aurea* and *Utricularia stellaris* is common *in* most of the lake, but lake polluted with anthropogenic activity largely support the growth *Utricularia aurea*. The other aquatic *Utricularia exoelata* is sparsely distributed aquatic species which occurred in few lake. Terrestrial wetland species are diverse, association of *Utricularia bifida* , *Utricularia polygaloides* and *Utricularia caerulea* is more predominant in most of the habitats. *Utricularia scandence* is spotted only in two sites which require specific microhabitat. *Utricularia fovelata* is a also sparsely distributed species. Both the species of *Drosera* more or less associated with *U. bifida, U. caerulea* and *U. polygaloides.*

CONCLUSION

Salekasa taluka represent the rich diversity of Insectivorous plant and represented by two families out of three families found in India. The Lentibulariaceae is represented by about two genus and more than 40 species. In India the genus *Utricularia* is represented by 40 species[(2)] while in Maharashtra 18 species of *Utricularia* found [(2)], out of which 9 species have been reported from the study area. The genus *Drosera* is represented by three species in India and in present study 2 have been reported from the taluka. The species, are decline due to loss of habitats by various anthropogenic activities. Due to their unique microhabitats the terrestrial species required to pay more attention for the conservation of habitats.

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