http://www.vpmthane.org/BNB/JBNB.aspx

J B.N.Bandodkar College of Science

Volume 3 February 2015
(Yearly)

Exploration is the engine that drives innovation. Innovation drives economic growth. So let's all go exploring.

Vidya Prasarak Mandal's

B.N.Bandodkar College of Science,Thane

NAAC Re-Accredited 'A' Grade
Best College Award (University of Mumbai)
Selected for FIST 'O' Level

Mission
To mould the students into rational thinkers, competent workers and socially aware citizens.

Vision
Imparting Quality Education in Science.

J

B.N.Bandodkar College of Science

Editor's Message ……

There is lot of challenges where the emergent economies face in the realm of basic necessities in life. Stakeholder's unity, collaboration on diversified issues and technologies may confront in bringing up economic change in society. One of the key objectives of research is to usability and application of diversified issues and technologies. With this motto, VPM's B. N. Bandodkar College, Thane bestow trail to our learners for adoptions of scientific temperament.

The main feature of this issue is Mosquito Repellents, hand sanitizer**,** Contribution of Bhaskaracharya in Modern Mathematical Concepts, Discovery in Database, Pre-Computer Crimes and Their Impacts, Soil Pollution, Chemistry a Curse or a Blessing, Vermicomposting, Electromagnetic Radiations, Organic Foods, Traffic in Mumbai, Hence the purpose of the e-journal is to have constructive decisions by the student for the development pathways for emergent country.

We intended to publish reports, review articles, short communications, monographs, research activities, new innovative procedures and news that help us in updating society's knowledge. Our main emphasis is to promote students scientific papers of good quality. We would like to thank all the contributing authors for providing such a rich variety of outstanding research articles on a broad range of exciting topics.

"A good scientist and student know the right answers. Great scientist and student know the right questions."

Dr. (Mrs) M.K.Pejaver

Dr. (Mrs) A.S.Goswami-Giri

B.N.Bandodkar College of Science

Available online www.vpmthane.org

J BNB

INDEX

STUDENTS CORNER

Available online www.vpmthane.org

J BNB

Please Note: The Authors of the papers are alone responsible for the technical content of the papers and reference cited therein. However students' papers are considered as apprentice.

How to submit:

Authors are required to submit manuscripts electronically by Email: asgoswamigiri@vpmthane.org

Available online www.vpmthane.org JBNB

SYNTHESIS OF EU^{3+} ACTIVATED ORTHOSILICATE PHOSPHORS BY SELF COMBUSTION SYNTHESIS USED FOR WHITE LIGHT EMITTING DIODES.

U. B. Gokhe[1*], S. K. Omanwar [2]

1. Department of Physics, B N Bandodkar college of science, Thane (MS), India

2. Department of Physics, SGB Amravati University, Amravati (MS) 444101, India

**corresponding author : ubgokhe@gmail.com*

Received on: 27/10/2014 Modified on : 23/12/14 Accepted on 16/01/2015

Abstract:-

Alkaline earth orthosilicates $SrMSiO_4$ (M= Ba, Ca, Mg, Li2) phosphors were synthesized through solution combustion method. Their crystal structures and luminescence properties were investigated. One of the Sr^{2+} of Sr_2SiO_4:Eu^{3+} was substituted by Ba^{2+}, Ca^{2+}, Mg^{2+} and $2Li^{+}$. The photoluminescence (PL) of all he samples shows broad-band absorption and the strongest excitation peak at 393 nm contributed to the $^7F_{0\rightarrow}{}^5L_6$ transition which matches well with the emission of a UV chip. The PL shows emission spectrum with the peaks at 580, 592 and 614 nm, were probably attributed to the transitions from $^5D_0$ to ^7F_J (J=0, 1, 2) of Eu^{3+} ions. Two emission bands peaked around 589 and 614 nm are of different intensities in different cation substitutions. Changing of the crystal field strength and covalence in the host lattice together were assigned for the tuning effect. With an overview of the excitation at 393 nm and the emission spectra in orange-red color, these doped phosphors can become promising phosphor candidates for white light emitting diodes.

Keywords: photoluminescence, crystal field, covalence.

Introduction

White light emitting diodes (WLEDs) have the potential of replacing the conventional incandescent and discharge column type fluorescent lamps, due to high efficiency, long lifetime, full solid state lamp; they are

friendly to environment etc (Zhang et al.,2006) . The first and traditional WLED has been used with an InGaN blue LED (460-480 nm) and yellow YAG: Ce^{3+} phosphors to produce white light (Yum et al., 2003). WLED with this pattern has low color rendering for lack of red color. To overcome these disadvantages, the white LEDs based on red, green, and blue primary colors have been studied. WLEDs can be achieved by combining red, green, and blue LEDs, coating green and red phosphors onto a blue LED (Guo et al., 2010).

Efficient red-emitting phosphors are necessary for both of the methods. In the current tricolor phosphors of the near-UV InGaN-LED chips, $Y_2O_2S:Eu^{3+}$ for red, $Zn2SiO_4:Mn^{2+}$ for green, and $BaMgAl_{10}O_{17}:Eu^{2+}$ for blue are generally used (Chou et al., 2005). Unfortunately, the use of a phosphor mixture containing a large amount of red phosphors is required for sufficient color rendering because the photoluminescence (PL) intensity of the $Y_2O_2S:Eu^{3+}$ red phosphor is lower than that of the green and blue phosphors (Guo et al., 2008). Furthermore, the lifetime of the $Y_2O_2S:Eu^{3+}$ red phosphor is inadequate under near-UV irradiation due to its instability. Accordingly, it is an attractive and challenging research task to develop novel, stable red phosphors that can be excited effectively by the near UV.

Silicates are of great interest owing to their outstanding thermal, chemical, and mechanical stability and structural diversity. Very recently, silicates have been extensively studied as the satisfactory host lattices for phosphors, which exhibit unusual, interesting luminescence properties when activated by rare earths. There are more reports about silicate phosphors, but less research about red phosphors based on silicates excited by near UV, therefore, it is very important to develop such appropriate red phosphors. Eu^{3+} is a preferable choice as an activator ion with red emission via the $^5D_0 \rightarrow {}^7F_1$ and $^5D_0 \rightarrow {}^7F_2$ transitions, which has been used in most commercial red phosphors (Yang et al., 2010). Recent years, red phosphors such as M_2SiO_4 (Ca, Sr, Ba) have been reported (Hong He Et al., 2009).

On the basis of the above reasons, in this work, a novel Orange-red phosphor $SrMSiO_4:Eu^{3+}$ (M=Ba, Ca, Mg, Li_2) were synthesized solution combustion method, and the luminescence properties were investigated. The technique of combustion synthesis is used to synthesize phosphors at low temperatures with high chemical homogeneity and high purity (Kingsley et al., 1990, Ekambaram et al., 2004). These phosphors have higher absorption efficiency at near UV (about 393 nm) and have good luminosity in the Orange-red region with the main peak at 589 and 614 nm, which is suitable for use in white LEDs.

2. Experimental details

All powder samples were synthesized by the solution combustion method technique. The starting materials were $Sr(NO_3)_2$, $M(NO_3)_2$ (M=Ba, Ca, Mg), Li_2CO_3, HNO_3 (99.99%), SiO_2 (99.99%), Eu_2O_3 (99.995), Ammonium Nitrate and Urea. The mole ratio of fuel to oxidizer was 1:1 for complete combustion. Stoichiometric amount of starting materials were mixed in agate mortar and then the mixture was kept in furnace at 700^0 C. The combustion takes place within 5 minutes. The samples were crushed and heated for 2 hours in open air at 800^oC and quenched at room temperature.

All samples were characterized by X-ray powder diffraction (XRD). The XRD measurements were performed on a Bruke /D8-Advance with Cu Kα radiation (λ=0.1518 nm). The operation voltage and current were maintained at 40 kV and 40 mA, respectively. A scan rate of $2(^o)$/min was applied to record the patterns in the range of $2\theta=10^o$ to 80^o. The excitation and emission spectra were measured by a Hitachi F-7000 fluorescence spectrofluorometer equipped with a 150W Xe lamp. All the experiments were performed at room temperature.

3. Results and discussion

Crystal structures $SrBaSiO_4$, $SrCaSiO_4$, $SrMgSiO_4$, $SrLi_2SiO_4$ were investigated (**Figure 1**). The XRD patterns obtained were compared with the standard JCPDS files. The XRD pattern of $SrBaSiO_4$, $SrCaSiO_4$, and SrLi2SiO_4 match well with JCPDS cards numbered 76-1631, 77-1619, and 47-0120 respectively.

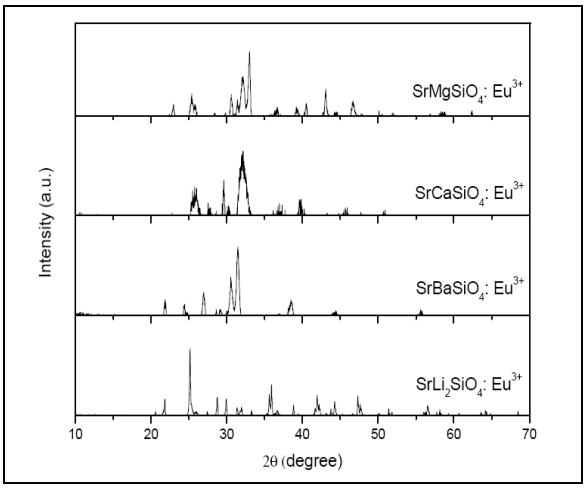
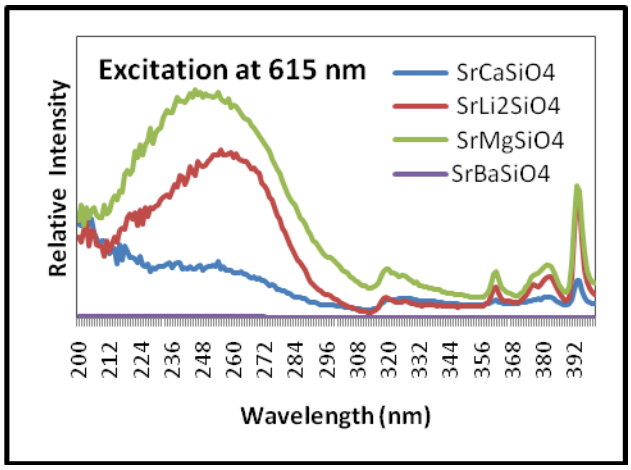


Figure 1: XRD of $SrMgSiO_4$, $SrCaSiO_4$, $SrBaSiO_4$ and $SrLi_2SiO_4$

The excitation spectrum of Eu^{3+} doped $SrMSiO_4$ phosphor while monitoring 615 nm emission corresponding to the ($^5D_0 \rightarrow {}^7F_2$) transition is presented in **Figure 2**. The intensity of excitation band decreases with increase in ionic radius (Li<Ca<Sr<Ba). The emission intensity is highest for Li2srSiO4 and lowest for BaSrSiO4; also the peak shows red-shift with increase in ionic radius. Thus it is confirmed that the alkali earth metal silicate host is solely responsible for PL emission. It can be seen that the excitation spectrum consists of two parts: one is an intense broad band from 200 to 350 nm; another is sharp lines in the region from 350 to 500 nm. The intense, broad band with the peak at 260 nm and 323 nm is assigned to the charge transfer (CT) band of $Eu^{3+} \rightarrow O^{2-}$ and host,



respectively. The broad bands in the UV

Figure 2: Excitation Spectrum.

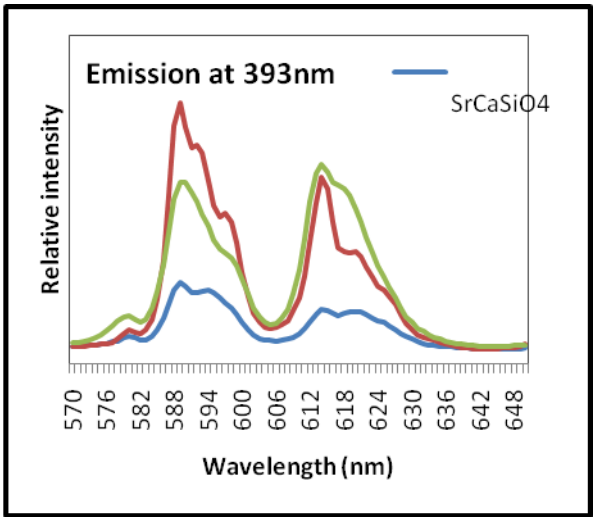
region may contain the charge transfer excitation of Eu^{3+} ions and the energy transfer transition from silicate groups to Eu^{3+} ions. In most of the literature, the contribution of the two components cannot be distinguished due to spectral overlap (Hong et al., 2011). The CT band corresponds to the electronic transition from the 2p orbital of O^{2-} to the 4f orbital of Eu^{3+},

and it is related closely to the covalence between O^{2-} and Eu^{3+} and coordination environment around Eu^{3+}. The decrease in energy for electron transfer in O^{2-} to Eu^{3+} represents the increase in the covalence and the decrease in ionicity between oxygen and Eu^{3+}. A series of sharp excitation bands present between 350 and 550 nm that are associated with the typical intra 4f transitions of the Eu^{3+} ions that centered at 362, 383 and 393 nm and were attributed to the $^7F_0 \rightarrow {}^5D_4$, $^7F_0 \rightarrow {}^5L_7$, and $^7F_0 \rightarrow {}^5L_6$ respectively. The strongest excitation peaks at 393 nm contribute to the $^7F_0 \rightarrow {}^5L_6$ transition in the UV light region.

Figure 3 displays the emission spectrum of Eu^{3+} doped $SrMSiO_4$ phosphor excited under 393 nm wavelengths. It is observed that those emission spectra consisting of lines in the orange and red spectral range exhibit exclusively the characteristic f-f transitions of Eu^{3+}, namely, $^5D_0 \rightarrow {}^7F_0$ (577 nm), $^5D_0 \rightarrow {}^7F_1$ (582 nm), and $^5D_0 \rightarrow {}^7F_2$ (615 nm) respectively.

It is observed that the emission spectrum not only has the most intense red peaks at 615 nm due to the electric dipole transition $^5D_0 \rightarrow {}^7F_2$ which indicates that Eu^{3+} occupies a site lacking inversion symmetry, but also has other powerful peaks in the range of 570-650 nm, of which involve available peaks at 582 and 595 nm ascribed to the magnetic dipole transitions, as an internal standard to gain some idea as to relative transition strengths of the other transitions of Eu^{3+} (Dhanraj et al., 2001). So the $SrMSiO_4:Eu^{3+}$ phosphor is thus suitable to be used for near-UV exciting red phosphor for white lighting devices.

Figure 3: Emission spectrum.



The two bands can be assigned for the transitions at two different Sr^{2+} sites, a shorter wavelength emission band at Sr(I) site and a longer wavelength emission band at Sr(II) site respectively (Choi et al., 2005). In α'-Sr_2SiO4 lattice, there are two Sr^{2+} sites. One site, Sr(I), has ten co-ordinations and the other site, Sr(II), has nine co-ordinations of oxygen. Thus, the Eu^{3+} ion doped into the host lattice results in two emission bands since it has different crystal field strengths and covalence at the two different sites with different crystal environments (Katti et al.,1983). This can be explained based on two aspects: the changing of covalence and variation of the crystal field strength when Ba^{2+}, Ca^{2+}, Mg^{2+} and $2Li^{+}$ ions are co-doped into the host lattice. The covalence of the Sr–O bonds in the lattice is decreased when Sr^{2+} ion is substituted by Mg^{2+}, $Ca^{2+}$and $2Li^{+}$. As a result less negative charge transfers to the Eu^{3+} ion. This makes the emission energy increased, which results in a blue-shift of the first peak of emission spectra (Kim et al., 2005). From the Fig3 it is observed that the intensity of the peak along blue side increases with decrease in ionic size. Since the ionic size of Ba is larger, the intensity for the substitution of Ba is comparatively so small which did not reflect in the graph. The decreasing of the covalence is effective in $2Li^{+}$, Mg^{2+} and Ca^{2+} in decreasing order according to their increasing ionic radius.

According to the crystal field theory, the crystal field strength is increased when the bond length decreases. Substitution of Sr^{2+} ions by smaller ion decreases the bond length increasing of the crystal field strength. The symmetry of ions surrounding the Eu^{3+} ions is distorted and the crystal field is released by the substitution of smaller ions. The crystal field cannot be effectively excited on the emission spectra of Mg^{2+} codoped phosphor as the radius of Mg^{2+} is too much smaller. In case of Ca^{2+} codoping, the effect of increasing of crystal field strength on the emission spectra is dominant rather than the covalence. As a result compared to $SrMgSiO_4$ only results in blue shift (controlled by covalence) (582 & 595 nm) are merged where as $SrCaSiO_4$ leads to red shift (controlled by crystal field

strength) (582 nm & 595 nm) are separated as well as (615 & 620 nm) are separated.

The size of Sr(I) is larger than that of Sr(II) sites. When Sr is substituted by Li^{+} and Mg^{2+} which have smaller ionic size exert the crystal field more effectively on Sr(I) than Sr(II) site. When Sr is substituted by Ca^{2+} which has comparatively larger ionic size exert the crystal field more effectively on Sr(II) than Sr(I) site. Thus the changing of the crystal field strength and covalence in the host lattice together were assigned for tuning effect.

4. Summary

Eu^{3+} activated alkaline earth orthosilicates $SrMSiO_4:Eu^{4+}$ (M= Li^{+}, Mg^{2+}, Ca^{2+}, Ba^{2+}) phosphors were synthesized through self combustion method. The products were confirmed by XRD. The Eu^{3+} doped in two different Sr sites in the host lattice resulted in two main intense emission bands being peaked. The emission of the Eu^{3+} is originated from the transmission from the split excited state $^{5}D_{O}$ to the ground state $^{7}F_{j}$ (j=1,2). These phosphors have intensity excitation in the UV wavelength range than in the blue. Smaller Mg^{2+} or Li^{+} ions codoped in $Sr2SiO_4:Eu^{3+}$ has intense peak towards blue wavelength and bigger Ca^{2+} or Ba^{2+} leads to the longer wavelength emission band shift to red region. This effect is attributed to and covalence of the increased field and the variation of the crystal field strength.

With an overview of the excitation at 393 nm and the emission spectra in arranged color, $SrMSrO_4:E^{3+}$ (M=Ba, Ca, Mg, 2Li) can become a promising red phosphor candidate for white light emitting diode pumped by ultraviolet chip.

References:

Catti M, Gazzoni G, Valdi G I, *J. Acta Cryst.* 39 (1983) 29.

Choi N S, Park H L, *J.Solid State Commun* 133 (2005) 187.

Chou T W, Mylswamy S, Liu R S. *J. Solid State Commun*. 2005, 136: 205.

Dhanaraj J, Jagannathan R, Kutty T R N, Lu C H. *J. Phys. Chem. B*, 2001, 105: 11098.

Ekambaram S, Patil K C, Mazaa M, *J. Alloys and comp.* 2004,393,81-92.

Guo C F, Xu Y, Lv F, Ding X. *J. Alloys Compd*., 2010, 497: 21.

Guo C F, Luan L. *J. Mater. Lett*., 2008, 62: 600.

Hong He, Renli Fu, Xueliang Zhang, Xiufeng Song, Xinran Zhao, Zhengwei Pan. *J Mat Elect* (2009) 20:433-438

Kim J S, Jean P E, Choi J C, Park H L, *J. Solid State Commun*.133, 187(2005).

Kingsley J J, Suresh K, Patil K C, *J Mater.Sci*., 1990,25,1305-1312.

Yang H M, Shi J X, Gong M L, Liang H B. *J. Rare Earths*, 2010, 28: 519.

YU Hong , GAO Guimei , KONG Li, LI Guanghuan, GAN Shucai, HONG Guangyan *J.of rare earths, Vol. 29, No. 5, May 2011, P. 431*

Yum J H, Seo S Y, Lee S H, Sung Y E. *Journal of the Electrochemical Society*, 2003, 150(2): 47.

Zhang N, Wang D J, Li L, Meng Y S, Zhang X S, Ming N, *J. Rare Earths*, 2006, 24(3):294

Available online www.vpmthane.org

JBNB

INVESTIGATIONS ON BREAD MOULD *RHIZOPUS STOLONIFER* (EHRENB.:FR.) VUILL.

Moses Kolet* and Seema S. Khavale

Department of Botany, B.N.Bandodkar College of Science, Thane 400601

*corresponding author, E-mail: mjkolet@hotmail.com

Received on: 14/11/2014; Accepted on: 10/01/2015

ABSTRACT:

The fungal genus *Rhizopus* Ehrenberg is a common entity in soil. One of the commonest species, *R.stolonifer* (Ehrenb.: Fr.) popularly known as 'black bread mould' or simply 'bread mould', apart from being a soil inhabitant, is frequently associated with post-harvest spoilage of fruits and vegetables. In laboratory investigations, rapid growth of *Rhizopus stolonifer* was obtained at room temperature, coupled with high humidity and starchy substrate, whereas cold (8^0C) and hot (70^0C) temperatures did not reveal any growth on the substrate. Asexual phase commenced from the sixth day after incubation followed by the sexual phase in the latter part of growth. The mesophilic status of *Rhizopus stolonifer* was reassessed, validated and confirmed.

Key words: *Rhizopus stolonifer*, bread mould, black bread mould, temperature effect

INTRODUCTION:

The fungal genus *Rhizopus* Ehrenberg is a common entity in soil. One of the commonest species is *R.stolonifer* (Ehrenb.: Fr.) Vuill. (syn. *R. nigricans* Ehrenberg) popularly known as 'black bread mould' or simply 'bread mould' is a widely occurring thread-like mould found very commonly on bread and its exposed surfaces, from where it derives nutrients vital for growth. The fungus is characterized by submerged and aerial mycelium; the former embedded in

substratum and the latter made up of arching filaments called stolons, spreading rapidly in all directions. Stolons bear rhizoidal hyphae which enter the substrate, functioning as organs of absorption and fixation. Opposite to rhizoidal hyphae and pointing upwards

arise the sporangiophores in groups of 2, 3 or more. Above the columella arise spherical pin head-like sporangia; whitish in the beginning and turning bluish-black with maturity. Sporangial walls rupture following which oval, bluish or brownish sporangio-spores are dispersed by air currents. The spores are fairly common component of air mycoflora and germinate immediately on obtaining suitable substrate for growth. Sexual reproduction follows the asexual phase and is characterized by straight, swollen and large suspensors without any appendages.

Apart from being a common soil inhabitant (Gilman, 1967; Makut and Owolewa, 2011), *Rhizopus stolonifer* is commonly associated with post-harvest spoilage of fruits, vegetables and tuber crops (Kirk *et al*., 2008; Kolawole *et al*., 2009). The fungus has been utilized for production of enzymes such as cellulases, endoglucanases (Navya and Pushpa, 2013), endopolygalacturonase (Trescott and Tampion, 1974), xylanases (Zhang *et al*., 2013), proteases (Kranthi *et al*., 2012), nucleases (Rangarajan *et al*., 2008) and pectin degrading enzymes (Sommer *et al*., 1963). Owing to its close association with post-harvest spoilages, it is commonly employed as a test fungus for evaluating plant extracts for their anti-microbial activities (Gujar and Talwankar, 2012; Sellam *et al*., 2013, Gachande and Khillare, 2013). The fungus is also actively used in various aspects of medical research (Sonomoto *et al*., 1982; Al-Jubury *et al*., 2012) and has applications in manufacture of birth control pills (Gupta and Mukerji, 2001). Several other species of *Rhizopus* are utilized as microbial sources of enzymes, viz. lipases, acid proteases and pectinesterase, to name a few (Gray *et al*., 2010), which have several novel applications such as catalysts in the production of biodiesel (Yu *et al*., 2013) and in commercial microbiological fermentation reactions (El-Mansi *et al*., 2007) inclusive of alcohol fermentation (Song *et al*., 2010). A survey of literature revealed relatively scarce and scattered information on the influence of

temperature on manifestation of growth characteristics of *Rhizopus stolonifer* which inspired the investigation. The investigation was part of a project to generate interest in mycology amongst undergraduate students of biological sciences.

MATERIALS AND METHODS:

The study was carried out in the Department of Botany, B.N.Bandodkar College of Science, Thane, in the months of June-October 2013. The laboratory experiments, modifications of the technique outlined by Sharma (2011), were conducted in aseptic conditions in triplicate using freshly obtained bakery bread as substrate for fungal growth. Three temperature treatments were maintained namely, cold temperature (8^0 C), room temperature (28^0- 30^0 C) and hot temperature (70^0 C). Refrigerator and hot air oven were used to maintain cold and hot temperatures respectively. The substratum was placed on a heat sterilized brick, placed in a tray partially submerged in sterile water and covered by a transparent tray to maintain humidity; the entire sets were then incubated at the respective temperatures. Over 90% humidity was recorded throughout the duration of study. Observations were carried out daily at fixed times for a period of two weeks (14 days). The fungus was characterized using standard literature.

RESULTS AND DISCUSSION:

Rapid growth of *Rhizopus stolonifer* was obtained at room temperature. The fungus manifested as a whitish fluffy mass on the substrate comprising bakery bread (Fig. 1). Vegetative growth was noticeable from the third day of incubation while asexual phase by formation of sporangia commenced from the sixth day onwards. Manifestation of sexual phase was recorded towards the latter part of the experiment. The substratum turning wet and soggy after a fortnight ultimately affected the fungal mycelia, thereby concluding the experiment. The other temperature variations, namely, cold (refrigerator 8^0C) and hot (hot air oven 70^0C) temperatures did not reveal any form of fungal growth on the rich starchy substrate. The results, presented in Table 1, are in agreement with Schipper, (1984). The characters of the fungus tallied with those mentioned by Hernandez *et al*., 2006. Odeniyi *et al*., (2009) reported extensive growth and mycelia formation of the fungus at 37^0C. Jay *et*

al (2005) reported *R. stolonifer* to be principally spread by *Drosophila melanogaster* amongst several other means and is the most common contaminant of foods. The fungus was reported to cause spoilage of bread and bakery products (Saranraj and Geetha, 2012), fruits (Tafinta *et al*., 2013) tuber crops and vegetables (Amienyo and Ataga, 2007; Amusa *et al*., 2013) and responsible for rots such as fruit rot of *Punica granatum*, *Artocarpus* sps., *Solanum* sps., *Craetaeva* sps.; soft rot of *Citrus* fruits and *Cucurbita* and fruit and seed rot of *Capsicum annuum* (Mukerji and Bhasin, 1986). Mukhtar (2009) reported the fungus as one of the major causes of *Rhizopus* head rot of sunflower. It was also reported as a common storage contaminant of sunflower seeds (Skrinjar *et al*., 2012). Sircar and Bhattacharya (2012) investigated its allergenic potential while Omoifo (2011) reported dimorphism in the species. Its genetic aspects were investigated by Vagvolgyi *et al*., (2004) while Gauger (1977) reported on genetical changes during the sexual phase. The various species of *Rhizopus* were reported to be of medical significance, causing respiratory tract infections, gastro-intestinal ailments and mucocutaneous infections, even leading to invasion of walls of blood vessels (Winn *et al*., 2005). Cutaneous mucormycosis, a rare and opportunistic zygomycete infection was reported to be rapidly fatal if not diagnosed and treated appropriately (Li *et al*., 2013). Banu and Rathod (2011) reported on the usage of *Rhizopus stolonifer* for synthesis of silver nanoparticles which had potential to open new vistas for drug delivery.

Ambient room temperature, coupled with the rich starchy substrate comprising bakery bread and high humidity was most favorable for growth and development of *Rhizopus stolonifer*, sporangio-spores of which are fairly common in air. Higher and lowered temperatures apparently inhibited growth of the fungus. The mesophilic status of *Rhizopus stolonifer* thus stands validated and confirmed.

Figure 1. Growth of *Rhizopus stolonifer* at room temperature (29^0C) on the substrate (Day 3-6).

Table 1. Effect of temperature on growth of *Rhizopus stolonifer*.

Temperature	Day	Growth Characteristics Observed
8^0C (Refrigerator)	1-14	No growth recorded on substratum throughout the duration of experiment.
29^0C (Average room temperature)	1	No visible signs of growth recorded.
	2	No visible signs of growth recorded.
	3	Initiation of growth recorded in form of superficial whitish patches on the substratum
	4	Development of white mycelial network; more growth recorded on the softer parts of substratum.
	5	Mycelial network turns grayish white and fluffy, silky, completely covering the exposed surfaces of substratum.
	6	Mycelia run into each other giving a cobwebby mouldy look to the mass Initiation of asexual phase; Development of sporangia.
	7	Spore dispersal stage.
	8	Asexual phase continues, development of new vegetative mycelia.
	9	Asexual phase continues development of new vegetative mycelia.
	10	Asexual phase continues.
	11	Early initiation of sexual phase.
	12	Sexual phase manifests.
	13	Mycelium starts thinning out as substratum starts losing consistency.
	14	Substratum loses consistency and turns excessively soggy, negatively affecting the fungal growth.
70^0C (Hot air oven)	1-14	No growth recorded on substratum throughout the duration of experiment.

ACKNOWLEDGEMENTS:

Authors are thankful to Vidya Prasarak Mandal, Principal and Head, Botany department, for to run Science Square activity of B.N.Bandodkar College of Science, Thane-1.

REFERENCES:

Al-Jubury, N.O., Sahood, A.S. and Rayshan, A.R. 2012. Effect of Rhizopus stolonifer metabolic product on serum vitamin C, some elements and catalase in albino male rats. *Ibn Al-Haitham Journal for Pure and Applied Science*, 25(1).

Amienyo, C.A. and Ataga, A.E. 2007. Use of indigenous plant extracts for the protection of mechanically injured sweet potato [*Ipomoea*

batatas (L) Lam] tubers. *Sci. Res. Essays*, 2(5): 167-170.

Amusa, N.A., Kehinde, I.A. and Ashaye, O.A. 2013. Bio-deterioration of bread fruit (*Artocarpus communis*) in storage and its effects on the nutrient composition. *Afr. J. Biol*., 1(2): 86-88.

Banu, A. and Rathod, V. 2011. Synthesis and characterization of silver nanoparticles by *Rhizopus stolonifer*. *International Journal of Biomedical and Advance Research*, 2(5): 148-158.

El-Mansi, E.M.T., Bryce, C.F.A., Demain, A.L. and Allman, A.R. 2007. Fermentation Microbiology and Biotechnology (2nd edn.) CRC Press, Taylor & Francis Group, Boca Raton. pp. 124-125.

Gachande, B.D. and Khillare, E.M. 2013. *In-Vitro* evaluation of Datura species for potential antimicrobial activity. *Biosci. Disc*., 4(1): 78-81.

Gauger, W.L. 1977. Meiotic gene segregation in *Rhizopus stolonifer*. *Microbiology*, 101(2): 211-217.

Gilman, J.C. 1967. A Manual of Soil Fungi (Rev. 2nd Edn.). Oxford and IBH, Calcutta, Bombay. pp. 20.

Gray, N., Calvin, M. and Bhatia, S.C. 2010. Enzymes Biotechnology. CBS Publishers and Distributors Pvt. Ltd., New Delhi. pp. 174-227.

Gujar, J.K. and Talwankar, D. 2012. Efficacy of some botanicals against seedling rot of oil yielding plants. *Golden Research Thoughts*, 2(1): 1-5.

Gupta, R. and Mukerji, K.G. 2001. Microbial Technology. Ashish Books, New Delhi. pp. 98.

Hernandez-Lauzardo, A.N., Bautista-Banos, S., Valazquez-del Valle, M.G. and Trejo-Espino, J.L. 2006. Identification of *Rhizopus stolonifer* (Ehrenb.: Fr.) Vuill., Causal agent of Rhizopus rot disease of fruits and vegetables. *Revista Mexicana de Fitopatologia*, 24 (1): 65-69.

Jay, J.M., Loessner, M.J. and Golden, D.A. 2005. Modern Food Microbiology (7th edn.) Springer (India) Pvt. Ltd., New Delhi. pp. 102-167.

Kirk, P.M., Cannon, P.F., Minter, D.W. and Stalpers, J.A. 2008. Dictionary of the Fungi (10th edn.) CABI, Wallingford, UK. pp. 599.

Kolawole, O.M., Adeyemi, B.J., Kayode, R.M.O. and Ajibola, T.B. 2009. The drying effect of colour light frequencies on the nutrient and microbial composition of cassava. *Afr. J. Agric. Res*., 4(3): 171-177.

Kranthi, V.S., Muralidhar Rao, D. and Jaganmohan, P. 2012. Protease production by *Rhizopus stolonifer* through solid state fermentation. *Cent. Euro. J. Exp. Bio*., 1(3): 113-117

Li, H.M., Hwang, S.K., Zhou, C., Du, J. and Zhang J.Z. 2013. Gangrenous cutaneous mucormycosis caused by *Rhizopus oryzae*: A case report and review of primary cutaneous mucormycosis in China over past 20 years. *Mycopathologia* 176: 123- 128.

Makut, M.D. and Owolewa, O.A. 2011. Antibiotic-producing fungi present in the soil environment of Keffi metropolis, Nasarawa state, Nigeria. *Trakia Journal of Sciences*, 9(3): 33-39.

Mukerji, K.G. and Bhasin, J. 1986. Plant Diseases of India. A source book. Tata Mc Graw Hill Publishing Company Ltd., New Delhi. pp. 43-232.

Mukhtar, I. 2009. Sunflower disease and insect pests in Pakistan: A Review. *African Crop Science Journal*, 17(2): 109-118.

Navya, P.N. and Pushpa, S.M. 2013. Production, statistical optimization and application of endoglucanase from *Rhizopus stolonifer* utilizing coffee husk. *Bioprocess Biosyst Eng*, 36: 1115-1123.

Odeniyo, O.A., Onilude, A.A. and Ayodele, M.A. 2009. Growth and substrate utilization patterns of a *Rhizopus stolonifer* strain isolated from depolymerizing rice husk. *World App Sci J*. 6(5): 595-599.

Omoifo, C.O. 2011. *Rhizopus stolonifer* exhibits dimorphism. *Afr. J. Biotechnol*., 10(20): 4269-4275.

Rangarajan, E.S., Deshpande, R.A. and Shankar, V. 2008. Extracellular nucleases of *Rhizopus stolonifer.Asian J. Biochem*.3: 52-61.

Saranraj, P. and Geetha, M. 2012. Microbial spoilage of bakery products and its control by preservatives. *Int J Pharm & Biol Archives IJPBA*, 3(1): 38-48.

Schipper, M.A.A. 1984. A revision of the genus Rhizopus. 1. The Rh. stolonifer-group and Rh. oryzae. *CBS studies in Mycology*., 25: 1-19.

Sellam, K., Ramchoun, M., Alem, C. and El-Rhaffari, L. 2013. Biological investigations of antioxidant- antimicrobial properties and chemical co position of essential oil from *Lavandula multifida*. *Oxid Antioxid Med Sci*, 2(3): 211-216.

Sharma, O.P. 2011. Fungi and Allied Microorganisms. Tata Mc Graw-Hill, New Delhi, India. pp. 122.

Sircar, G. and Bhattacharya, S. 2012. Allergenic significance of airborne *Rhizopus stolonifer* (Ehrenb.) Vuill., a common bread mold. World Allergy Organ. J., 5(2) PMC 3512667.

Skrinjar, M.M., Petrovic, Z.M., Blagojev, N.T. and Soso, V.M. 2012. Sunflower seed for human consumption as a substrate for the growth of mycopopulations. *APTEFF*, 43: 115-121.

Sommer, N.F., Creasy, M.T., Maxie, E.C. and Romani, R.J. 1963. Production of pectinolytic enzymes by *Rhizopus stolonifer* sporangiospores after "lethal" gamma irradiation. *Appl. Microbiol.* 11(6): 463-466.

Song, J.H., Kim, J.H., Ahn, B.H. and Lee, J.S. 2010. Screening of functional *Rhizopus stolonifer* for alcohol fermention and production of high quality Korean traditional rice wine. *Mycobiology* 38(2): 122-127).

Sonomoto, K., Nomura, K., Tanaka, A. and Fukui, S. 1982. 11a- Hydroxylation of

progesterone by gel-entrapped living *Rhizopus stolonifer* mycelia. *Eur J Appl Microbiol Biotechnol*, 16: 57-62.

Tafinta, I.Y., Shehu, K., Abdulganniyyu, H., Rabe, A.M. and Usman, A. 2013. Isolation and identification of fungi associated with the spoilage of sweet orange (*Citrus sinensis*) fruits in Sokoto state. *Nig. J. Basic Appl. Sci*., 21(3): 193-196.

Trescott, A.S. and Tampion, J. 1974. Properties of the endopolygalacturonase secreted by *Rhizopus stolonifer*. *Microbiology* 80(2): 401-409.

Vagvolgyi, C., Heinrich, H., Acs, K. and Papp, T. 2004. Genetic variability in the species *Rhizopus stolonifer*, assessed by random amplified polymorphic DNA analysis. *Antonie van Leeuvenhoek*, 86: 181-188.

Winn, W. (Jr.), Allen, S., Janda, W., Koneman, E., Procop, G., Schreckenberger, P. and Woods, G. 2005. Koneman's Colour Atlas and Textbook of Diagnostic Microbiology (6th edn.). Lippincott Williams & Wilkins. Philadelphia. pp 1169-1170.

Yu X.W., Chong, S., Yong-Liang, G., Rong, X. and Yan, X. 22013. High-level expression and characterization of a chimeric lipase from *Rhizopus oryzae* for biodiesel production. *Biotechnology for Biofuels*, 6: 29.

Zhang, Z., Li, J., Feng, F., Liu, D. Pang, Q., Li, M. and Chen, K. 2013. Optimization of nutrition constituents for xylanase activity by *Rhizopus stolonifer* under solid-state fermentation on corncob. *Bioresources*, 8(2): 2018-2032.

Available online www.vpmthane.org JBNB

MODERN TECHNOLOGY PRE-COMPUTER CRIMES AND THEIR IMPACTS

Renuka Sabapathi and Pradnya Pawar

Information Technology and Computer Science Department,

B.N.Bandodkar College of Science, Thane, Maharashtra – 400601.

E-mail: renuka.prema@gmail.com ,

pradnyachaudhari5@gmail.com

Received on 12/12/2014;Modified on 15/01/1015; Accepted on 20/01/2015

ABSTRACT:

The facilities of computer technology have not come out without drawbacks. Though it makes the life so speedy and fast, but hurled under the eclipse of threat from the deadliest type of criminality. Computer crimes, cyber-crimes and Internet crimes can be "pre-computer" crimes. They can also include "modern technology" crimes that began with the introduction of personal computers, networks, cyberspace, and the Internet.

Computer crime is increasing every day and it is creating many problems. This paper clearly views information related to "Pre-Computer and Modern Technology Crimes and understanding of their impacts over various levels of Society.

Keywords: Cyber Crime, Computer, Internet, Network.

INTRODUCTION:

Computer Crime is defined as a set of crimes in which computerized data or software play a major role.[Reference Nina Godbole 2011]. It broadly describes criminal activity in which computers or computer networks are a tool, a target, or a place of criminal activity.

A computer can be a small device like mobile. And the network mainly used is an Internet connection because of its availability and access. Computer crime includes acts in which computer or a network is used to harm someone else either by stealing data, plotting a virus, hacking someone's computer.

computer crimes conducted earlier are using someone else computer to scan or print without consulting the owner or using someone else internet connection to

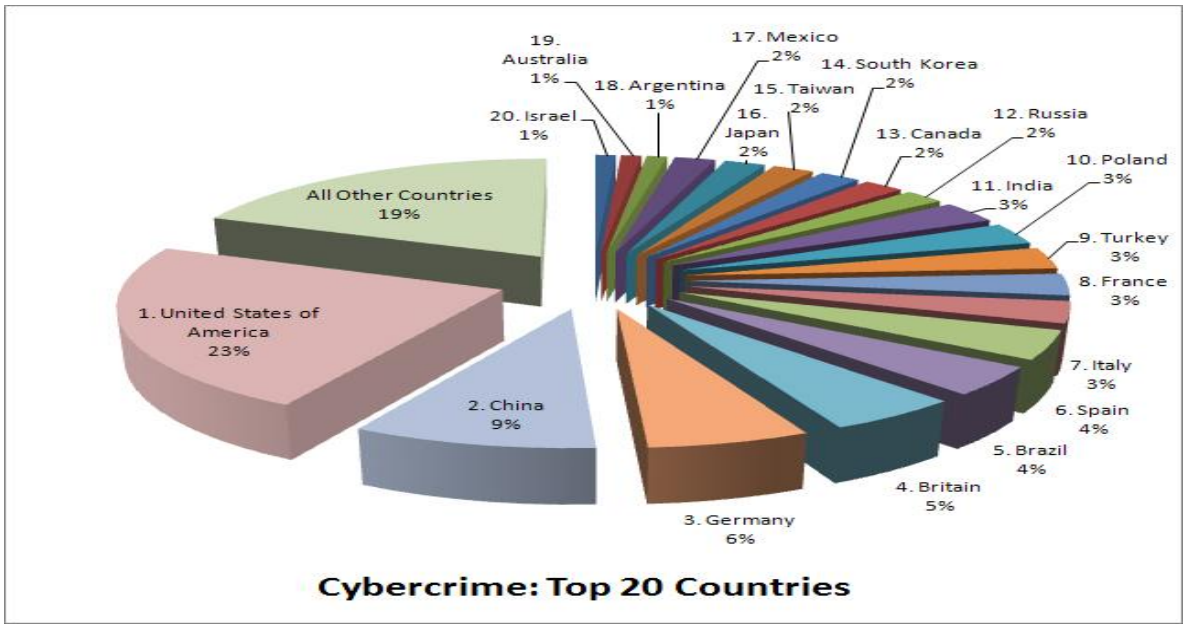
distribute false information or conduct a fraud with the help of a computer or use false to information steal from someone else on the internet and use someone else internet name etc. these are all type of old computer crime.

New computer crime includes work like stealing some ones privacy, create a software or a tool to harm someone else computer and put the virus or malware in order to harm him in any case, use someone else email account to do mails.

Computer crimes, cyber-crimes and Internet crimes make as "pre-computer" crimes that existed before the advent of the computer, such as: fraud, identity theft, stalking. It also includes modern technology crimes such as hacking, phishing, spam, software piracy, viruses, worms, denial–of-service attacks, Trojan Horses, Malware (malicious code), cyber-bullying, online predators.

Security research firm, Symantec, has discovered specific factors that determine where a certain country is plagued with cybercrime more or less than another which allowed them to come up with a ranking for each.

Symantec has ranked 20 countries that face, or cause, the most cybercrime



Cybercrime: Top 20 Countries

Fig 1.0 List of Top 20 Countries with the highest rate of Cybercrime

CRIMES MAKING PRE COMPUTER CRIMES: [Reference Babak Akhgar 2014 and Dr R K Chaubey 2011].

Computer Crime: computer crime is an act commonly performed by a knowledgeable computer user, sometimes named to as a hacker that illegally browses or steals a company's or individuals private information. destructive and internal computer crimes includes acts in which one computer's program interferes with another computer, thus hindering its use, damaging data or programs, or causing the other computer to crash .

Examples of computer crimes: Child pornography - Making or distributing child pornography.

Cyber terrorism - Hacking, threats, and blackmailing towards a business or person.

Cyber Crime: Cyber crimes are any crimes that involve a computer and a network. Internet crime is any crime or illegal online activity committed on the Internet, through the Internet or using the Internet. Internet crime is a strong branch of cybercrime. Identity theft, Internet scams and cyber stalking are the primary types of Internet crime.

Examples of cyber crimes:

Transaction Fraud- Simple financial fraud is another common crime in the online arena. A scammer may offer an item for sale through an auction site with no intention of delivering after receiving payment.

Advance Fee Fraud- These frauds involve bilking victims out of money by promising them an eventual payoff.

3. TYPES OF PRE-COMPUTER CRIMES:

[http://www.salzmanattorney.com/federal-crimes/computer-crimescyber-crimes/]

Fraud: A dishonest way to do a loss which could make a profit for a person in any case e.g. make a false webpage of a bank to retrieve information of account of someone. Fraudulent schemes conducted via the Internet are generally difficult to trace and prosecute. Fraud is any type of scheme in which one or more Internet elements are employed in order to put forth "fraudulent solicitations to prospective victims, to conduct fraudulent

transactions, or to transmit the proceeds of fraud to financial institutions or to others connected with the scheme.

Identity theft: Identity theft is the crime of obtaining the personal or financial information of another person or a small business for the purpose of assuming that person's or business' name or identity to make transactions or purchases. Identity theft occurs in many ways through the use of a computer and is among the fastest growing crimes.

Stalking: In Cyber stalking the attacker harasses a victim using electronic communication such as e-mail or instant messaging (IM), or messages posted to a Web site or a discussion group. Cyber stalking messages differ from ordinary spam in that a cyber stalker targets a specific victim with often threatening messages, while the spammer targets a multitude of recipients with simply annoying messages.

TYPES OF MODERN TECHNOLOGY CRIMES:

Hacking:

Hacking is done via network programming. Hackers prepare programs to break network codes and passwords. The hacking methods have evolved over the years and some hackings are done just for fun others are done for stealing information yet others are done for personal reasons such as taking revenge.

Phishing: Phishing" or "Web spoofing" attacks use fraudulent Web sites by giving away confidential personal information such as credit card numbers, account usernames and passwords, and ID numbers. A phishing attempt usually starts with an email urging user to click on a Web link in order to check something about bank account or another on-line account. These emails often appear to be from popular online institutions. When user click on the link, user is redirected to a page asking information. The page appears genuine, but is in fact counterfeit. Phishers may then use the personal information given on the page to steal the identity or money.

Cyber-bullying: Cyberbullying is the use of cell phones; instant messaging, e-mail, chat rooms or social networking sites such

as Facebook and Twitter to harass threaten or intimidate someone. With the increase in use of these technologies, cyberbullying has become increasingly common, especially among teenagers. Cyberbullying can include such acts as making threats, sending provocative insults or racial or ethnic slurs, gay bashing, attempting to infect the victim's computer with a virus, and flooding an e-mail inbox with messages.

Spam: Spam is a junk mail, send with a web link or business proposal. Clicking on this link redirects to a phishing website and it helps to install a malware in the computer. The sender of these emails is always unknown. Spam is unsolicited email sent in massive quantities simultaneously to numerous users, generally trying to advertise or publicize certain products or services. Spam messages normally have a fake origin address, which is randomly generated, in order to keep the author of the message from being easily discovered.

Software Piracy: Computer users are part of software piracy which includes copying and using commercial software purchased by someone else. The following type of work constitutes a cyber crime of Software Piracy.

1. Cracking the key of any software.
2. Using unlicensed software in personal computer.
3. Using single licensed software to multiple computers.
4. Distributing such type of software to other persons.

Viruses and worms: A computer virus is a computer program that can infect other computer programs. Viruses are dependent programs that reproduce themselves through a computer code attached to another program, Worms are independent programs that create temporary files and replicate themselves to the point. Both cause damage to computer systems through the commands written by their authors.

Denial-of-Service Attack: In this type of cyber crime criminals target the web server of the websites and flow a large number of requests to that server and a hacker can prevent authorized or intended users from accessing resources and services. Through the attack, the hacker can prevent users from accessing several websites, using email, video conferencing, banking services and online shopping.

Trojan Horses: A Trojan horse actually causes havoc and damages the computer. It is the first stage of an attack and their primary purpose is to stay hidden while downloading and installing a stronger threat such as a bot. Unlike viruses and worms, Trojan horses cannot spread by themselves. They are often delivered to a victim through an email message where it masquerades as an image or joke, or by a malicious website, which installs the Trojan horse on a computer through vulnerabilities in web browser software such as Microsoft Internet Explorer. After it is installed, the Trojan horse lurks silently on the infected machine, invisibly carrying out its misdeeds, such as downloading spyware, while the victim continues on with their normal activities.

Malware: Malware consists of programs such as viruses, worms, Trojan horses, and rootkits that are designed to harm the computer. A computer can be harm by opening email attachments that contain malware, downloading infected files, from clicking on links in instant messenger or chat rooms, or from active content applications on Web pages.

Online predators: Internet-initiated sex crimes against minors involve deceit and violence, and begin with adult strangers known as internet predators communicating with children and young teenagers over the Internet and sometimes then meeting face to face. Online predators mostly uses Chat rooms, instant messaging, Internet forums, social networking sites, cell phones, and even video game consoles.

IMPACTS OF COMPUTER CRIMES:

1) A computer crime affects the society due to potential disturbance such as victim may lose anything that has value like Safety, peace, money, and property are perhaps basic values, because they

contribute to the satisfaction of many wishes.

2) Cyber crime over socio-eco political riders influenced by the changes occurring in the correlated phenomenon and value system generated by these changes. This clearly reflects that crime has its interdependency with other social phenomenon, economic systems and political machineries. A positive correlation between the growth in incidences of crime and the population of the country has been observed. The other factors influencing the crime are such as situation at a particular place, rate of urbanization, migration of population from neighboring places, unemployment, income inequality, etc. Also the political system which prescribe norms, make rules, and create preventive measure, the political structure and system also influence the controlling system of crime. This clearly demonstrates that every definition of crime has correlation with the socio-economical and political factors.

3) Cyber crimes are also affecting teenagers very badly. They are more susceptible and feared from Cyber Bullying and it is a fear when person receives threats, negative comments or negative pictures or comments from other person. Because of cyber bullying teenagers are suffering from depression, humiliation and threatens. Teenagers and youth of the country using Online social networking websites, text messages and emails and spending hours online every day, on computers or personal electronic devices.

4) Despite the high level of awareness of the cyber threat the impact of cybercrime has serious financial consequences for businesses and government institutions. Very often the companies realize that they have been victims of frauds or attacks until long after the event occurred and this time gap between the criminal event and its discovery provides an advantage to those who commit crimes. Such crimes impacting badly on the economy of the company. Defense, utilities and energy, and financial service companies experience higher costs than organizations in retail, hospitality and consumer products.

5) Emotional impact of cybercrime shows victim's strongest reactions like feeling angry, annoyed and cheated, and in many

cases, they blame themselves for being attacked.

CONCLUSION:

It can be seen that the threat of computer crime is not as big as the authority claim. This means that the methods introduce to combat represents an unwarranted attack on human rights. The international treaties being drawn up to deal with it are so vague that they are bound to be ineffective in dealing with the problem. It will also mean the civil liberties will be unjustly affected by the terms of the treaties since they could, conceivably, imply that everybody who owns a computer fitted with a modem could be suspected of being a hacker. People are spending more time and money on the internet. Every time someone is online, they can be a targeted as a victim. The government still has an important role to play, but most of the prevention needs to be done by commercial entities producing software and those with the ability to stop fraud.

REFERENCE:

Nina Godbole , Sunit Belapure –Wiley Publication- Understanding Cyber Crimes, Computer Forensics and Legal Perspectives (Wind) Paperback – 2011.

Babak Akhgar , Andrew Staniforth- Syngress Media Publication - Cyber Crime and Cyber Terrorism Investigator's Handbook Paperback – 2014

R K Chaubey - Kamal Law House Publication -An Introduction to Cyber Crime and Cyber Law – 2009.

http://www.britannica.com/EBchecked/topic/130595/cybercrime 11th March 2014.

http://www.salzmanattorney.com/federal-crimes/computer-crimescyber-crimes/

Available online www.vpmthane.org

JBNB

KNOWLEDGE DISCOVERY IN DATABASE USING DATA MINING

Renuka Sabapathi and Sony Yadav

IT and CS Department,

B.N.Bandodkar College of Science, Thane, Maharashtra – 400601.

renuka.prema@gmail.com ,

soni.ryadav16@gmail.com

Received on 12/12/2014;Modified on 15/01/1015; Accepted on 20/01/2015

ABSTRACT:

This paper exhibit information related to "discovering hidden and unknown patterns in database using data mining".

Data mining is a kind of business information analysis techniques; it helps in improving the quality and effectiveness of business and scientific decision making process. The term Knowledge Discovery in database refers to the broad process of finding Knowledge in data and emphasis the 'high-level' application of particular data mining methods.

Keywords: KDD, data-mining techniques, database, Competitive advantage.

INTRODUCTION:

Knowledge Discovery and Data Mining (KDD) is an interdisciplinary area focusing upon methodologies for extracting useful knowledge from data. The ongoing rapid growth of online data due to the Internet and the widespread use of databases have created an immense need for KDD methodologies. The challenge of extracting knowledge from data draws upon research in statistics, databases, pattern recognition, machine learning, data visualization, optimization, and high-performance computing, to deliver advanced business intelligence and web discovery solutions.

Data mining produce lots of advantages, when it is used in a specific industry. Data Mining involves multiple steps as shown in figure 1. The process starts with selection of data or understanding of data that consists of historical data. After that in data preparation data is then cleaned and

preprocessed. Cleaning process removes the discrepancies and preprocessing is responsible for relevant information. The next steps are data modeling, in this step the data is modeled to identify the patterns and after that the data is evaluated as per the requirement. In the last step data is finally deployed with new data sets. The process continues until meaningful knowledge is extracted.[Referenced : Usama M. Fayyad, Gregory Piatetsky-Shapiro, Padhraic Smyth, Ramasamy Uthurusamy -1993]

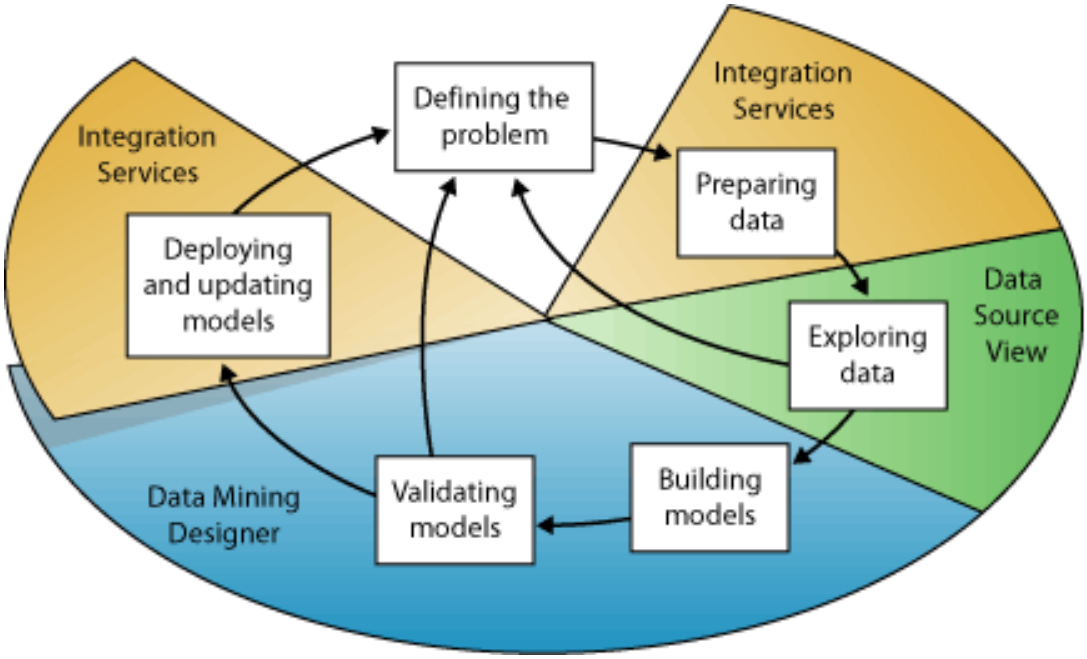


Figure 1 Steps for data mining

Data Mining has six types of models, which are used to solve business problems: classification, regression, time series, clustering, association and sequence discovery. The first two classifications and regression are used to make predictions,

while association and sequence discovery are used to describe behavior. Clustering can be used for either forecasting or description. **[Referenced:** Chris Rygielski, Jyun-Cheng Wang, David C. Yen 2002]

DEFINING KDD PROCESS AND ITS STEPS USING DATA MIMING IN DATABASE

In this context, the extraction of knowledge from large-scale mutation data is an increasingly challenging task and KDD approaches are now being applied in many domains of biomedicine. KDD is commonly defined as the "non trivial process of identifying valid, novel, potentially useful and ultimately understandable patterns in data .From an operational point of view, the KDD process is performed within a KDD system including databases, data mining modules, and interfaces for human interactions, such as editing and visualization. The KDD process involves three main operations: selection and preparation of the data, data mining, and finally interpretation of the extracted units.

It involves the evaluation and possibly interpretation of the patterns to make the decision of what qualifies as knowledge. It does this by using data mining methods (algorithms) to extract (identify) what is deemed knowledge, according to the specifications of measures and thresholds, using a database along with any required preprocessing, sub sampling , and transformations of that database.

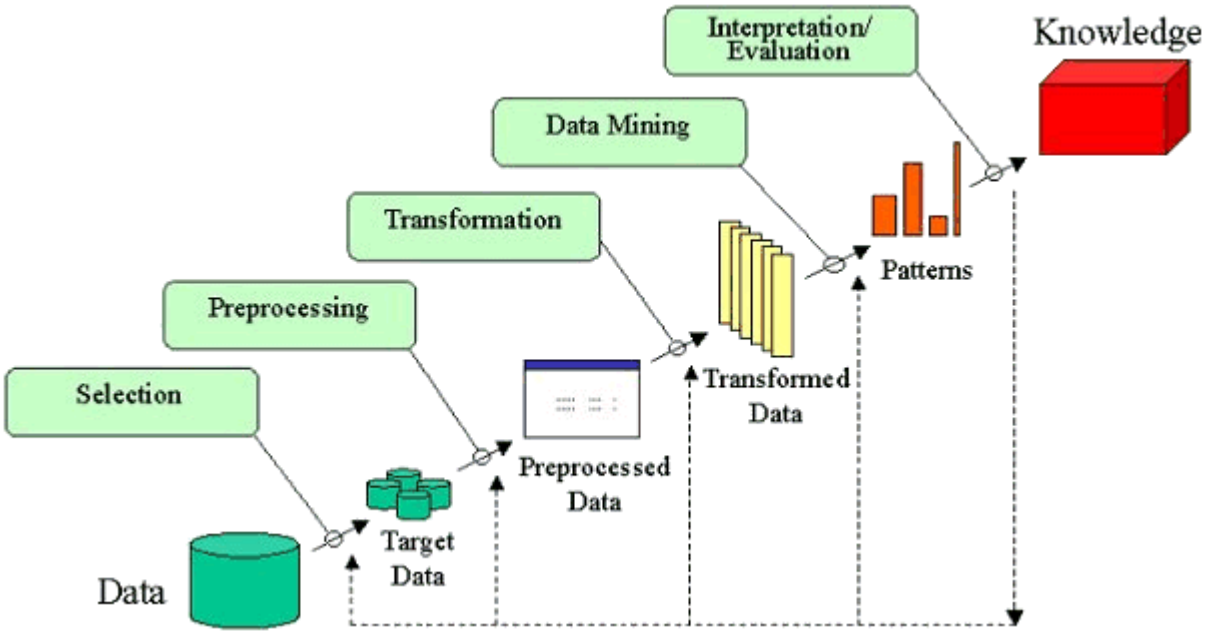


Figure 2 KDD STEPS USING DATA MINING

Developing and understanding of the application domain: This is the initial preparatory step. It prepares the scene for understanding what should be done with many decisions(about transformation, algorithms, representation, etc.).

Selecting and creating a target data set: Having defined the goals, the data that will be used for the knowledge discovery should be determined. This includes selecting a data set or focusing on a subset of variables or data samples on which discovery is to be performed.

Data cleaning and preprocessing: It includes data clearing, such as handling missing values and removal of noise and outliers. If appropriate, collecting the necessary information to model, deciding on strategies for handling missing data fields.

Data transformation: In this stage, the generation of better data for the data mining is prepared and developed. It includes finding useful features to represent the data, depending on the goal of the task.

Choosing the appropriate data mining task: This includes deciding the purpose of the model derived by the data mining algorithm (e.g., summarization, classification, regression, clustering). This mostly depends on the KDD goals, and also on the previous steps.

Choosing the data mining algorithm: This stage includes selecting the specific method to be used for searching patterns, such as deciding which models and parameters may be appropriate, and matching a particular data mining method with the overall criteria of the KDD process.

Data Mining: In this step the implementation of the Data Mining algorithm is done.

Interpretation or evaluation:

In this stage, the mined patterns are evaluate and interpret with respect to the goals defined in the first step. Here the pre-processing steps with respect to their effect on the Data Mining algorithm results are considered.

Using the discovered knowledge:

It includes incorporating the knowledge into another system for future action. The knowledge becomes active in the sense that we make changes to the system and measure the effects

DATA MINING ARCHITECTURE HIGHLIGHTING THE DESCRIPTIVE, PROSPECTIVE NATURE OF DATA MINING:

Data mining is described as a process of discover or extracting interesting knowledge from large amounts of data stored in multiple data sources such as file systems, databases, data warehouses etc. The aim of this technology is usually to find hidden but significant relationships that can lead to a bigger profit. Data mining tools predict future trends and behaviors, allowing businesses to make proactive, knowledge-driven decisions. Data mining techniques can yield the benefits of automation on existing software and hardware platforms, and can be implemented on new systems as existing platforms are upgraded and new products developed. Data is collected explosively every minute through business transactions and stored in relational database systems. In order to provide insight about the business processes, data warehouse systems have been built to provide analytical reports that help

business users to make decisions. The four possible architectures of a data mining system as follows: [[Referenced by: Adela Tudor, Adela Bara, Iuliana Botha 2011]

No-coupling: In this architecture, data mining system does not utilize any functionality of a database or data warehouse system. A no-coupling data mining system retrieves data from a particular data sources such as file system, processes data using major data mining algorithms and stores results into file system. The no-coupling data mining architecture does not take any advantages of database or data warehouse that is already very efficient in organizing, storing, accessing and retrieving data. The no-coupling architecture is considered a poor architecture for data mining system however it is used for simple data mining processes.

Loose Coupling: In this architecture, data mining system uses database or data warehouse for data retrieval. In loose coupling data mining architecture, data mining system retrieves data from database or data warehouse, processes data using data mining algorithms and stores the result in those systems. This architecture is mainly for memory-based data mining system that does not require high scalability and high performance.

Semi-tight Coupling: In semi-tight coupling data mining architecture, beside linking to database or data warehouse system, data mining system uses several features of database or data warehouse systems to perform some data mining tasks including sorting, indexing, aggregation…etc. In this architecture, some intermediate result can be stored in database or data warehouse system for better performance.

Tight Coupling: In tight coupling data mining architecture, database or data warehouse is treated as an information retrieval component of data mining system using integration. All the features of database or data warehouse are used to perform data mining tasks. This architecture provides system scalability, high performance and integrated information

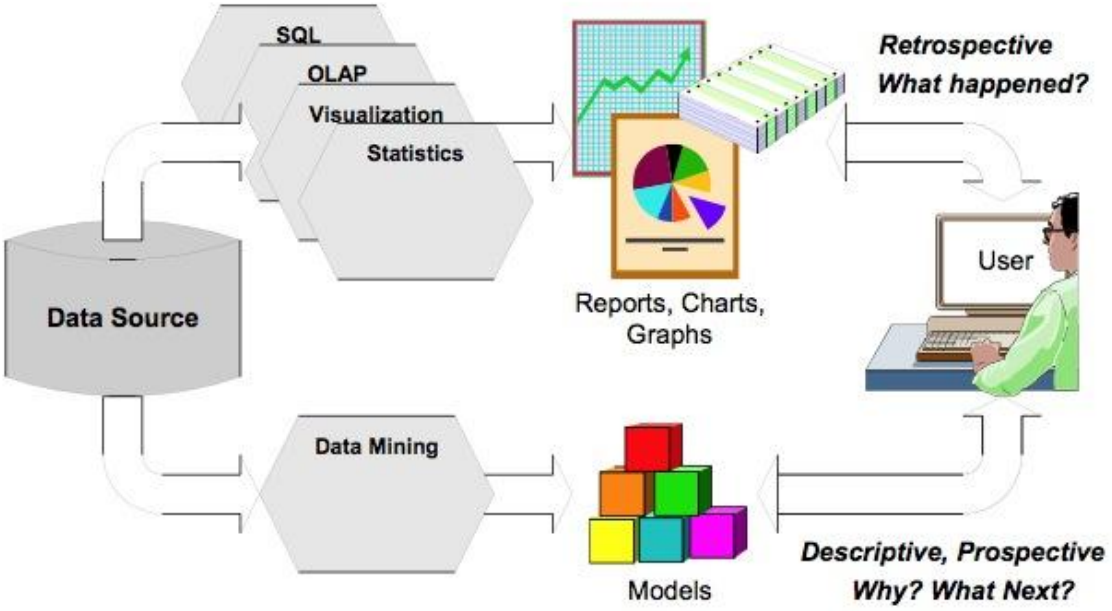


Figure 3 Data mining architecture.

Tight Coupling data mining architecture have three tiers, which are as follows:

Data layer: as mentioned above, data layer can be database and/or data warehouse systems. This layer is an interface for all data sources. Data mining results are stored in data layer so it can be presented to end-user in form of reports or other kind of visualization.

Data mining application layer is used to retrieve data from database. Some transformation routine can be performed here to transform data into desired format. Then data is processed using various data mining algorithms.

Front-end layer provides intuitive and friendly user interface for end-user to interact with data mining system. Data mining result presented in visualization form to the user in the front-end layer.

FOUR TECHNIQUES USED IN DATA MINING: There are several major data mining techniques have been developing and using in data mining projects including association, classification, clustering, prediction, regression. These are briefly examine in the following sections [Referenced: Eric Siegel 2013]

1. Association: Association is one of the best known data mining technique. In association, a pattern is discovered based on a relationship between items in the same transaction. That's why association technique is also known as *relation technique*. The patterns discovered with this data mining technique can be represented in the form of association rules

Apriori algorithm: Apriori is a classic algorithm used in data mining for learning association rules. It is a algorithm for frequent item set mining and association rule learning over transactional databases. It proceeds by identifying the frequent individual items in the database and extending them to larger and larger item sets as long as those item sets appear sufficiently often in the database. The frequent item sets determined by Apriori can be used to determine association rules which highlight general trends in the database. Apriori is the best-known algorithm to mine association rules. It uses a breadth-first search strategy to count the support of item sets and uses a candidate generation function which exploits the downward closure property of support.

Eclat algorithm: Eclat is a depth-first search algorithm using set intersection. The Eclat algorithm is used to perform item set mining. Item set mining let us find frequent patterns in data like if a consumer buys milk, he also buys bread. This type of pattern is called association rules and is used in many application domains.

FP- growth algorithm: The FP- growth algorithm allows frequent item set discovery without candidate item set generation. The Algorithm, proposed by Hanin, is an efficient and scalable method for mining the complete set of frequent patterns by pattern fragment growth, using an extended prefix-tree structure for storing compressed and crucial information about frequent patterns named frequent-pattern tree (FP-tree).

2. Classification: Classification is a classic data mining technique based on machine learning. Basically classification is used to classify each item in a set of data into one of predefined set of classes or groups. Classification method makes use of mathematical techniques such as decision trees, linear programming, neural network and statistics. In classification, we

develop the software that can learn how to classify the data items into groups.

Decision Trees: Decision trees are trees that classify instances by sorting them based on feature values. The Microsoft Decision Trees algorithm is a classification and regression algorithm provided by Microsoft SQL Server Analysis Services for use in predictive modeling of both discrete and continuous attributes. Decision trees are produced by algorithms that identify various ways of splitting a data set into branch-like segments. These segments form an inverted decision tree that originates with a root node at the top of the tree. Decision trees play well with other modeling approaches, such as regression, and can be used to select inputs or to create dummy variables representing interaction effects for regression equations.

Naïve Bayesian Classification:

It is based on the Bayesian theorem It is particularly suited when the dimensionality of the inputs is high. The Microsoft Naive Bayes algorithm is a classification algorithm provided by Microsoft SQL Server Analysis Services for use in predictive modeling. The algorithm calculates the conditional probability between input and predictable columns, and assumes that the columns are independent. This algorithm is less computationally intense than other Microsoft algorithms, and therefore is useful for quickly generating mining models to discover relationships between input columns and predictable columns. The algorithm considers each pair of input attribute values and output attribute values.

Support vector machine:

Support vector machines(SVM) have been promising methods for data classification and regression. SVM performs well on data sets that have many attributes, even if there are very few cases on which to train the model. There is no upper limit on the number of attributes; the only constraints are those imposed by hardware. Traditional neural nets do not perform well under these circumstances. In machine learning, support vector machines are supervised learning models with associated learning algorithms that analyze data and recognize patterns, used for classification analysis.

3. Clustering: Clustering is a data mining technique that makes meaningful or useful cluster of objects which have similar

characteristics using automatic technique. The clustering technique defines the classes and puts objects in each class, while in the classification techniques, objects are assigned into predefined classes. The algorithm uses iterative techniques to group cases in a dataset into clusters that contain similar characteristics. These groupings are useful for exploring data, identifying anomalies in the data, and creating predictions

Hierarchical- Groups data objects into a hierarchy of clusters. The hierarchy can be formed top-down or bottom-up. Hierarchical methods rely on a distance function to measure the similarity between clusters.

Partitioning - Partitions data objects into a given number of clusters. The clusters are formed in order to optimize an objective criterion such as distance

Locality-based- Groups neighboring data objects into clusters based on local conditions.

Grid-based- Divides the input space into hyper-rectangular cells, discards the low density cells, and then combines adjacent high-density cells to form clusters.

PREDICTION:

The prediction, as it name implied, is one of a data mining techniques that discovers relationship between independent variables and relationship between dependent and independent variables. For instance, the prediction analysis technique can be used in sale to predict profit for the future if we consider sale is an independent variable, profit could be a dependent variable. Then based on the historical sale and profit data, we can draw a fitted regression curve that is used for profit prediction.

BENEFITS OF DATA MINING:

[Referenced: Gary Miner, John Elder IV, Thomas Hill, Robert Nisbet, Dursun Delen, Andrew Fast, 2012]

In finance and banking, data mining is used to create accurate risk models for loans and mortgages. They are also very helpful when detecting fraudulent transactions.

In marketing, data mining techniques are used to improve conversions, increase customer satisfaction and created targeted advertising campaigns. They can even be utilized when analyzing the needs in the market and coming up with ideas for

completely new product lines. This is done by looking at historical sales and customer data and creating powerful prediction models.

Retail stores use customer shopping habits/details to optimize the layout of their stores in order to improve customer experience and increase profits.

Tax governing bodies use data mining techniques to detect fraudulent transactions and single out suspicious tax returns or other business documents.

In manufacturing, data discovery is used to improve product safety, usability and comfort.

Data mining helps organizations get the necessary information needed to handle different processes as quickly as possible. For the surveillance and policing industries, the need to meet deadlines and process information quickly is of the utmost importanceData mining helps government agency by digging and analyzing records of financial transaction to build patterns that can detect money laundering or criminal activities.

Data mining has helped in the various researches in the field of science. Other than researches, data mining has also contributed to help the medical field and the engineering field in improving their processes.

CONCLUSION:

This research study involved a real life application problem. The unifying goal of the KDD process is to extract Knowledge from data in the context of large databases. Data Mining is used in business environment as well as other fields such as weather forecast, medicine, transportation, healthcare, insurance, government and etc. Data mining produce lots of advantages, when it is used in a specific industry. Data mining (formally termed Knowledge Discovery) is a process that aims to use existing data to invent new facts and to uncover new relationships previously unknown even to experts thoroughly familiar with the data. Most data mining algorithms used in KDD accept as input a single database table where the data to mine are represented as objects displaying specific values for given properties. In this paper we have outlined a review of data mining with its techniques and benefits. This framework will be beneficial for a brief knowledge.

REFERENCES:

R.Agrawal, T.Imielinski, and A. Swami Database mining: A performance perspective IEEE Transactions on Knowledge and Data Engineering December 1993. Special Issue on Learning and Discovery in Knowledge Based Databases.

Adela Tudor, Adela Bara, Iuliana Botha The Bucharest Academy of Economic Studies Bucharest Romania (2011) : Solutions for analyzing CRM systems - data mining algorithms. International Journal Of Computers Issue 4, Volume 5, 2011.

Chien-Hua Wang and Chin-Tzong Pang : Applying Fuzzy Data Mining for an Application CRM H. -J. Zimmermann, *Fuzzy sets, Decision Making, and Expert Systems*, Kluwer, Boston, 1991.

Chris Rygielski, Jyun-Cheng Wang, David C. Yen : Data mining techniques for customer relationship management, Technology in Society 24 (2002) 483–502.

.Jaiwei Han;Micheline kamber;Data mining concepts and Techniques;Morgan Kaufmann Publishers.

Fayyad U.M.Piatetsky-Shapiro.G & smith.P" From data mining to knowledge discovery in databases'AI magazine.

Usama M. Fayyad, Gregory Piatetsky-Shapiro, Padhraic Smyth, Ramasamy Uthurusamy- Advances in Knowledge Discovery and Data Mining -1996.

Gary Miner, John Elder IV, Thomas Hill, Robert Nisbet, Dursun Delen, Andrew Fast, Practical Text Mining and Statistical Analysis for Non-structured Text Data Applications, 2012.

Eric Siegel, Predictive Analytics: The Power to Predict Who Will Click, Buy, Lie, or Die, Wiley, 2013.

Available online www.vpmthane.org JBNB

TRAFFIC IN MUMBAI

Darshan H.Mahajan ,Nikhil D.Argade, Aniket P.Bagul and Sudhir K.Bhosale*

Department of Foundation Course,

B. N. Bandodkar College of Science, Thane (W)-400601 (MS) India.

sudhirbhs12@gmail.com

Received on 31/01/2015 Modified on 2/02/2015 Accepted on: 04/02/2015

ABSTRACT

Traffic congestion is a condition on road networks that occurs as use increases, and is characterized by slower speeds, longer trip times, and increased vehicular queueing. Traffic jams in Mumbai mostly are caused due to improper driving habits and wrong parking habits. The traffic jams affect the daily activities as they are delayed. A lot of pollution is also caused due to the traffic jams which indirectly cause global warming and climate change. People should follow the traffic rules and awareness should be made for the traffic rules. Educational institutes should take the responsibility to keep various seminars for the awareness of traffic rules.

Key Words – Mumbai, Traffic, Roads, Awareness.

INTRODUCTION:

The overall definition of traffic jam is obstacles in the normal speed of the multiple vehicles at any given time, either due to external or internal reasons. Another aspect of traffic jam is unavoidable circumstances which leads to traffic jam and the ultimate consequences is negative responses caused due to it. Traffic jam also means stand still of the moving vehicles due to absence of proper functioning of proper vehicles and absence of traffic police.

CAUSES OF TRAFFIC JAMS: Bad weather conditions especially heavy rains cause water clogging on the roads leading to slow traffic movement.

Traffic jams are also caused due to accidents of vehicles, as a lot of time is required to move the vehicles from the road causing traffic jam.

Due to certain weather conditions, sometimes fog is formed on roads of hilly areas leading to slower traffic and in worst cases accidents.

The construction work or any pipeline repair work occupies half of the road, which eventually leads to traffic jam.

Improper driving habits and poor parking habits have also contributed their share to increase in traffic jams.

Poor traffic control management as well as improper roads also increases traffic jam.

Special or religious events which take place along the road sides also use up the available road space of vehicles which causes traffic jams.

EFFECTS OF TRAFFIC JAMS

Traffic jams causes a lot of delay in the activities of the office going people and sometimes people reach late due to the immense traffic.

Also a lot of time is wasted in traffic jams which cause loss of valuable time.

A lot of green house gases like Carbon dioxide, Carbon monoxide, Nitrous oxide, Tetrafluoromethane are released from the exhaust of vehicles which are responsible for global warming and the climate change. These gases are also responsible for formation of smog which is a great problem.

The traffic jams increases the fuel consumption, thus increasing the cost of travelling.

Road rage is a senseless reaction to traffic that is common in congested traffic areas. Road rage often manifests itself as shouting matches on the road, intentional tailgating, retaliatory traffic maneuvers and mostly a lack of attention being paid to the traffic around the people involved. It is basically a temper tantrum by frustrated drivers in traffic.

People crossing roads die or get seriously injured as because of the heavy traffic flow, the vehicles that follow each other don't stop and this leads to accidents due to negligence of the driver.

Emergency services like ambulances, fire brigades get obstructed and a lot of damage of life or property or both might happen due to their helplessness to reach on time.

REMEDIES FOR TRAFFIC JAMS

The public should adhere to the traffic rules diligently so that the flow of the traffic is maintained.

If there is any accident then we should allow police to do their job and should not stop the traffic by standing as mute spectators.

If the signal is faulty it should be brought to the notice of any traffic police rather than ignoring it.

If the signal is not working then we should again point it out to the police or else help as a volunteer to clear the traffic.

The government should also be notified of any bad road conditions, so that the roads are repaired quickly.

The government should also see if a making of flyover could help reduce the traffic jams on highways.

People should make use of car pools. If there are 4-5 people going to a same destination like office, then they should share the vehicle. If only a single person is travelling then make use of public transport instead of one's private vehicle.

Proper parking space should be provided to avoid their parking on the roads leading to the traffic jam.

The citizens should be given proper traffic education. Schools can keep various types of seminars for awareness of traffic rules.

There should be a proper divider on the road along with working street lamps to illuminate the road during the dark hours. Roads like highways and circles which receive a lot of vehicles from other small roads should have a traffic signal.

The people should be encouraged to use public transport and awareness about the traffic rules should be created among them.

All forms of roadside hawking and trading should be banned.

CONCLUSION:

Taking into consideration the above explained causes and an effect of traffic jams in Mumbai, prevention is better than cure. It is concluded that, total follow of discipline of traffic rules and regulations,

and the awareness of traffic laws and road safety will definitely lead to possible way out of traffic jam. We also come to the conclusion that as per the proverb "Charity begins at home" we all must implement the above suggestions first ourselves. It is also advisable to say that better positive comparison with the excellent traffic management in western countries can be implemented in Mumbai, which happens to be the International city.

The better ways to solve the problem of traffic jams as explained in the Foundation Course textbooks is also the source of inspiration to solve the problem.

REFERENCES:

How we can remove traffic from the road easily ? How to avoid from traffic jams ? (n.d.). Retrieved December 12, 2014, from http://www.indiastudychannel.com/experts/28711-How-we-can-remove-traffic-from-road-easily-How-avoid-from-traffic-jams.aspx

Popoola M. O., Abiola S. O., Adeniji W. A. (2013). Traffic Congestion on Highways in Nigeria Causes, Effects and Remedies. International Journal of Civil, Architectural, Structural and Construction Engineering Vol:7 No:11, 516-521

Available online www.vpmthane.org JBNB

IMPORATNCE OF ORGANIC FOODS

Ankita Dharma and Anita Goswami-Giri

Biochemistry Department,

B.N.Bandodkar College of Science, Thane, Maharashtra – 400601

E-mail: ajd_0108@yahoo.co.in

anitagoswami@yahoo.com

Received on 12/12/2014; Modified on 15/02/2015 Accepted on 20/02/2015

Abstract:

Organic foods are those foods which are prepared by use of organic farming. It is truly said that the organic foods are much better than the conventional foods in terms of all the factors considered. Today many organic foods are available ranging from fruits vegetables and also organic meat. This trend of organic meat has been developed in some parts of India and also in USA. Organic meat generally means that the animals are devoid of steroid injections that generally increase the meat in them but they are fed with grass, hay and raised in a healthy environment with love and care. The statistical data shows that the demand for organic meat has been increased.

Key words: Organic farming, conventional foods, steroid injections, livestock, organically produced feed organic beef.

Introduction:

Organic foods are those foods which are generally produced by organic farming. Organic farming is a technique which is not new in India but is being followed from ancient times. It is a method of raising of crops in such a way as to keep the soil alive and in good health by use of organic wastes such as animal and farm wastes and other biological material along with the beneficial microbes to provide nutrients to the crops for increase in the yield in an eco-friendly environment. This technique excludes the use

of fertilizers, pesticides, hormones etc. (Bjelakovic *et al* 2012)

Now coming back to organic foods, there are some differences between the amount of nutrients when organically produced foods and conventionally prepared foods are prepared. Conventionally grown is an agriculture term referring to a method of growing edible plants (such as fruit and vegetables) and other products. It is opposite to organic growing methods which attempt to produce without synthetic chemicals (fertilisers, pesticides, antibiotics, hormones) or genetically modified organisms. (Sophie *et al* 2009)

It is truly said that the organic foods are much better and more safer, nutririous and tastes better than the conventional foods. Due to such reasons the need and demand for organic food products has tremendously made up to the mark. Today many new organic foods are available such as organic sugar, organic ghee and also organic meat. The trend of organic meat is being practiced in some parts of Uttarakhand and also in USA. There is a significant difference between organic meat and the meat which we consume daily in the diet. Generally animals are injected with steroids that are often used to increase their size and ultimately the meat.Hence; humans consume them for their need and suffer from various health hazards such as reduced sperm count, hair loss and many more. But this practice is slowly coming to an end. Organic meat comes from an animal that has not been fed anything grown with toxic or synthetic fertilizers, pesticides, herbicides, fungicides or fumigants; has not been given any kind of growth hormone, antibiotic or genetically engineered product; has been conceived by organically raised animals; and has been butchered and processed organic regulations.

Organically raised animals are provided with living conditions and stocking rates appropriate to their behavioural requirements, high-quality diet of organically-produced feed and ethical animal husbandry that facilitates low stress, promotes good health, and prevents disease.(Bourn D *et al*, 2012).With organic farming, prevention of maladies is emphasized over treatment of

them. When a disease or infection does strike an animal, it is nursed back to health without the use of chemical treatments, but with a little tender loving care. In 2008, there were 2 million acres of organic certified rangeland and 63,680 organically-certified beef cows. The price of natural/organic beef averaged $5.48 in the first quarter of 2011 which represented a premium of $1.70 per pound. Such premiums are the result of consumer demand as well as the additional costs of producing organic beef. Thus the rate for the consumption of organic meat over the regular meat has lead to an increase in the demand for organic products.(Paul J.*et al*, 2011)

Conclusion:

Organic meat is one of the more expensive items. In fact, organic beef costs almost twice as much as its non-organic counterpart. There has been much debate on whether or not organic meat offers enough benefits to warrant the price difference. There have been many research studies going on the nutritional contents of organic and non-organic meat in certain parts of Canada and South Africa as the consumption is more in these countries. As the statistical data shows that the price of organic meat has been rising with respect to years. This means that the consumption is more and the practice of injecting the livestock with steroids is slowly ceasing.

References:

http://www.organicadvocates.org/stores.pdf

http://www.ota.com/organic/benefits/antibiotics.html

Bjelakovic, M., Asioli, D., Bendini, A., Cantore, N., Gallina Toschi, T., Spiller, A.,Obermowe, T., Buchecker, K. and Lohmann, M. (2012). Summary report on sensory- related socio-economic and sensory science literature about organic food products.

Bourn D, Birgitt; Alrøe, H. J. & Kristensen, E. S. (January 2012). "Approaches to assess the environmental impact of organic farming with particular regard to Denmark".Agriculture, Ecosystems & Environment **83** (1–2): 11–26.

Paul J, KA; Johnson, DE (2011). "Methane emissions from cattle". Journal of animal science **73** (8): 2483–92.

Sophie., U. Niggli and C. Leifert (eds.). 2009. Handbook of organic food safety and quality. CRC Press, Boca Raton. 544 pp.

Available online www.vpmthane.org JBNB

IMMUNE BOOSTERS

Vaibhavi V. Gujar and Anita Goswami-Giri

Biochemistry Department,

B.N.Bandodkar College of Science, Thane, Maharashtra – 400601.

E-mail: vaibhavigujar@yahoo.com

anitagoswami@yahoo.com

Received on 12/12/2014; Modified on 15/02/2015 Accepted on 20/02/2015

ABSTRACT:

Food is one of the most powerful tools that help to prevent disease. A healthy body begins with a healthy immune system. Over 70 % of the human immune system is in the gut that is responsible for the foundation of health. The immune system maintains homeostasis by defending against viruses and bacteria which can cause inflammation in the body, illness and diseases. Food is most healing when it is close to its original state and has properties to heal and nourish. Hence, staying well while others around human sniffle and sneeze requires that human extract as much nutrients from the diet as it can. Hence this note focuses on diet rich fungi, citrus fruits, cruciferous vegetables, edible stem, roots and dairy products in relation to health.

KEYWORDS: Immune system, homeostasis, inflammation.

INTRODUCTION:

Popping a daily multivitamin might be worthwhile as "health insurance," but let's face it: Eating real food is a lot more fun than gobbling supplements. Besides, one can get most, if not all, of the nutrients essential to good health by selecting the right combination of foods. There are many such foods which belong to the immune boosters category. These foods do not require any tampering but can be consumed in their natural forms. Here are a few easily available foods which will help boost immunity.

1. Mushrooms: Some of the most potent immunosupportive agents come from mushrooms. There are mushrooms that kill viruses, mushrooms that kill bacteria and even mushrooms that kill yeast. Some mushrooms destroy cancer cells, and others facilitate nerve regeneration. While many types of mushrooms have been studied, it is the shiitake mushroom which shows the best antiviral activity. Lentinan is the active ingredient and has been shown to stimulate the cells of the immune system and to inhibit the replication of certain viruses. Lentinan is a polysaccharide complex that signals the immune system to produce white blood cells, which defend against environmental pathogens.(Xu Y *et al,* 2013) The shiitake mushrooms also stimulate the body to produce interferon, which is a protein produced by the immune system to inhibit viral replication. (Katherine *et al,* 1995)

2. Olive leaf: Olive leaf (*Olea europea*) has a long history of use as far back as ancient Egyptians who viewed it as a symbol of heavenly power. Olive leaf was used medicinally to bring down fevers in people who were suffering from malaria. Olive leaf has been observed to disable the proper replication of viruses within the human body by blocking essential pathways for amino acid use. (Kathleen *et al,* 1999) It can slow the spread of the virus by inactivating the viral enzymes that are necessary to infect human cells. (Gleeson *et al,* 2000)

3. Garlic and Ginger: These foods act as antiviral remedies, enhancing the immune system, making it easier for the body to fight viral infections. These antiviral foods work best when consumed throughout the year to keep the immune system in top form. Garlic is well known throughout history as a food that fights infections from bacteria and viruses. Allicin is one of the immune stimulating nutrients in garlic that is released when cut, chopped or crushed. (Wyatt *et al,*1996 *)*

Garlic stimulates the activity of immune system cells that destroy cold and flu viruses. Ginger reduces fevers, soothes sore throats, and encourages coughing to remove mucus from the chest. The chemicals shagaols and gingerols in ginger give it that spicy kick that stimulates blood circulation and opens your

sinuses. Improved circulation means that more oxygen is getting to your tissues to help remove toxins and viruses. (Wyatt *et al*, 1996)

4. Guavas, Oranges and Lemons: Guavas, oranges and lemons contain vitamin C which plays an important role as a natural antioxidant in the body. Vitamin C also helps the white blood cells perform their function of responding quickly to infections and thus, has an immunity-enhancing action. (Pati *et al*, 2003) Guavas also contain a lot of fiber which has a protective role against high cholesterol and heart disease.

5. Carrots, Red Pumpkins and Papayas: All orange, yellow and red colored fruits and vegetables are rich sources of beta carotene that is known to have immune-protective action. By acting on different components of the immune system, beta carotene helps the body fend off infection quite effectively. The phenolic compounds, caffeic acid, chlorogenic acid, quercetin and kaempferol exhibit potent antioxidant effect. This prevents the cell death caused by the free radicals. (Guardia *et al*, 2001)

6. Cruciferous vegetables: Vegetables such as broccoli, cabbage and radish have sulfur-containing compounds that are converted into isothiocyanates (ITCs). These ITCs improve immune response and are also linked to cancer prevention. Spinach and kale are rich in vitamin A, vitamins C, chlorophyll, antioxidants and essential fatty acids, which have immunoprotective effects. (Daria *et al*, 2008)

7. Onions: The trace mineral selenium in onions helps reduce inflammation and stimulates immune function. Selenium helps initiate the immune response and prevents excessive immune response. Immune cells that are deficient in selenium undergo more oxidation, causing them to develop and reproduce inefficiently.

Selenium-deficient immune cells also have more difficulty producing proteins and transporting calcium. Quercetin, a bioflavonoid antioxidant in onions, prevents cancer cells from growing. At lower concentrations, quercetin helps prevent cancer formation by quenching free radicals.

At higher concentrations, quercetin exerts toxic effects on cancer cells. Red onions are particularly high in quercetin. (Cai J *et al*, 2000)

8. Probiotics: Probiotics work by keeping the good bacteria well-populated in the intestines. These probiotics are found in foods like yogurt, buttermilk or kefir. They not only help boost immunity but aid in optimal digestion. Because the immune system is located so near to the intestine, this "good" bacteria also helps to fight off the "bad" bacteria. These same good bacteria also help to break down and absorb nutrients that can prevent infections, too. The good bacteria typically found in probiotics are acidophilus, bifid bacterium, and lactobacillus.

CONCLUSION:

Thus, it takes more than an apple a day to keep the doctor away. It turns out that eating some pretty surprising nutrients will help keep the immune system on guard. One can ensure that the body and immunity runs smoothly by rounding out one's plate with plenty of colorful servings of fruits and veggies, plus 8 to 10 glasses of water a day, at the very least. The list of immune boosting foods is in exhaustive. Daily consumption of the above mentioned foods will not only help prevent diseases, but due to their high satiety and palatable value provide a healthy diet rich in many nutrients.

REFERENCES:

1. Katherine, Daniel G. and Kaye. 'Life's First Food'. Salt Lake City: CNR Publications. 1996.

2. Wyatt, Dominic K and Casilda. Anti-inflammatory properties of plants. Well Being Journal, Vol. 17 No. 4, 1996.

3. Kathleen, Robert D., Olivia and Drake N. 'Olives for immunity'. Australian Journal of Nutrition, 1999: 15(3):301-324

4. Gleeson, M, Nieman, D and Pedersen, BK 2000, 'Exercise, nutrition and immune function'. Journal of Sports Sciences, 22, pp. 115-25.

5. Cai J, Nelson KC, Wu M, Sternberg P Jr, Jones DP. Oxidative damage and protection of the RPE. 2000;19(2):205-221. University of Maryland Medical Center

6. Guardia T, Rotelli AE, Juarez AO, Pelzer LE. Anti-inflammatory properties of plant

flavonoids. Effects of rutin, quercetin, and hesperidin on adjuvant arthritis in rat. Farmaco.2001;56(9):683-687.

7. Pati Chandler. Foods that prevnt pain. Well Being Journal, Vol. 22 No. 2., 2003

8. Ey J, Schömig E, Taubert D. Dietary sources antioxidant and anti- inflammatory effects of ergothioneine. J Agricultural & Food Chemistry 2007; 55: 6466-6474

9. Daria Brambilla, Rio Mogan, T., Cesare Mancuso, Mariagrazia Rita Scuderi, Paolo Bosco, Giuseppina Cantarella1, Laurence Lempereur, Giulia Di Benedetto, Salvatore Pezzino and Renato Bernardini* The role of antioxidant supplement in immune system. Nutrition Journal 2008.

10. Xu Y, Na L, Ren Z, Xu J, Sun C, Smith D, Meydani SN, Wu D. Effect of dietary supplementation with white button mushrooms on host resistance to influenza infection and immune function in mice. British Journal of Nutrition 2013.

11.www.globalhealingcenter.com
www.healthyeating.sfgate.com
www.vitalitymagazine.com
www.renegadehealth.com

Available online www.vpmthane.org JBNB

PLANT BASED MOSQUITO REPELLENTS: A REVIEW

Shaikh, K.I.A.,Jamdhade, V.M. and Saha, M.

Department of Botany, B. N. Bandodkar College of Science,Thane (M.S.) -400601

kashfiya786@yahoo.com

Received on 15/02/2015 Modified on 15/02/2015 Accepted on 20/02/2015

Abstract:

Diseases transmitted by mosquitoes are a major source of death worldwide. Mosquitoes can cause dangerous diseases like dengue, malaria, yellow fever, encephalitis etc. Mosquito repellents and insect repellents are used to control mosquito menace. The natural and effective way to repel mosquitoes is the use of mosquito repellent plants. This alternative is environmentally sustainable. Plant based repellent scan be used singly or in combination for effective protection against mosquitoes. Plant based repellents are considered as a safer alternative to synthetic chemicals.

Key words: Mosquitoes, natural products, mosquito repellents.

Introduction:

Mosquito borne diseases currently represent a great health problem in tropical and subtropical climate. No part of the world is immune to their risks. Mosquitoes alone transmit disease to more than 700 million persons annually (Osimitz and Grothaus, 1995).The worldwide threat of mosquito transmitted diseases, with their associated morbidity and mortality, underscores the need for effective mosquito repellents (Moreira *et al.*, 2002) Protection from mosquito bites is achieved by using insect repellents. Repellents are the chemical products designed to ward off insects. They are effective against a wide range of arthropods including mosquitoes and flies but not against bees and wasps. Choosing the proper repellent can be difficult because no single product repels all pests (Combemale, 2001).The mission to make humans less attractive to mosquitoes has fuelled decades of scientific research on mosquito behaviour and control. The search for the perfect topical insect repellent/killer continues (Singh*et al.*,2012). Most plants contain compounds that they use in preventing attack from

phytophagous (plant eating) insects. These chemicals fall into several categories, including repellents, feeding deterrents, toxins, and growth regulators. Although the primary function of these compounds is defence against phytophagous insects, many are also effective against mosquitoes and other biting Diptera, especially those volatile components released as a consequence of herbivory (Pichersky and Gershenzon, 2002). Plant-based repellents are extensively used in traditional way throughout rural communities in the tropics because for many of the poorest communities, the only means of protection from mosquito bites that are available (Moore and Lenglet, 2006) and natural smelling repellents are preferred because plants are perceived as a safe and trusted means of mosquito bite prevention. Bites of mosquitoes belonging to the genera *Anophelesmeigen, Aedesmeigen, Culex* L. and *Haemagogus* L. are a general nuisance and are responsible for the transmission of important tropical diseases such as malaria, hemorrhagic dengue and yellow fevers and filariasis (elephantiasis). Plants are traditional sources of mosquito repelling essential oils (EOs), glyceridic oils, repellent and synergistic chemicals (Pohlit *et al.*,2011).There is a demand for plant-based repellentsthat are safe, pleasant to use and environmentally sustainable. This paper presents a review on plant-based mosquito repellents.

Mosquitoes as vector:

Bites of mosquitoes belonging to the genera *Anophelesmeigen, Aedesmeigen, Culex* L. and *Haemagogus* L. are a general nuisance and are responsible for the transmission of important tropical diseases such as malaria, haemorrhagic dengue and yellow fevers and filariasis (elephantiasis) (Pohlit *et al.*,2011). Malaria is one of the most important public health problems and India has to confront this problem perennially. Anopheles species are *Anopheles dirus, Anopheles annularis, Anopheles culicifacies, Anopheles fluviatilis, Anopheles minimus, Anopheles philippinensis, Anopheles stephensi, Anopheles sundaicus, Anopheles varuna, Anopheles aconitus, Anopheles maculatus, Anopheles tessellatus, Anophelessubpictus.* Malaria is a disease with symptoms of intermittent fever with chills, headaches and

vomiting, occurring daily, alternate day or every fourth day associated with enlargement of spleen later. Mosquitoes are the vectors of malaria. The causal organism is a minute protozoa belonging to the genus *Plasmodium.* There are about fifty different species of *Plasmodium* identified out of which only 4 cause malaria in human beings. They are *Plasmodium malariae, Plasmodium vivax, Plasmodium falciparum* and *Plasmodium ovale.* Dengue fever also known as break-bone fever, is a mosquito-borne tropical disease caused by the dengue virus. Symptoms include fever, headache, muscle and joint pains, and a characteristic skin rash that is similar to measles. Chikungunya is a viral disease transmitted to humans by the bite of infected *Aedesaegypti* mosquitoes. Chikungunya virus (CHIKV) is a member of the genus *Alphavirus,* in the family *Togaviridae*(Babu *et al.*, 2004).

Mosquito breeding condition: Mosquitoes prefer stagnant water. However, they are capable of thriving in a variety of locationswithin which to lay their eggs. They most commonly infest ponds, marshes, swamps and other wetland habitats. Mosquito larvae can be found in various habitats. Some larvae are active in transient waters such as floodwater, ditches and woodland pools. Conditions likely to favour the breeding of mosquitoes are proximity of wetlands near homesteads, the presence of plants, bushes, pits and open drains in the compound.

Mosquito control:

There are various strategies to control the mosquito menace. Destroying the breeding ground to prevent mosquito breeding and mosquito bites helps to control the mosquito breeding. Selectively destroying the breeding ground of mosquitoes is a control measure. Burning of logs, plants or cow dung to generate smoke prevents the breeding of mosquitoes. Removing plants and bushes, covering open drains, monitoring wetlands and filling open pits helps in mosquito control. Mosquito repellents are important tools for prevention of dreadful diseases as well as painful mosquito bites. Mosquitoes and mosquito larva can be killed effectively with synthetic chemicals; however synthetic chemicals raise numerous environmental issues. Thusplant based mosquito repellents

are promisingas they prevent mosquito bites and alsoprovide herbal protection from mosquito bites.The plants can be used alone or combined for effective protection against mosquitoes. They can also be used for control of mosquito breeding. They also offer safer alternative to synthetic chemicals (Barnard and Dexue, 2004).

Paradigm shift towards botanicals: Synthetic repellents have been formulated and advocated. However, continuous and indiscriminate use of these synthetic repellents causes adverse effects on the user (Mandal, 2011). Plant based mosquito repellents serves as an alternative to insecticide based repellent. Insect repellents date back to ancient times, with the use of tars, smokes, plant oils and other modalities (Peterson and Coats, 2001). Essential oils could be also used as a better and safer substitution of chemical repellent substances such as *DEET* (Barat *et al.*, 2012). Lemon grass (*Cymbopogoncitratus*) essential oil has been investigated for its repellent activity against mosquitoes respectively. Approximately 80% repellence activity has been observed. It showed all-out (50 80%) protection time in comparison to the activity of the best known chemical insect repellent, N, N-diethyl-mtoluamide (DEET). It can be concluded that lemon grass oil is a promising natural repellent due to its safety advantage over chemical repellents (Shooshtari *et al.*, 2013). There has been a paradigm shift towards botanicals to overcome the problems associated with the use of synthetic compounds. Plant products have been used traditionally to repel and kill mosquitoes in many parts of the world. Plant based products have been used as repellents either as topical applicant (Samuel *et al.*, 2012) or fumigant and many plant species have been screened for their repellent and insecticidal properties (SuKumar *et al.*, 1991).

Plant based mosquito repellents:

Currently the use of synthetic chemical to control insect and arthropod raises concerns related to human health and environment so the alternative is to use plant based repellants that possess good efficacy and are environmental friendly.In recent years, several plants extracts including neem (*Azadirachtaindica, A. bJuss*), Citronella grass (*CymbopogannardusRendle*), basil

(*Ocimumbasilicum L.*, *Ocimumgratissimum L.*, *Ocimumamericanum L.*), clove (*Syzygiumaromaticum L.*), prickly straggler (*Solanumtrilobatum L.*), musk basil (*Moschosmapolystachyum L.*) and thyme (*Thymus vulgaris L.*) have been studied as possible mosquito repellents (Gillij, *et.al.*, 2007). Among the plant families with promising essential oils used as mosquito repellents, *Cymbopogon spp*., *Ocimum spp*. and *Eucalyptus spp*. are the most cited. Individual compounds present in these mixtures with high repellent activity include α-pinene, limonene, citronellol, citronellal, camphor and thymol (Tawatsin *et al.*,2002). Essential oils extracted from flowers of *Lavandulaofficinalis*, leaves of*Rosmarinusofficinalis*, herb of*Ocimumbasilicum* belonging to the family (Lamiaceae), *Melissa officinalis*(Labiatae),peel of *Citrus limonum (*Rutaceae),leaf of *Eucalyptus globolus*(Myrtaceae) serve as mosquito repellent (Shooshtari *et al.*, 2013).Out of 105 (52.5%) homemade herbal medicine user, *Azadirachtaindica*leaves was the most frequently mentioned 72 (68.6%) species(SinghandSingh.,2014). *Lavender* and *Eucalyptus* oils rather than other oils had a better repellent effectiveness, 97.16 and 97.15% respectively, against *anopheles*Therefore, they could be recommended as a safe and suitable substitution of chemical repellent(Gillij *et al.*, 2007).The potential of volatile oils extracted fromturmeric, citronella grass and hairy basil as topicalrepellents against both day and nightbitingmosquitoes has been demonstrated(Tawatsin*et al*., 2001). The repellent efficiency of 38 essentialoils against mosquito bites was compared, includingthe species *Aedesaegypti*and found Citronella oil as themost effective and provided 2 hours of repellency(Trongtokit *et al.*,1995).Thusthe plant-based repellents provide an effective and environmentally sustainable alternative to synthetic chemical repellents.

Conclusion: Diseases transmitted by mosquitoes remain a major source of death worldwide. Mosquito borne diseases currently represent a great health problem in tropical and subtropical climate. Mosquito repellent like lemon, Eucalyptus oil, citronella oil, cinnamon oil, castor oil etc. are

the essential oils that repelmosquitoes.The natural plant based mosquito repellents are immensely effective. They provide an attractive alternative to commercial mosquito repellents.

Acknowledgement: Authors are thankful to Botany department B.N. Bandodkar College of Science for providing the laboratory facility.

References:

Babu, C. J., Nair, A. S. and David, B. V. (2004). Handbook of malaria, diseases, its vectors and management. Namrutha publication Chennai. First edition 2004. pp 21 -22.

Barnard, D. R. and Dexue, R. D. (2004). Laboratory evaluation of mosquito repellents against *Aedesalbopictus, Culexnigripalpus* and*Ochlerotatustriseriatus*(Diptera: Culicidae). *J. Med. Entomol*, 41:726-730.

Combemale, P. (2001). The prescription of repellents. *Med. Trop. (Mars)*, 61(1):99-103.

Gillij, Y.G., Gleiser, R.M. and Zygadlo, J.A. (2008). Mosquito repellent activity of essential oils of aromatic plants growing in Argentina. *Bioresour. Technol*, 99(7): 2507–2515.

Mandal, S. (2011). Repellent activity of Eucalyptus and *Azadirachtaindica* seed oil against the filarial mosquito *Culexquinquefasciatus* Say (Diptera: Culicidae) in India, *Asian Pacific Journal of Tropical Biomedicine*, 1(2): S109-S112.

Moore, S. J. and Lenglet, A. Hill N. In: Insect Repellents: Principles Methods, and Use. Debboun M, Frances SP, Strickman D, editor. Boca Raton Florida: CRC Press; 2006. Plant-Based Insect Repellents.

Moreira, L. A., Ghosh, A. K. and Abraham, E. G. (2002). "Genetic Transformation of Mosquitoes: A Quest for Malaria Control", *Int. J. Parasitol*., 32: 1599-1605.

Osimitz, T. G. and Grothaus, R. H. (1995)s. "The Present Safety Assessment of DEET". *J. Am. Mosq. Control Assoc.*, 11: 274-278.

Peterson C., and Coats J., (2001). Insect repellents- past, present and future.*Pesticide Outlook*, 12: 154-158.

Pichersky, E. and Gershenzon, J. (2002). The formation and function of plant volatiles: perfumes for pollinator attraction and defense. *Curr.Opinion Plant Biology*, 5:237–243

Pohlit, A. M., Lopes, N. P., Gama, R. A., Tadei, W. P. and Neto, V. F. (2011).Patent literature on mosquito repellent inventions which contain plant essential oils-a review.*Planta Med.*, 77(6):598-617.

Samuel, T., Ravindran, K. J., Eapen, A. and William, S.J., (2012) Repellent activity of *Ageratum houstonianum* Mill. (Asteraceae) leaf extracts against *Anopheles stephensi*, *Aedesaegypti* and *Culexquinquefas ciatus* (Diptera: Culicidae). *Asian Pacific Journal of Tropical Disease*, 2(6): 478-480

Shooshtari, M. B., Kashani, H. Heidari, H. S. and Ghalandari, R. (2013). Comparative mosquito repellent efficacy of alcoholic extracts and essential oils of different plants against *Anopheles Stephensi.African Journal of Pharmacy andPharmacology*, 7(6): pp. 310-314

Singh, B., Singh, P. R. and Mohanty, M. K. (2012). Toxicity of a plant based mosquito repellent/killer. *Interdiscip.Toxicol.*, 5(4): 184–191.

Singh, S. and Singh, R. (2014). Herbal Medicinal Treatment of Malaria in Aliero Local Government Area, Kebbi, Nigeria. *Journal of medicinal plant studies*,2(2):117-126.

Sukumar, K., Perich, M. J., and Boober, L. R. (1991). Botanical derivatives in mosquito control: A review. *Journal of the American Mosquito Control Association*, 30: 122-124.

Tawatsin, A., Wratten, S. D. and Scott, R. R. (2001). Repellency of volatile oils from plants against three mosquito vectors. *J. Vector Ecol.*, 26: 76-82

Tawatsin, A.,Thavara, U., Chompoosri, J. (2002). Field evaluation of mosquito coils derived from plants against night-biting mosquitoes in Thailand. *Proc Inter Conf on Biopesticides*, 3: 243-253.

Trongtokit, Y., Rongsriyam, Y., Komalamisra, N. and Apiwathnasorn, C.(2005). Comparative repellence of 38 essential oils against mosquito bites. *Phytother Res*, 19(4):303-309.

Available online www.vpmthane.org

JBNB

CONTRIBUTION OF BHASKARACHARYA IN MODERN MATHEMATICAL CONCEPTS: AN OVERVIEW

Minal Wankhede Barsgade

Department of Mathematics , B.N.Bandodkar College of Science, Thane, India

Email: minaltbw@gmail.com

Received on :15/02/2015 ;Accepted on : 20/02/2015

Abstract:

Indian culture has a vast heritage in every field. The subject mathematics also has a great cultural heritage in India. It is the most to correctly understand our cultural heritage and interpret it for outside world. Many Indian Mathematicians have immense contribution in developing the subject of Mathematics from ancient to medieval and modern mathematics as well. Among many Indian mathematicians, the contribution of Bhaskaracharya is really noteworthy. Many modern mathematical concepts like differential calculus, trigonometry, Instantaneous Velocity were known to Bhaskaracharya before its inception.

This paper throws light on these modern mathematical concepts known to Bhaskaracharya and tries to work out with the comparative study of the mathematician like Newton, Euler, Lagranges, Leibnitz and Galois, who were considered to be pioneer of these concepts.

Keywords: differential calculus, trigonometry, instantaneous velocity

Introduction:

Indian mathematics has its glorious root in the civilization. We need to explore various causes of lacking its expansion during ancient and medieval period. In Indian subcontinent, mathematics flourished under the banner of Hindu astronomy and after the emergence of Jain and Buddhist philosophy in about 300 B.C. Indian mathematics grew interacting each other. The modern mathematical concepts like, integral calculus, derivative, spherical trignometry are considered to be originated by the foreign mathematician Newton, Leibnitz etc. But the

book "Siddhanta Shiromani" i.e. crown of Siddhanta, written by Bhaskarachrya in 12th century is the true origin of modern mathematical concepts.

His work, "Siddhanta Shiromani" is a book basically on astronomy which contains the preliminary concepts of Infinitesimal calculus, mathematical analysis, trigonometry and integral calculus.

Bhaskaracharya was acquainted with the idea of differential calculus. It seems however that he did not understand the utility of his research and the historians of mathematics generally neglect this achievement. Bhaskaracharya also goes deeper into the differential calculus and suggest the differential coefficient vanishes at extreme value of the function, indicating the knowledge of infinitesimals.

In computing instantaneous velocity of a planet, the time interval between successive positions of the planets was no greater than truti or 1/33750 of a second and his measure of velocity was expressed in this infinitesimal unit of time.

All his work is actually an advancement of the work already done by Indian mathematician. The so called golden age of Indian mathematics can be said to extend from 5th to 12th centuries. It has been found that some very advanced mathematical discoveries were made at a very early time in India. Before 1000 B.C. provide evidence of the use of arithmetic operations such as addition, subtraction, multiplication, fraction, squares, cubes and square roots. Before Pythagorus, Shulbha sutra listed several Pythagorean triplets in 8th century B.C.

Lack of development in History of Indian Mathematics:

Very few books are written on the development and history of Indian mathematics. Though the results and discoveries made by Indian mathematicians is being catalogued, there has been a total lack of attention to the methodology and foundation of Indian mathematics. There is a very little discussion of the arguments by which Indian mathematicians arrive at and justify their results. In the same way no attention is paid to the philosophical

foundation of Indian mathematics, its understanding of the nature of mathematical objects, the nature of mathematical knowledge and the nature of validation of mathematical results and processes.

It is often said that no rigorous proofs are advanced in Indian mathematics, while the modern scholars seems to be unanimous in holding the view that Indian mathematics totally lacks any notion of proofs.

In fact some of the results were noted in various European works on Indian mathematics up to the first half of the nineteenth century. It would be interesting to find out how the currently popular view, that Indian mathematics lacks the very notion of proof, has come about during the last 100 – 150 years.

One of the major reasons for our total lack of comprehension, not merely of the notion of proof, but also of the entire methodology of Indian mathematics, is the scant attention; we have so far paid to the source work themselves.

The recently published book "Source book of Indian astronomy" list about 285 works published in mathematics and mathematical astronomy, of which about 50 are works written prior to 12 th century A.D. About 75 are works written during 16-19 centuries. A serious study of even the published works would give us a reasonable idea of the methodology of Indian mathematics and astronomy.

History of Trigonometry:

Development of trigonometric functions is having rich diverse history. Trigonometry is not the work of one man or a nation. It is developed independently in India from 5^{th} century onwards from the work "siddhanat" whose author is unknown. India is the one in the development of the word "sine".

Spherical trigonometry is the branch of trigonometry in which its principals are applied to spherical triangles which are the triangles on the surface of the sphere. This trigonometry is only discussed in more advanced mathematics classes.

The trigonometry of Ptolemy was based on the functional relationship between chords of a circle and the central angle they subtend. The writers of the Siddhanta changed this to a study of the relationship of half of a chord of a circle and half of the angle subtend at the centre by the whole chord. From these stemmed the predecessor of modern trigonometric function known as the sine of the angle. So the chief contribution India and mainly Siddhanata is the mere formal introduction of sine function to the history of mathematics.

Development of trigonometry in India:

Trigonometry significantly developed in India in 4 th – 5 th century. In siddhant, sine is defined between half an angle and half a chord while also defining the cosine, versine and inverse sine. Aryabhatta (476 – 550 A.D.) collected and expanded upon the development of the Siddhanta in "Aryabhatiya". The Siddhanta and Aryabhatiya contains the earliest surviving tables of sine values and versine (1- cosine) value in 375^0 intervals from 0^0 to 90^0, to an accuracy of 4 decimal places. They used the word jya for sine, kojya for cosine, utkarma-jya for versine and otkarma-jya for inverse sine.

Bhaskara I in 7 th century produced a formula for calculating the sine of an acute angle without use of a table. Later on Bramhagupta developed the formula $1 - \sin^2 x = \cos^2 x$.

Bhaskara II in 12^{th} century developed spherical trigonometry and discovered many modern trigonometric results. He is the one who discovered the following trigonometric formulae:

$$\sin(a+b) = sina * cosb + cosa * sinb$$

$$\sin(a-b) = sina * cosb - cosa * sinb$$

Indian mathematician were the first to give a real life application to tangent, relating it to shadow and heights. By 1150 A.D. the ideas of the six trigonometric functions existed, they were just not named as we know them today.

Euler has some input in the development of trigonometry. In his work, Sine was no longer a line segment, rather it transformed

into a number or ratio. He is the one who has given the name "sine, cos, tan" etc. He gave the strict analysis of trigonometric functions. The creation of trigonometry took thousand years and it was being developed and expanded before anyone recognizes it as a subject worth studying.

Origin of Calculus in India:

The Indian mathematician –astronomer Aryabhatta in 499 A D used a notion of infinitesimals and expressed an astronomical problem in the form of basic differential equation. Manjula in the 10^{th} century, elaborated on this differential equation in a commentary. This equation is eventually led Bhaskaracharya to develop the concept of infinitesimal change, and he described the early form of Rolle's theorem.

The discovery of calculus is often attributed to two men, Isaac Newton and Gottfried Leibnitz who independently developed its foundation. Newton considered variables changing with time, Leibnitz thought of the variables x, y as ranging over sequences of infinitely close values. Leibnitz introduced dx and dy as differences between successive values. Newton used quantities x and y which are finite velocities to compute x and y. Much of the notation used today is due to Leibnitz.

In the development of Calculus, both Newton and Leibnitz used "infinitesimals" quantities that are infinitely small and yet nonzero. After 100 years, Cauchy, Weirstrass, Riemann reformulated calculus in terms of limits rather than infinitesimals. The derivative and integration were reformulated in terms of limits.

Mathematical work of Bhaskaracharya:

The most renowned Indian mathematician and astronomer before the advent of modern European science was Bhaskaracharya. In his thirty-sixth year he wrote the famous Siddhanta Shiromani. It consists of four parts, Arithmetic under the title, Lilavati, Algebra (bijganit), Goladhyaya (spherical trigonometry), Grahaganita (Planetory motion). In astronomy he worked on the idea of instantaneous velocity and discovered the derivative of sin x.

Lilavati is modern text book on Elementary mathematics. It includes algebra, geometry, mensuration, permutation, combination, area, volume etc. In spherical trigonometry, the advanced formula of

sin(x + y) is found to be proved. Instantaneous velocity, derivative and its application in terms of Mean value theorem is actually the first evidence in Siddhanta Shiromani. Inspite of the early evidences of advanced mathematics, the due credit was not given to Bhaskarachraya.

Rolle's Theorem:

The subject of Calculus includes hundreds of theorems and equations that have been derived throughout centuries. Each theorem contributes to new computations on different levels of calculus. French mathematician Michel Rolle discovered the theorem in 1691. The name Rolle's theorem was given to the basic result by Giusto Bellavitis in 1846.

Statement of Rolle's theorem:

If a function f is continuous on closed and bounded interval [a, b], differentiable on open interval (a, b) such that f(a) = f(b) then the derivative of f vanishes at some intermediate point.

In other words, if f is continuous curve that has a unique tangent line at every point of the interval and has the same value at each of the end points, then somewhere in the interval f has a horizontal tangent line.

Bhaskaracharya's theorem (Rolle's Theorem):

Evidence of Rolle's theorem in the work of bhaskaracharya:

When a planet is either in apogee or in perigee the equation of the centre vanishes, hence he concludes that for some intermediate position the increment of the equation of centre (i.e. differential) also vanishes.

Evidence of the formula of sin(x + y) :

The formula for sin(x + y) which is given in verses 21, 22 in the form

$$Hsin(x+y) = \frac{HsinxHcosy + HcosxHsiny}{R}$$

Similarly the formula for Hcos (x + y) is obtained by putting 90 – (x+ y) for (x + y)

Determination of H sin (A + B) from H sin A, H sin B, H cos A, H cos B is called Samasa-Bhavana and that of H sin (A – B) is called Antara- Bhavana and computation of H sin A and H cos A is called Tulya_ Bhavana.

The proof of d (sin x) = cos x dx given by the Bhaskaracharya:

Since

$$Hsin(x+1) = \frac{Hsinx + HcosxHsin1}{R}$$

$$Hsin(x+1) - Hsinx = \frac{HcosxHsin1}{R} = Hcosx * k$$

Hence the variation in the function H sin x is proportional to H cos x.

Let it now be required to find the increment in H sin x for an increment dx in x where dx < 60.

$$Let\ Hsin(x+1) - Hsinx = \frac{60Hcosx}{R} = y$$

$$y\frac{dx}{60} = \frac{60Hcosx}{R} * \frac{dx}{60}$$

$$y\frac{dx}{60} = \frac{Hcosxdx}{R}$$

Hence ,

$$Hsin(x+dx) - Hsinx = d(Hsinx) = \frac{Hcosxdx}{R}$$

$$d(sinx) = cosxdx$$

Attention was drawn to the occurrence of this formula by Pandit Bapudev Shashtri in 1858. Bhaskaracharya is thus the first Mathematician to have perceived this differential formula 500 years before Newton and Leibnitz.

Method of finding Volume of a sphere using integral calculus by Bhaskaracharya:

Consider on the surface of the sphere pyramidal excavations, each of a base of an unit area having unit sides and of a depth equal to the radius, as many as the number of units of area in the surface. The apices of these pyramids meet at the centre of the sphere. The sum of the volumes of the

pyramids is equal to the volume of the sphere. So it is proved that the volume of a sphere is equal to the sixth part of the product of the surface area and diameter.

This result is the nearest approach to the method of integral calculus in Hindu mathematics. It is observed that the modern idea of the "limit of a sum" is not present but the idea is of comparatively recent origin of the integral calculus, so the credit must be given to Bhaskaracharya.

Conclusion:

A lot need to be done to honor the rich mathematical heritage. There is an increasing awareness around the world that as one of the ancient cultures, India has attributed substantially to the global scientific development in many spheres and mathematics has been one of the recognized areas in this respect.

The country has witnessed steady mathematical development over most part of the last 3000 years, throwing up many interesting mathematical ideas well ahead of their appearances elsewhere in the world, though at times they lag behind, especially in the recent centuries. The history of Indian mathematics suffers from the fact that foreigners were the first to write it and promulgate their views about it to the world at large. In books of History of Mathematics written in Europe and America, the reference to Asiatic Mathematics is naturally meager.

It is therefore deemed necessary to set forth a brief account of India's mathematical past with special reference to contribution in advanced mathematics, which is anticipation of modern work.

References:

[1] Dr. D Arkkasomayaji, *Siddhanta Shiromani Of Bhaskaracharya* ,Kendriya Sanskrit Vidyapeeth, Tirupati, 1980.

[2] Lancelet Wilkinson, ESQ, C.S., *Siddhanta Shiromani*, Revised by Pandit bapu Dev Shashtri, 1861.

[3] S.G.Dani, *Ancient Indian Mathematics – A Conspectus*, Resonance, march 2012.

[4] B Datta and A N Singh, *History of Hindu Mathematics: A source book*, Asia Publishing house, 1962.

[5] History of Calculus – Wikipedia, the free encyclopedia.

[6] A.A.Krishnaswami Ayyengar, *Peeps into India's mathematical Past*

[7] Kim Plofker, *Mathematics In India*, Princeton University Press, 2008.

Available online www.vpmthane.org

JBNB

PRELIMINARY PHYTOCHEMICAL EVALUATION OF *TRIDAX PROCUMBENS* L.

Deshmukh, A. P. Phirke, S. S. and Saha, M.

Department of Botany, B. N. Bandodkar College of Science Thane-400601

Email: aishdeshmukh2011@gmail.com

Received on : 15/02/2015 ; Modified and Accepted on : 15/02/2015

ABSTRACT: Traditional medicine is an important source of potentially useful new compounds for the development of new therapeutic agents. The essential values and uses of some plants have been worked out and published, but many of them remain unexplored to date. Therefore, there is a necessity to explore such plants and investigate their phytochemical and pharmacological properties. *Tridax procumbens* L. is a spreading annual herb found throughout India but it is lesser known for its medicinal properties. Hence, the present paper aims to study the preliminary phytochemical in *Tridax procumbens* L. Preliminary phytochemical analysis showed the presence of alkaloids, steroids, proteins, sapponins, resins, tannins, phenols, mucilage, carbohydrates, glycosides, fats and fixed oils, steroids, acid compounds and aleurone grains in different solvent.

KEY WORDS: *Tridax procumbens* L., Preliminary phytochemical, Microscopical analysis

INTRODUCTION: Nature has been a source of medicinal agents for thousands of years and an impressive number of modern drugs have been isolated from natural resources. *Tridax procumbens* L. is a common medicinal herb used by ethno-medical practitioners. It belongs to the family Asteraceae. It is common widespread weed and a pest plant. *Tridax procumbens* L. *is* native to tropical America but it has been introduced to tropical, subtropical and mid temperate regions worldwide. The plant is a procumbent herb and is valued for its pharmaceutical properties. The plant is found throughout India and is used as indigenous medicine for variety of ailments. The plant also shows various pharmacological activities like immunomodulatory, antidiabetic (Durgacharan *et al*., 2008), anti hepatotoxic, anti-oxidant (Reddipalli *et al*., 2008), anti-

inflammatory, analgesic and marked depressant action on respiration. *Tridax procumbens* L. is lesser known for its medicinal properties. Hence, the present paper aims to study preliminary phytochemical analysis in *Tridax procumbens* L.

MORPHOLOGICAL FEATURES:

Tridax procumbens L. is a small perennial herb having short, hairy blade like leaves. Corolla is yellow in colour. It is a common weed which grows in open places, coarse textured soils of tropical regions, sunny dry localities, fields, waste areas, meadows and dunes. It is a semi prostate, annual, creeper herb (Plate 1A). The stem is ascending, 30-50cm in height branched, sparsely hairy, rooting at nodes (Plate 1 B). Leaves are simple, opposite, exstipulate, lanceolate to ovate. 3-7 cm long irregularly toothed margin, base wedge shaped, short petiole, hairy on both surfaces (Plate 1 C). Flowers are tubular, yellow with hairs, inflorescence capitulum. Tridax has two types of flower: ray florets and disc florets with basal placentation. Flowering and fruiting occurs throughout the year (Plate 1 D). Fruits are hard achene covered with stiff hairs and having a feathery, plume like white pappus at one end. The plant is invasive in part because it produces so many achenes and each achene can catch the wind in its pappus and be carried some distance. Calyx is represented by scales or reduced to pappus (Plate 1E).

MATERIALS AND METHODS:

Collection of Plant material: The plant material of *Tridax procumbens* L. were collected, dried, powdered and stored in air tight containers separately.

Preparation of crude extract: 500 mg of *Tridax procumbens* L. plant powder was extracted separately in 100 ml of five different solvents (Water, Ethanol, Methanol, Ethyl Acetate and Toluene) overnight. The content was filtered through Whatman filter paper No. 1. The filtrate was evaporated on boiling water bath until dry. The extracts were reconstituted in same solvents and then stored in freezer for further use.

Phytochemical Screening: Qualitative chemical examination of the dried leaf powder of *Tridax procumbens* L. revealed the presence or absence of various plant constituents in different chemical extracts.

The observations were recorded in + (present) or – (absent). The tests were performed according to Khandelwal (1998) and Kokate (2007).

RESULTS AND DISCUSSION:

The preliminary phytochemical studies showed the presence of various components. The phytochemicals detected in extracts were alkaloids, steroids, proteins, sapponins, resins, tannins, phenols, mucilage, carbohydrates, glycosides, fats and fixed oils, steroids, acid compounds and aleurone grains. Aqueous extract showed the presence of aleurone grains, alkaloids, carbohydrates, fats and fixed oils, glycosides, phenols, tannins and sapponins. Alcohol extract showed the presence of acid compounds, aleurone grains, proteins, mucilage, steroids and resins. Methanol extract showed the presence of acid compounds, aleurone grains, alkaloids, proteins glycosides, flavonoids, steroids, tannins and resins. Ethyle acetate extract showed the presence of aleurone grains, carbohydrates, glycosides, mucilage, steroids and resins. Tolune extract showed the presence of aleurone grains, carbohydrates, fats and fixed oils and resins.

The present study shows the presence of forteen phytochemicals in *Tridax procumbens* L. Screening of phytochemicals present in any plant is very important because the phytochemicals are the major factors in identification of plant drugs. It is also important to study pharmacological characters as it helps to determine the medicinal uses of plant (Table 1). *Tridax procumbens* L. plant has been found to possess significant medicinal properties against blood pressure, bronchial catarrh, malaria, dysentery, diarrhea, stomach ache, headache, wound healing, it also prevents hair fall and check hemorrhage from cuts and bruises (Ali *et al*., 2001). Its flowers and leaves possess antiseptic, insecticidal and parasitical properties (Sahoo and Chand, 1998). Thus *Tridax procumbens* L. may be used in the pharmaceutical and cosmetic industries for the development of new drug formulation. Essential oil can be used as modern medicine with the combination of new pharmaceutical and drug designing methodologies (Manjamalai and Grace, 2010).

CONCLUSION: The qualitative analysis revealed the presence of the biomolecules such as anthraquinone, catachol, flavonoids, phenolic compounds, saponins, steroids, tannins and terpenoids. This study on *Tridax procumbens* L. was desired to investigate novel therapeutic agents with diverse pharmacologic properties. This creates a huge room for research in direction of more pharmacological investigates in plant and to elucidate the mechanism of action of same in future.

ACKNOWLEDGMENTS: Authors are thankful to Botany Department, B. N. Bandodkar College of Science, Thane for providing the laboratory facilities.

Table 1: Preliminary phytochemical analysis of *Tridax procumbens* L.

S. N	Test	T	EA	Al	M	Aq
1	Acid compounds	-	-	+	+	-
2	Aleurone grains					
	Picric acid	+	+	+	+	+
	Iodine solution	+	+	-	+	+
3	Alkaloids					
	Mayer's rgt	-	-	-	-	-
	Dragondoff' rgt	-	-	-	-	-
	Wagner's rgt	-	-	-	+	+
4	Anthraquinone	-	-	-	-	-

5	Amino acids	-	-	-	-	-
6	Proteins					
	Heat	-	-	+	-	-
	TCA	-	-	+	+	-
7	Carbohydrates	+	+	-	-	+
8	Starch	-	-	-	-	-
9	Fats and fixed oils	+	-	-	-	+
10	Glycosides	-	+	-	+	+
11	Mucilage	-	+	+	-	-
12	Phenols	-	-	-	-	+
13	Flavonoids					
	NaOH	-	-	-	+	-
	Lead acetate	-	-	-	-	-
14	Steroids	+	+	+	+	-
15	Tannins					
	Lead acetate	-	-	-	+	+
	$FeCl_3$	-	-	-	-	-
16	Saponins	-	-	-	-	+
17	Essential oils	-	-	-	-	-
18	Resins					
	$FeCl_3$	+	+	+	+	-
	Turbidity test	-	-	+	+	-

+ = Present; - = Absent

Values are mean of three determinants

T: Toluene; EA: Ethyl acetate; A: Alcohol:

M: Methanol; Aq: Aqueous

REFERENCES:

1. **Ali, M., Ravinder, E. and Ramachandram, R**. (2001). Phytochemical communication a new flavonoid from the aerial parts of *Tridax procumbens. Fitoterapia*, **72**: 313-315.

2. **Christudas, S., Kulathivel, T. M. and Agastian, P.** (2012). Phytochemical and antibacterial studies of leaves of *Tridax procumbens* L. *Asian Pacific Journal of Tropical Biomedicine*, 159-161.

3. **Durgacharan, B. A., Killedar, S. G. and Adnaik, R. S.** (2010). Anti-diabetic activity of leaf extract of *Tridax procumbens*; *International Journal of Green Pharmacy*, **2(2):**126-128.

4. **Ganju, K. and Pathak A. K**. (2013). Pharmacognostic and Phytochemical Evaluation of *Tridax procumbens* Linn. *Journal of Pharmacognosy and Phytochemistry*, ISSN -2278- 4136, **1(5):** 42-46.

5. **Khandelwal, K. R.** (1998). Practical Pharmacognosy. Nirali Prakashan, Pragati Books Pvt. Ltd. India. 23.1-23.17.

6. **Kokate, C. K.** (2009). Practical pharmacognosy published by Vallabh prakashan, Delhi. pp107-111.

7. **Manjamalai, A. and Grace, V. M. B.** (2010). Effect of Essential Oil of *Tridax Procumbens* Linn on *In –Vivo* Antioxidant Level in Cancer Model and *In –Vitro* Free Radical Scavenging Activity. *International Journal of Pharmaceutical Analysis*, ISSN- 2051-2740, **37(10):** 261-271.

8. **Mundada, S. and Shivhare, R.** (2010). Pharmacology of *Tridax procumbens* a Weed: Review. *International Journal of Pharm. Tech. Research*, ISSN- 0974-4304, **2(2):** 1391-1394.

9. **Reddipalli, H.,** (2008). Anti-hepatotoxic and anti-oxidant defense potential of *Tridax procumbens. Int. J. of Green Pharmacy*, **l.2(3):**164-169.

10. **Sahoo, M. and Chand P. K.** (1998). *In vitro* multiplication of a medicinal herb *Tridax procumbens* L. (Mexican Daisy, coat button): influence of explanting season, growth regulator synergy, culture passage and planting substrate. *Phytomorphology* **48**: 195 – 206.

11. **Sawant, R. S. and Godghate, A. G.** (2013). Preliminary phytochemical analysis of leaves of *Tridax procumbens*

Linn. *International Journal of Science, Environment and Technology*, ISSN 2278-3687 (O), **2(3)**: 388-394.

12. **Sutar, M., Malvankar, K. and Singh, S.** (2013). Pharmacognostical and phytochemical investigation of leaves of a weed *Tridax procumbens* Linn. *International Journal of Current Pharmaceutical Research*, ISSN- 0975-7066, **5(1):** 29-33.

Plate 1: A – Stem of *Tridax procumbens* L. B – Leaf of *Tridax procumbens* L.
C – Flower of *Tridax procumbens* L. D – Seeds of *Tridax procumbens* L.

Available online www.vpmthane.org

JBNB

Efficiency of pharmaceutical reactions

Anita S. Goswami – Giri

Department of Chemistry, B.N.Bandodkar College of Science, Thane (MS)-1

Abstract:

The process for the reduction of hazardous generation substances or from the products is needed to attain for ease of environment. To get exact idea of designed materials used in the process or into final product, efficiencies of reactions shall be studied. Hence present paper is focusing on the economy of pharmaceutical reactions.

Key word: Atom economy, E-factor; selectivity

Introduction:

A chemical reaction is a process that leads to the transformation of one set chemical substances to another that has different chemical identity. Hence it is necessary to study the actions of reactant material, its products and also its efficiency. But in number of reactions reactants may not present to balance it. Hence to design and invention of new reactions which gives the depth knowledge of green synthesis were selected.

Green chemistry is defined as the utilization of a set of principles that reduces or eliminates the use or generation of hazardous substances in the design, manufacture and application of chemical products. The arm of pharmaceutical chemistry concerned with the development and optimization of a synthetic method and pilot plant procedure to manufacture compounds for the drug development phase and tasked with designing and synthesizing molecules on small scale in the early drug discovery phase.

Chemically, atom economy/efficiency describes the conversion efficiency of a chemical process in terms of all atoms involved /desired products produced. In an ideal chemical process, the amount of starting materials or reactants equals the amount of all products generated and no atom is wasted. High raw material costs and increased sensitivity to environmental

concerns have made atom economical efficiency is addressed approaches more popular. Hence atom

Materials and Methods:

Three reactions was consider for its economy and calculated as follows:

The three reactions are **Buchwald**–Hartwig amination ,Suzuki reaction, Reductive amination are selected for the efficiency study.

$$\% \text{ atom economy} = \frac{\text{(Molecular weight of desired product}}{\text{Molecular weight of all reactants)}} \times 100$$

Efficiency of a Reaction measured or calculates the yield

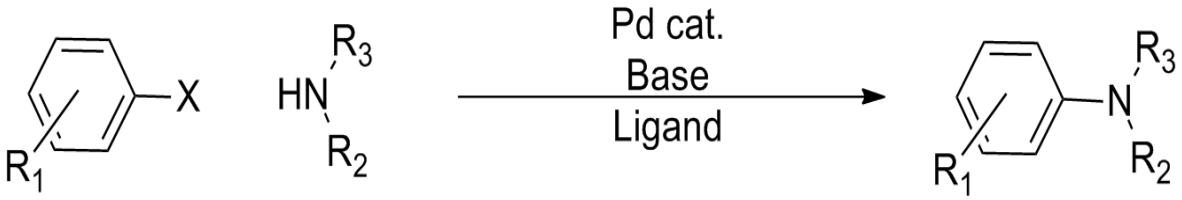
$$\text{Theoretical yield} = (\text{moles of limiting reagent}) \times \frac{\text{(stoichiometric ratio; desired product)}}{\text{(Limiting reagent)}} \times (\text{MW of desired product}$$

To evaluate the efficiency of the reaction, chemists compare the theoretical and actual yields by calculating the percentage yield of reactions.

Percentage Yield = (Actual yield / Theoretical yield) × 100

Result and discussion: All three reactions efficiency characteristics shown in table.

1. **Buchwald–Hartwig Amination** - e.g penicillin

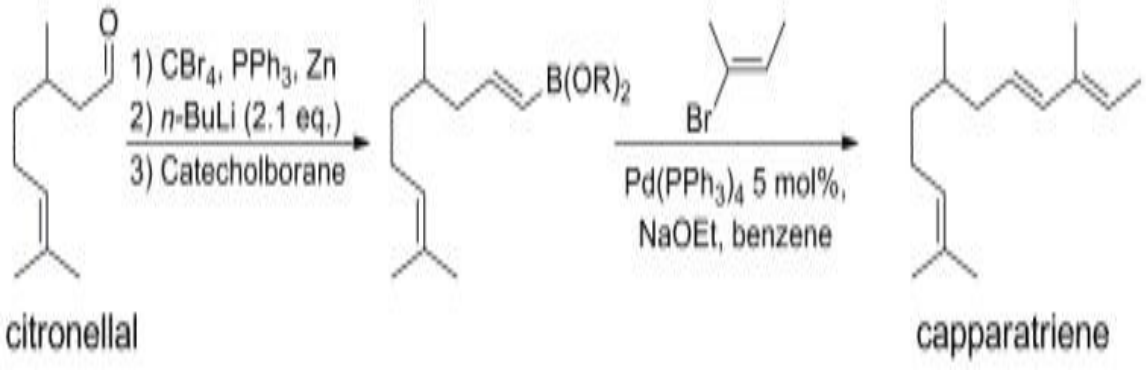


X = Cl, Br, I, OTf
R_2 = Alkyl, Aryl, H
R_3 = Alkyl, Aryl

Efficacy of palladium-catalyzed reactions of aryl halides with an array of amines has been demonstrated which can be used commercially. Electron-poor, electron-neutral, and electron-rich aryl halides (X) participated in the process and exhibited the length of. C-C, C-N, and C-O bonds have increased. Significant stereo electronic contrasts exist between these two ligands which help account for differences in the activities of the Pd/**2** and Pd/**3**catalytic systems.**(**Sameer Urgaonkar etal, 2003) but this reactions is moisture sensitive at R2 but not at R3.

This synthesis having nearby 13 starting material producing 137 products renewable methodology .The presence of sulfides, it is commonly used functional group in drugs . (AA Kanakis, V Sarli , 2010)

2. Suzuki reaction e.g **leukemia**

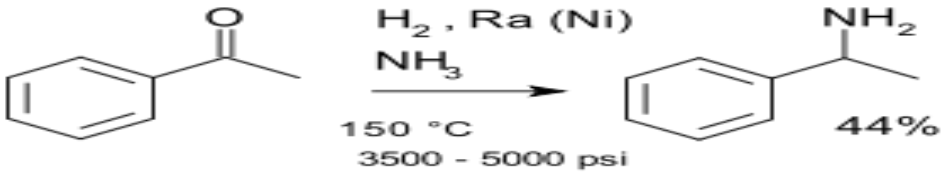


The palladium-catalyzed cross-coupling reaction between different types of organoboron compounds, sp^2-, sp^3-, and sp-hybridized carbon-boron compounds and various organic electrophiles in the presence of base provides a powerful and general methodology for the formation of carbon-carbon bonds. The coupling reaction offers several advantages. (Akira Suzuki 2002) also displays remarkable selectivity.hence it is acts as natural killer in leukemia. (Joa Kyum Kim etal., 2008)

Due to coupling it developed number of natural lacteals. This condensed cascade reactions produce 80- 89 % theoretical yield while practical yiels it exhibited 74%.

The number of experiments using even more complex bicyclic substrates to demonstrated the efficiency of these reactions because it is one pot synthesis.This reactionswas carried out by using 5 cm2 toluene are heated at 100^0C for 19 hr.After evaporation of solvent reactions product were analyzed for its efficiency.

3.**Reductive amination** (also known as **reductive alkylation**



Procedures for using this mild and selective reagent have been developed for a wide variety of substrate. saliphatic acyclic and cyclic ketones, aliphatic and aromatic aldehydes, and primary and secondary amines including a variety of weakly basic and nonbasic amines. Limitations include reactions with aromatic and unsaturated ketones and some sterically hindered ketones and amines. *(Anastassiya Pagnoux-Ozherelyeva et, al 2012).*

Sodium triacetoxyborohydride isreducing agent for the reductive amination of aldehydes and ketones. This reactions is also one pot synthesis and enantioselective and highly chemo selective and mild, efficient. Under solvent-free conditions with solid catalysts could enhance their efficiency.

Table: Reactions and its green characters.

SN	Reaction Name	Atom economy	E -factor	selectivity	**Efficiencies**	
					Theoretical Yield	% Yield
1	Buchwald–Hartwig amination	78%	0.27	Stero and Regioselectivity	0.789	78.9
2	Suzuki reaction	74%	0.60	steriospecific	0.74	74
3	Reductive amination	44%	0.13	Chemo selectivity Enanatio selective	0.44	44

Conclusion:

These selected reactions possible to assess the relative efficiencies. An efficient protocol for C−N cross-coupling reactions has been Simple, efficient catalyst system for the palladium-catalyzed amination of aryl chlorides, bromides, and triflates. Atom economy/efficiency of pharmaceutical reaction were calculated, this knowledge may used for the preparation of drugs reactions.

References:

1. Green Chemistry. (2014) In College Organic and Industrial Chemistry. Mumbai: Himalaya.

2. Sameer Urgaonkar , Ju-Hua Xu , and John G. Verkade * Application of a New Bicyclic Triaminophosphine Ligand in Pd-Catalyzed Buchwald−Hartwig Amination Reactions of Aryl Chlorides, Bromides, and Iodides *J. Org. Chem.*, 2003, *68* (22), pp 8416–8423

3. Akira Suzuki Cross-coupling reactions via organoboranes Journal of Organometallic Chemistry Volume 653, Issues 1–2, 1 July 2002, Pages 83–90.

4. Joa Kyum Kim , Young Ha Kim , Ho Tae Nam , Bum Tae Kim and Jung-Nyoung Heo Total Synthesis of Aristolactams via a One-Pot Suzuki−Miyaura Coupling/Aldol Condensation Cascade Reaction. *Org. Lett.*, 2008, *10* (16), pp 3543–3546.

5. AA Kanakis, V Sarli Total synthesis of (±)-marinopyrrole A via copper-mediated N-arylation *Org. Lett.*, 2010, *12* (21), pp 4872–4875.

6. Anastassiya Pagnoux-Ozherelyeva,Dr. Nicolas Pannetier,Dr. Mbaye Diagne Mbaye, Dr. Sylvain Gaillard and Prof. Jean-Luc Renaud' Knölker's Iron Complex: An Efficient In Situ Generated Catalyst for Reductive Amination of Alkyl Aldehydes and Amines. Angewandte Chemie Volume 124, Issue 20, pages 5060–5064, May 14, 2012.

Available online www.vpmthane.org

JBNB

Studies on Fungi from Indoor Corridors of Buildings

Moses Kolet and Ruchita Dhanavade

B.N.Bandodkar College of Science, Chendani, Thane 400601, Maharashtra

Email: mjkolet@hotmail.com

Received on : 20/02/2015 ; **Modified on:** 26/02/2015 **Accepted on**: 27/022015

ABSTRACT:

The investigation focused on painted surfaces of walls of corridors. Fungi are known to degrade walls and painted surfaces, causing deterioration, which was documented. The study was carried out in the corridors on the ground floor of B.N. Bandodkar College of Science, Thane. A total of 21 fungal forms belonging to 6 genera and 5 non sporulating sterile mycelia were isolated during the study. The results revealed dominance of genus *Aspergillus* which was represented by ten species. The most common fungal species encountered during the current study were *Aspergillus fumigatus* and *Penicillium citrinum*.

Key words: fungi, paints, *Aspergilli*, paint fungi

INTRODUCTION

Paints have had a long and intimate connection with human civilizations since ancient times. These are currently industrial products of mass manufacture; several different types and classes of paints are available for various uses (Zengolewicz, 2010) and the paint industry is expanding at a very rapid pace (Anon, 2015). Modern paints are known to contain many organic as well as inorganic constituents which also serve as favourable substratum for microorganisms, mainly the fungi (Ciferri, 1999). The fungi are known to damage walls, mainly due to their painted surfaces, which are known to harbor these natural agents of spoilage. Modern day paints do contain anti-microbial additives to thwart fungal damage (Schwensen *et al*., 2014) but these apparently only delay the deterioration, which eventually manifests itself in form of unevenly discoloured patches and ungainly pigmentations over the painted surfaces. The damage is faster, more evident and further compounded by seepage of water and prevalence of humid conditions.

The fungal organisms growing abundantly on such damaged wall surfaces may also be responsible for allergies, discomfort and disorders in sensitive individuals, an aspect to which medical attention is drawn (Elumalai *et al*., 2014) but also needs more studies and focussed research attention. In the present study, fungal organisms inhabiting painted surfaces of walls of three indoor corridors on the ground floor of two buildings of B.N. Bandodkar College of Science were isolated and studied.

MATERIALS AND METHODS

Samples of spoiled paint films were collected from painted wall surfaces of corridors situated on the ground floor of B.N. Bandodkar College of Science, Thane; by lightly scraping the discolored wall surfaces. The samples of scrapings were agitated in 10 ml sterile distilled water using a vortex mixer, 0.5 ml of which was directly plated on Potato Dextrose Agar and Malt Extract Agar plates amended with chloramphenicol @ 50 µg/L. Plates were incubated at room temperature and observed from 72-120 hrs for expression of fungal growth. Fungal colonies were isolated by transferring to new plates. The isolated forms were identified using standard literature (Gilman, 1967; Subramanian, 1971; Tzean *et al*., 1990) and confirmed at the fungal culture collection centre at Smt. CHM College, Ulhasnagar, District Thane, Maharashtra. The study was conducted over a period of six months, from July 2014 to January 2015.

RESULTS AND DISCUSSION

Fungi are known to play a role in the deterioration of paints applied over various surfaces. Fungal growth over the painted surfaces is further accelerated by increased humidity and moisture levels. The white painted surfaces constituting super white washable oil bound distemper paint, in the current study viz., walls of indoor ground floor corridors, showed visible symptoms of fungal deterioration such as patches of fungal growth, fouling of the painted surface, giving an ungainly dirty appearance and small reddish brown spots of pigmentations. A total of 21 fungal forms belonging to 6 genera and 5 non sporulating sterile mycelia were isolated during the current investigation which are shown in Table 1. The most represented genus was *Aspergillus* with ten species. The most common species encountered in the present investigation was *Aspergillus fumigatus*, followed by *Penicillium citrinum*. *P. citrinum* which produced reddish pigmentation on the reverse of culture plates, later turning dull reddish brown in colour, was also probably, responsible for the pigment spots developed on the walls. The results tally with those of Biswas *et al*. (2013).

Most of the fungal organisms isolated in the present investigation are known to cause

allergies, asthma and several other respiratory health risks (Sharpe *et al.*, 2015) which are a reason for concern. Aspergilli especially *Aspergillus niger*, *A. fumigatus* and *Trichothecium* were implicated in human disorders and health issues especially in immune compromised individuals (Chao *et al*., 2011). Hence it is necessary to isolate and document moulds and fungi responsible for such spoilage, check on their potential capability to cause health related issues in human inhabitants and ensure appropriate protective measures for safety.

Table 1. Fungi isolated from spoiled painted surfaces of indoor corridors

Sr. No.	Fungal Organism
1	*Absidia* sp.
2	*Aspergillus flavus* Link
3	*A. fumigatus* Fresenius
4	*A. japonicus* Saito
5	*A. oryzae* (Ahlburg) E. Cohn
6	*A. niger* van Tieghem
7	A. niger group
8	*A. tamarii* Kita
9	*A. terreus* Thom
10	*A. ustus* Thom.
11	*Aspergillus* sp.
12	*Curvularia lunata* (Wakker) Boedijn
13	*Penicillium citrinum* Thom
14	*Penicillium* sp.
15	*Trichoderma* sp.
16	*Trichothecium roseum* (Pers.) Link
17	Non sporulating mycelium (1)
18	Non sporulating mycelium (2)
19	Non sporulating mycelium (3)
20	Non sporulating mycelium (4)
21	Non sporulating mycelium (5)

ACKNOWLEDGEMENTS

The authors gratefully acknowledge co-operation and encouragement received from Vidya Prasarak Mandal, Thane and the Principal and HOD Department of Botany, B N Bandodkar College of Science, Science square committee of Bandodkar College; and technical help received from Dr Lal Sahab Yadav, Fungal Culture Collection, Chandibai College, Ulhasnagar, District Thane.

REFERENCES

Anonymous. 2015. Asian paints scouting for land in South for decorative paints plants. *Chemical Weekly* (Jan 2015) LX (24): 144.

Biswas, J., Sharma, K., Harris, K.K. and Rajput, Y. 2013. Biodeterioration agents: Bacterial and fungal diversity dwelling in or on the pre-historic rock-paints of Kabra-pahad, India. *Iran J Microbiol*. **5**(3): 309-314.

Chao, H.J., Chan, C-C., Rao, C.Y. Lee, C-T., Chuang, Y-C., Chiu, Y-H., Hsu, H-H. and Wu, Y-H. 2011. The effects of transported Asian dust on the composition and concentration of ambient fungi in Taiwan. *Int J Biometeorol* **56** (2): 211-219.

Ciferri, O. 1999. Microbial deterioration of paintings. *Appl. Envir.Micro*. **65**: 879- 885.

Elumalai, P., Elumalai, E.K. and David, E. 2014. Fungi associated with deteriorations of painted wall surfaces: isolation and identification.*European Journal of Academic Essays* **1**(3): 48-50.

Gilman, J.C. 1967. A Manual of Soil Fungi (2nd Rev. Edn.). Oxford and IBH Pub. Co., Calcutta, Bombay, New Delhi.

Schwensen, J.F., Lundov, M.D., Bossi, R., Banerjee, P., Gimenez-Arnau, E., Lepoittevin, J.P., Liden, C., Uter, W., Yazar, K., White, I.R. and Johansen, J.D. 2014. Methylisothiazolinone and benzisothiazolinone are widely used in paint: a multicentre study of paints from five European countries. *Contact Dermatitis*. doi: 10.1111/cod.12322

Sharpe, R. A., Bearman, N., Thornton, C.R., Husk, K. and Osborne, N.J. 2015. Indoor fungal diversity and asthma: a meta-analysis and systematic review of risk factors. The Journal of *Allergy and Clinical Immunology* **135** (1): 110-122.

Subramanian, C.V. 1971. Hyphomycetes. ICAR, New Delhi.

Tzean, S.S., Chen, J.L., Liou, G.Y., Chen, C.C. and Hsu, W.H. 1990. *Aspergillus* and related teleomorphs from Taiwan. Culture Collection and Research Centre, ROC Taiwan.

Zengolewicz, K. 2010. Paint types and their and their uses. www.blisstree.com.2010/02/02 (accessed on 4/1/2015).

Available online www.vpmthane.org

JBNB

ROLE OF BIOCHEMISTRY IN SOCIETY

Monali S.Katkar-Torne and Anita S. Goswami-Giri*

Department of Biochemistry, Department of Chemistry

B.N.Bandodkar College of Science, Chendani Bunder Road, Thane- 400 601(MS) India.

Received on 26/02/ 2015 Modified on 26/02/2015 Accepted on 27/02/2015

ABSTRACT:

Biochemistry is a bridge-gap between of the living processes, systems and physical constituents. Artefacts suggest that interdisciplinary sciences explore fundamentals of all diversified areas in science and technology. Today, the main focus of pure biochemistry is in perceptive of biochemical molecules that distinctly in to the processes occur within living cells. Hence need to attend the recognition of the biochemistry in relation to societal applications.

KEY WORDS: Medicine, hormones, pharmacology, agriculture, nutrition, fisheries.

INTRODUCTION: In 1882, the term "biochemistry" came into existence but it was proposed and accepted in 1903, by Carl Neuberg, a German chemist and is a combination of two disciplines: biology and chemistry. Biochemistry is the scientific study concerned chiefly with the chemistry of biological processes; it utilizes the tools and concepts of chemistry, particularly organic and physical chemistry, to investigate living organisms. Biochemistry explains living system's signalling system through biochemical reactions and produce chemical energy through metabolism. It is define as the branch of life sciences devoted to the identification and analysis of the structure, function, and mechanisms of action of the molecules of life. It is closely related to molecular biology, the study of the molecular mechanisms by which genetic information encoded in DNA is able to result in the processes of life.

MEDICINE In the field of medicine, biochemistry provides a way to understand the physiological and biological changes in

the living system's body. Pathology of any disease is studied through biochemical changes. Today's generation rely on taking multi vitamins as supplements to enhance bodily functions and also proteins for weight gain and muscle development. The role of various vitamins and minerals are studied with biochemistry.

For any dysfunction of organ the hormone levels along with their functioning are tartan. Many disorders are related to imbalance of hormones; that are studied through endocrinology. The structural studies and its formation and role of hormones are very well studied in biochemistry shows the depth of knowledge to the researchers.

The subject explains the central dogma of life, which entails the conversion of DNA to RNA and RNA to proteins. The whole immune system and their function, one can gain a deep knowledge through biochemistry.

CLINICAL BIOCHEMISTRY: In field of clinical biochemistry, the subject knowledge is applied to study the various tests like blood test, glucose test, kidney function test, liver function test, serum cholesterol test etc. prescribed by a doctor to monitor a person's any clinical condition.

For maintenance of health, optimum intake of many biochemicals like macro, micro nutrients, vitamins, minerals, essential fatty acids and water is necessary. All these essential and non-essential nutrients are studied through food chemistry under nutrition subject in biochemistry. Hence need of dieticians for their suggestion to the patients. A physician can suggest the important nutrients to be taken by various biochemical tests. In biochemistry role of various carbohydrates, vitamins, proteins (amino acids) and their contribution are studied. Subject knowledge can be implemented in understanding the function and interaction of nervous, immune, endocrine, respiratory, physiology and circulatory systems.

AGRICULTURE : Apart from human, biochemistry also plays a leading role in the field of agriculture. The optimize utilization of fertilizers and pesticide can increase the crops yield by studying their function.

Genotypes of plants can be well developed and exploited .By studying the plant hormones and their roles the specific fertilizers can be used. Even the crop and milk adulteration can be studied by various biochemical tests. Hence during import and export of food grains a biochemical check of the toxic residues is done to fix the quality. Biochemical test are implemented to evaluate nutritive value of cereals, pulses, poultry and cattle feed. Food preservation, processing technology and post-harvest physiology of fruit crops and vegetables and their nutritional quality can be developed with biochemical techniques.

Plants biochemistry helps to understand the functional activity of autotrophs, which describes the process of plants fruits get ripening, plant seed germination and the respiration inside the plant cell. Amino acids and proteins are synthesised on rough endoplasmic reticulum and fats are formed on smooth ER along with metabolic cycles (e.g. glycolysis , gluconeogenesis, TCA/Krebe cycle, ETC, Q cycle etc .

It gives a brief idea of photosynthesis, respiration, different sugars and their metabolites

FISHERIES: Biochemical reaction exhibits the protons/water quality, sensors, signalling, phytoremidation, all induces the chemistry of oceanography and it chemical composition of organic and inorganic contents for good survival of aquatic organisms.

PHARMACOLOGY: In field of pharmacy, drug - molecule interaction and its mode of action shows the breeze between life and death. Various pharmacological tests of drug's (LD_{50}) half life and its storage in various conditions which gives an idea of deterioration of drug .Due to biochemical reactions and specific activity of enzymes on drug is time, temperature, pH dependent. Specific action of drug also depends on certain conditions such as oxidation, reduction or may be contamination due to improper storage. Hence there is a need of evaluation of drug metabolism with the help biochemical reactions.

BIOCHEMISTRY IN PHYSICS: For understanding how atoms and molecules interact with enzyme, it's binding with substrate, or how iron ions interact with the porphyrin ring of haemoglobin biochemistry knowledge is required in physics. Understanding how electromagnetic radiation and matter interact gives a way of how certain spcetrophotometers work (like fluorimeters, circular dichroism spectropolarimeters, etc.), or understand how X-ray crystallography can give molecular structures. Understanding how magnetic fields and matter interact helps in understanding how NMR can provide the structure of molecules.

Biophysics acts like a bridge between biology and physics. Biochemistry scales from molecular recognition to bonding in biological organization. Its gives signal in number of plasmic signals chemical, magnetic, physical to the electrical. Hence, it's specified the role of biochemistry in biomedical engineering, instrumentation, bioanalytical methodology, molecular biology. Bio-computational study of life at every level, from atoms and molecules to cells, organisms, and environments that serves the DNA gives the depth knowledge of genomics and proteomics.

PROSPECTUS OF BIOCHEMISTRY: One can do a successful carrier in biochemistry, by doing research, jobs in various fields like clinical, pharmaceutical, drug, cosmetics, molecular biology, food industries opthamology, X-ray technology, pathology, textiles industries, and dyes industries. Government also do provide jobs for biochemistry in Food and drug, health sector, research institutions, education institutions agriculture sectors, bioinformatics, forestry, forensic sciences, plasma institutions and many more.

CONCLUSION: The insights Biochemists provide into life processes at their most fundamental level not only help to satisfy our curiosity about ourselves and the world in which living and provide the foundation for the development of new approaches to fighting disease, generating food and energy, healing our environment and producing job etc.

SOIL POLLUTION IN MUMBAI

Anurag R.Tiwari, Sanket R.Bhole, Ashish R.Jaiswal and Sudhir K.Bhosale*

Deparment of Foundation Course,

B. N. Bandodkar College of Science, Thane (W)-400601 (MS) India.

sudhirbhs12@gmail.com

Abstract :

Soil pollution means the contamination of soil with harmful substances. Soil pollution has become the major concern in all aspects, residential, agricultural and commercial. Various factors directly and indirectly adds to soil pollution. This soil pollution affects health and other aspects of human activities.

Soil pollution can be controlled by regulating and controlling the soil contamination. General awareness related to its consequences must be made. Government should also formulate laws and rules for the protection and conservation of soil and for the prevention of soil pollution.

Key Words: Soil, Pollution, contamination, Prevention, Factors.

Introduction:

Soil pollution is the contamination of soil with harmful substances that can adversely affect the quality of the soil and the health of those living on it. Pollution can be the result of an accident or carelessness, or done on purpose through illegal dumping.

Causes: All soils (weather polluted or un-polluted) contains a variety of compounds (contaminants) which are naturally present. Such contaminants include metals, inorganic ions and salts (e/g., phosphates, carbonates, sulfates, nitrates), and many organic compounds (such as lipids, proteins, DNA, fatty acids, hydrocarbons, alcohol etc.). These compounds are mainly formed through soil microbial activity and decomposition of organisms (e.g., plants and animals). Additionally, various compounds get into soil from the atmosphere (with precipitation water, as well as by wind activity or other types of soil disturbances)

and from surface water bodies and shallow ground-water flowing through the soil. When the amounts of soil contaminants exceed natural levels (what is naturally present in various soils) pollution is generated. There are the following main mechanisms that generate soil pollution:

1. Antropogenic – through human activity including:

Accidental spills and leaks during storage, transport or use of chemicals (e.g., leaks and spills of gasoline and diesel at gas stations).Agricultural activities involving the spread of herbicides/pesticides/insecticides and fertilizers .Transportation activities (e.g., vehicle emissions),dumping of chemicals (accidental or intended – such as illegal dumping).Storage of wastes in landfills (which may leak to ground-water or generate polluted vapors),cracked paint chips falling from building walls, especially lead-based paint.

2) Natural:

Natural accumulation of compounds in soil due to imbalances between atmospheric deposition and leaching away with precipitation water (e.g., concentration and accumulation of perchlorate in soils in arid environments).Natural production in soil under certain environmental conditions (e.g., natural formation of perchlorate in soil in the presence of a chlorine source, metallic object and using the energy generated by a thunder-storm).Leaks from sewer lines into sub-surface (e.g., adding chlorine which could generate trihalomethanes such as chloroform).

Effects:

Health effects on humans : considering how soil is the reason we are able to sustain ourselves, the contamination of it has major consequences on our health. Crops and plants grown on polluted soil absorb much of the pollution and then pass these on to us. This could explain the sudden surge in small and terminal illnesses.

Long term exposure to such soil can affect the genetic make-up of the body, causing congenital illnesses and chronic health problems that cannot be cured easily. In fact, it can sicken the livestock to a considerable extent and cause food poisoning over a long period of time. The soil pollution can even lead to widespread famines if the plants are unable to grow in it.

Effect on Growth of Plants: The ecological balance of any system gets affected due to the widespread contamination of the soil. Most plants are unable to adapt when the chemistry of the soil changes so radically in a short period of time. Fungi and bacteria found in the soil that bind it together begin to decline, which creates an additional problem of soil erosion.

The fertility slowly diminishes, making land unsuitable for agriculture and any local vegetation to survive. The soil pollution causes large tracts of land to become hazardous to health. Unlike deserts, which are suitable for its native vegetation, such land cannot support most forms of life.

Remedies for soil pollution :

1.Make people aware about the concept of Reduce,Recycle , and reuse.
2.Reduce the use of pesticides and fertilizers in agricultural activities.
3.Avoid buying packages items as they will lead to garbage and end up in landfill site.
4.Ensure that you do not litter on the ground and do proper disposal of garbage.
5.Buy biodegradable products.
6.Do organic gardening and eat organic food that will be grown without the use of pesticides.
7. Create dumping ground away from residential areas.

Conclusion:

Much is being done to control, monitor and rectify damage done by pollutants. The problems are diverse and some are only being recognised but it is important to keep a close control over pollutants so that we can maintain the environment in an acceptable condition for future generations.

We need to take pollution issue seriously because ignorance is certainly not the proper way to go. The stakes are really high and world needs to wake up and start acting right now because environmental issues are constantly growing in both number and size.

Aren't we aware of the different problems occurring in our nature, especially in different bodies of water? We, humans are only creating problems that consequently will also carry the burden of these problems. We all know how important environment is .Act right now.

References:

Soil pollution. (n.d.). Retrieved January 15, 2015, from http://www.wikipedia.org/

Causes and Effects of Soil Pollution - Conserve Energy Future. (2013, July 8). Retrieved January 15, 2015, from http://www.conserve-energy-future.com/causes-and-effects-of-soil-pollution.php

Soil Pollution Causes. (n.d.). Retrieved January 15, 2015, from http://www.environmentalpollutioncenters.org/soil/causes/

STUDENTS CORNER

Available online www.vpmthane.org

JBNB

CHEMISTRY A CURSE OR A BLESSING

Prachi.N. Vishwakarma , Madhuri.S.Desai , Sneha .M.Singh, Bhavesh.M.Garg, Ajit.A.Raut

Department of Chemistry, B.N.Bandodkar College of Science, Thane (W)-400601.

Guiding Teacher: Anita.S.Goswami-Giri* **(anitagoswami@yahoo.com)**

ABSTRACT: Chemistry is part of everyday activity of human being. Playing role into healthy as well as infirmity need to check its day to day reactions in and around the human being .the present note it is addressed element found in human being and its role, drugs that provide energy and play role against the bacterial/fungal infections; dyes which are consume with food, tablets cosmetics and it's a part of our cloths. Hence, the role of chemistry is in human being is curse or a bless require to decide.

Keywords: Chemistry; Drugs; Dyes; Industrial Reaction; Environment; Forensic Chemistry

INTRDUCTIONS:

India has made considerable progress in the field of science and technology .science has rendered a great service to man by exposing the hollowness of several superstitious beliefs and myths which stiflet man's onward march to progress[1].

Food, clothing and shelter are the basic needs of human beings and are fulfilled only with the help of science –Chemistry. Now-a-days, chemistry is highly developed and,"It is a branch of Science that studies composition properties and the changes that a matter undergoes".

ELEMENT IN THE HUMAN BODY [2]:

Body is made up of chemical compounds, which are combinations of elements;

probably known body is mostly water, which is hydrogen and oxygen.

96% of mass of human body is made up of just four elements: - O2 ,C ,H, N with a lot of that in the form of water .

Nutrients perform various functions, including the building of bones and cell structure, regulating the body‘s pH carrying charge and deriving chemical reaction.

O2 (65%) and H (10%) are predominantly found in water which makes 60% of the body by weight .

Carbon (18%) is synonymous with life .It’s central role is due to the fact that it has four bonding sites that allow for the building of long complex chains of molecules . moreover carbon bonds can be formed and broken with a modest amount of energy, allowing for the dynamic organic chemistry that goes in our cells.

Nitrogen (3%) is found in many organic molecules including the amino acids that makeup proteins and nucleic acids that makeup DNA.

Calcium (1.5%) is nearly all of it is found in bones and teeth and important in bodily functions ,such as muscle contraction and protein regulation etc.

Phosphorous (1%) is also predominantly found in bone and also in the molecules of ATP which provides energy in cells for deriving chemical reactions.

Potassium (0.25%) is important electrolyte, helps in regulating heartbeat.

Sulphur(0.25%) found in 2 amino acids ; important for giving proteins their shapes.

Sodium (0.15%) another electrolyte that is vital for electrical signaling in nerves.

Chlorine (0.15%) found in the body as negative ion called chloride .Maintains normal balance of fluid.

Magnesium (0.05%) is important role in the structure of skeleton and muscles.

Iron (0.006%) key element in the metabolism.

Flourine(0.0037%) is found in teeth and bones .

Zinc(0.0032%) is essential trace element for all forms of life.

Copper (0.0001%) is important as an electron donor in various biological reactions.

Iodine (0.000016%) is required for making thyroid hormones which regulate metabolic rate and other cellular functions.

Selenium (0.000019%) is essential for certain enzymes, also antioxidants.

Chromium (0.0000024%) helps regulate sugar levels by interacting with insulin.

Manganese (0.000017%) is essential for certain enzymes, especially protect the mitochondria.

Molybdenum (0.000013%) is essential to virtually all forms.

Cobalt (0.0000021%) is contained in vitamin B_{12} which is important in protein formation and DNA regulation.

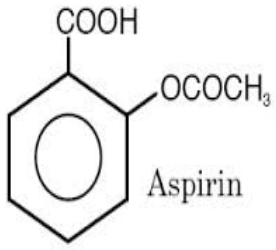
DRUG:

A drug may be defined as "any substance which is used or intended to be used for modifying or exploring physiological system or pathological states for the benefit of the recipient".

Various diseases have been cured because of this drug. But drug should not have toxicity, should have minimum side effect and its action should be localize at the desire site. Most common example is

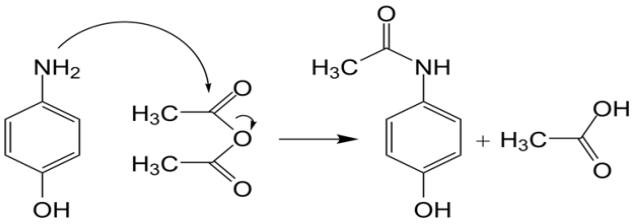
Aspirin-

It is used as analgesic, anti-inflammatory, antipyretic etc. It is used in the treatment of common flue, headache but when it is used daily acts as dangerous.



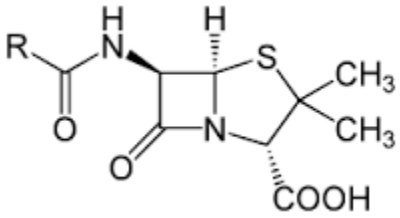
Aspirin

Paracetamol / Crocin : It is also used in the treatment of common flue , body ache .High dose usage (greater than 2000mg/day) of paracetamol increases the risk of upper gastrointestinal complication like stomach bleeding . paracetamol used excessively damage multiple organs particularly the liver and kidney.

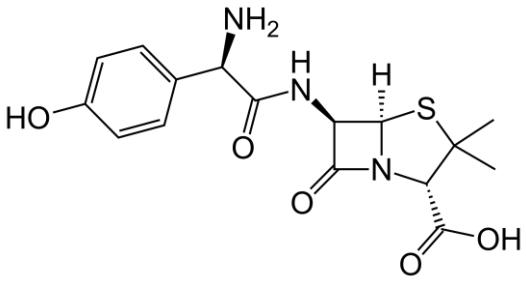


Antibiotics: It is a chemical compound derived from living organisms, which is capable, in small concentrations, of inhibiting life process of other micro-organisms.the best examples are Penicillin ,Amoxicillin C Amoxil , Polymox , Larotids etc .

Penicillin: It is semisynthetic penicillin used in the treatment of urinary tract infection , meningitis e etc. but it also has side effects like diarrhea, vomiting , fever etc…..Also ,there are some anti HVI drugs.

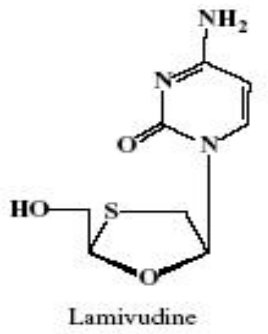


Amoxicillin:



Lamivudine:

It is used for the HIV as well as chronic hepatitis B at lower dose .side effects like nausea, vomiting, diarrhea, tingling of the hands or feet, skin rash tec. Up to now, we can conclude that as there are advantages of drug to curve a particular disease there are also some disadvantages (side effects).



Lamivudine

CNS Depressants / Hypnosis and sedations:

Benzodiazepines**,** such as diazepam (Valium) and Alprazolam (Xanax), are sometimes prescribed to treat anxiety, acute stress reactions, and panic attacks.

Opoid overdose is an acute condition due to excessive use of narcotics.

Cocaine is tropane alkaloid I.e. obtained from the leaves of coca plant .It is a stimulate and appetite suppressant and nonspecific voltage gated sodium channel blocker ,which in turn causes it to produce anaesthesia at low doses.

Side effects-It is addictive due it's effect on mesolimbic reward pathway (brain pathway).

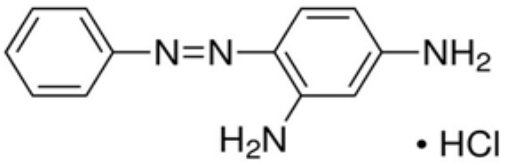
There are some habit forming drugs:- e.g. Morphine –principal alkaloid constituent of opium .It is a plant analgesic and all types of severe pains caused by serious injury , neoplasm (abnormal growth of tissue), migraine ,biliary and renacolic C abdominal pain –kidney stone etc. But it is habit forming. There are some diseases for which highly potent drugs are taken for a particular period ,But after the diseases has been are ,the drugs are also stopped but than, there is discomfort in our body and this conditions is called as **Addictions of drugs**. This drugs act directly on the brain and cause mental mechanisms to respond abnormally. Directly needles and solutions used for the injecting drugs can cause abscesses in the arms and veins, AIDS, infections of kidneys and brain.

From this, we can say that, chemistry is principles are used for preparations of drugs which cures can cause addictions, so there should be limited use of drugs.

DYES [3]:

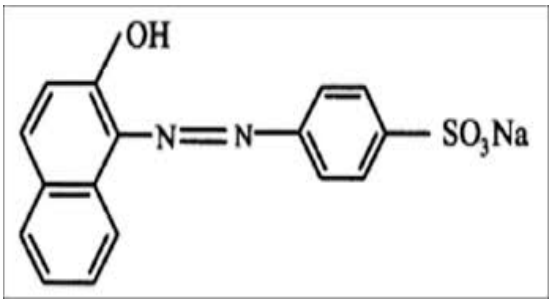
"A dye may be defined as a colored organic substances, may be compound or mixture, which when applied to the substrate, imparts color to that substrate" However, all colored substances may not be drugs. In dyes, chromophores and auxochromes are very important. Chromospheres –gives the color to dye and auxochromes -intensify the color . A dye should have good fastness property.

Chrysoidine Y



It is used in leather industry. Also carbon papers are made by coating the paper with a compositions containing waxes ,oils and oil soluble dyes.

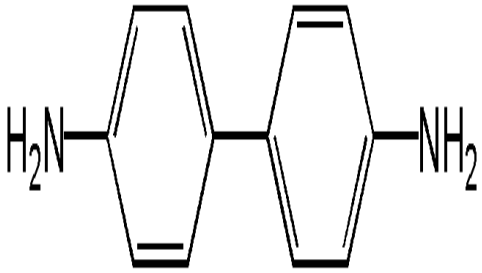
Orange I



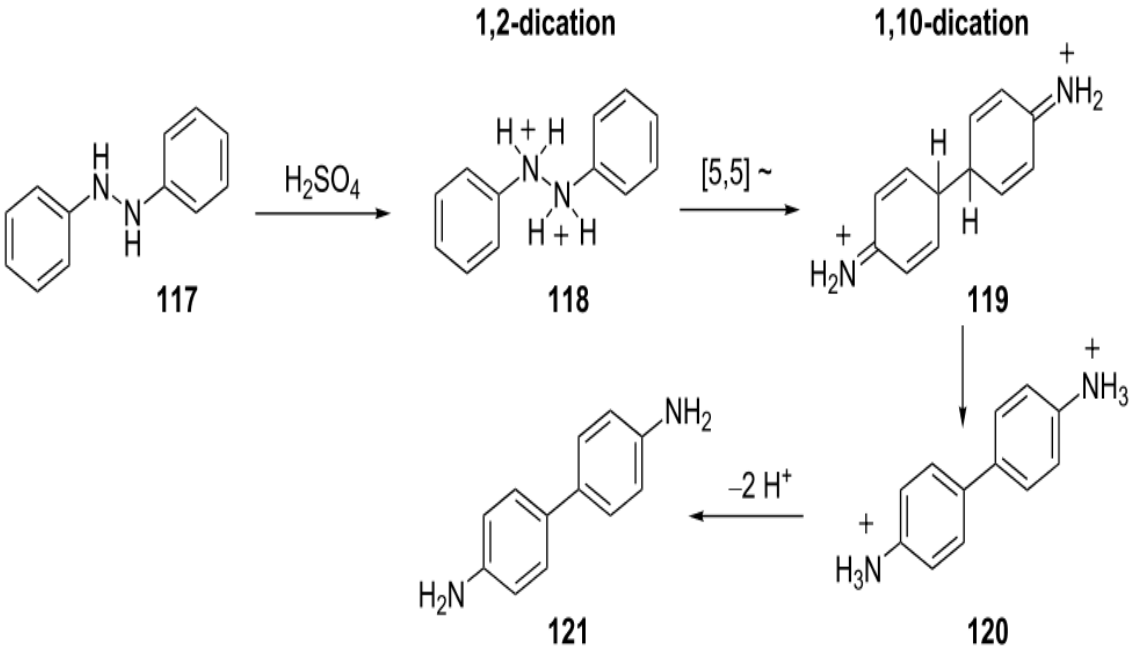
It is used as a food color, as it is non-toxic . Also there some natural dyes like turmeric saffron etc. Certain dyes have curative properties and so they are more useful as medicines rather than as dyes. E.g.-Crystal violet, methyl violet is chemistry against skin diseases.

Chemistry has developed a lot in dyes, but there also some toxicity of dyes. The synthetic dyes have replaced natural dyes. The large scale manufacture and use of dyes have started pollutions problems.

Further, the dyeing process is not 100% efficient .About 5 to 10% of the dye is wasted and these dye pollute water bodies like rivers, sea, ponds etc. It also affects soil. Many of the azo dyes are highly toxic and carcinogenic.



Benzidine causes bladder cancer.



Tthe aromatic amines get concentrated in liver, kidney and bladders causing tumors. Many dyes which are used as food color are toxic and amaranth dye causes urticaria , erythrosine causes chromosomal damage , thyroid tumors etc. Sunset yellow cause kidney damage, vomiting and fast green causes bladder.

Dyes with no toxicity should be used as food colors and the wasted dye should be disposed properly, dyes should be used such that it should not harm and cause various diseases.

DISADVNTAGES OF DYES

Environmental pollutions from dye factories are the major problem. Almost every industrial dye process involves a solutions of a dye in water in which in which the fabric are dipped or washed .After dyeing a batch of fabric , it is cheaper to dump the used water –dye effluent –than to clean and re-use the water in the factory . so dye factor across the world are dumping millions of tons of the dye into rivers.

Harmful chemicals used in dying process include:

Dioxine -carcinogenic and possible hormone disrupteo.

Toxic heavy metals such as chrome , Cu and Zn-carcinogenic and

Formaldehyde, a suspected carcinogen.

FORENSIC CHEMISTRY[4]:

Forensic chemistry is the applications of chemistry of to law enforcement or the failure of products or processes. It is unique among chemical science in that its research, practice and presentations must meet the needs of both the scientific and legal communities. One method of separation and quantitations one or more individual components of unknown sub or mix is the use of Gas Chromatographic, Mass Spectrometer.

In this a small volume of a unknown sub is dissolved in a organic solvent (chloroform, methanol) and quickly injected hot column. Volatile compound is vaporized by the heat of oven. The special chemical compound (s) within the column bind to the sub contained in moving vaporized sample. As a result, different sub or “eluted” (emerge from end of column) in different amount of time ‘retentions time” .The room temperature of various

compound can be compared ,this comparison provides identifications of a particular compound in unknown sample.

Another technique like Fourier Transform Infrared Spectrometer **(FTIR)** is used for identifications of compound, also ultraviolet –visible –near infrared spectroscopy is used to test certain drugs of abuse. Thermoplastics (substance when heated becomes soft and when cooled becomes hard, it can be remolded) can be analysed by NMR, infra-red spectroscopy, ultraviolet –visible spectroscopy etc.

It helps in determining the cause of death by examining the postmortem changes ,blunt injuries , burns and body and scene of death.

The alcohol content in a human being can be determined by analyzing the blood and other fluids like saliva, urine etc.

Disadvantages:-

1. Equipments are expensive
2. It requires precise and accurate analysis; even if a minor error occurs in analysis, it may result in wrong figure.
3. The evidence cannot be accessible at all times.
4. There is no particular standard to verify the result of experiment.

HEALTH CARE AND BEAUTY:

Due to the increasing use of Chemicals, environment has an adverse effect on Human Look. hence, various cosmetics are used to become fair. Kajal, Lipsticks, Nailpolish, Creams if used low grade reflects side effects on various parts of the body.

Lipstick contains Lead and also contains other heavy metals such as Nickel, Copper, Chromium, Arsenic and Cobalt and when a Woman applies Lipstick some of these toxic substances are absorbed by the lips in our Stomach. This causes Rashes on the Lips. Bleaches are used to change the skin tone and hide the unwanted hairs on the cheek bone but due to the repeated use of the bleach it results in skin blackening as it contains Ammonia in excess. Nail polish mainly consists of Nitrocellulose, which has Film-forming properties. Many cheap nail paints have

high amount of Toxic substances such as Toulene and Formaldehyde which are dangerous for Health.

POLLUTIONS:[5]

Pollutants are substances that cause pollutions. And it is created as by-products or as wastes from the processes of chemical industries, agriculture etc.

Air pollutions consist of gases, liquids or solids present in the atmosphere in high enough levels to harm humans and other organisms. Air pollutants are the products of chemical reactions, vehicular emissions.

Burning of fossil fuels and often incomplete combustions in engines leads to the release of no. of polluting gases such as carbon monoxide , carbon-dioxide ,oxides of sulphur etc. into atmosphere which have serious ill effects on human health on vegetations ,materials etc.

The emissions from chemical industries, petrochemical plants, power plants contain smoke and soot. The pollutants effects human health and on flora and fauna as well as on oil, water etc. With the growing populations and industries, increased power requirement, mega power plants have been erected. The use of coal in thermal power stations led to the increase in air pollutants such as oxides of carbon, sulphur etc.

INDUSTRIAL WATER POLLUTIONS:

During chemical reactions, some amount of by-products are manufactured which when disposed in water pollutes water.

Major polluting industries in INDIA include leather, pulp and paper, textiles and chemicals .inorganic and organic – which are not biodegradable. i.e. solvents , oils , plastics ,metallic wastes phenols etc. in water makes the water unfit for human applications. Certain metals like zinc , copper , lead , mercury etc. which are used in processes related to batteries and electronics are toxic.

Lead poisoning is known to cause metal retardations and mercury poising causes insanity and crippling birth defects.

INDUSTRIAL SOIL POLLUTIONS:

Power plants produce huge amount of fly ash which causes land pollutions. Industries like paper, pulp mills, oil

refineries, chemical and fertilizer manufacturing etc. produce large amounts of solid wastes which are dumped on land and causes soil pollutions.

CHANGING CLIMATE[6]:

The gases that absorb heat are carbon dioxide, methane, ozone, CFCs these gases are called as green house gases because they act like glass in the troposphere is called as green house effects.

Human activities leads to release of green house gases .The resulting gradual increase in the temperature of the earth is called as global

CO2 contributes 55% of the global warming. Methane accounts 18% of the global warming. CFS-24% and nitrous oxide accounts 6%, it is released during nylon productions. The global sea level rises 10-15cm over the last century, this will be due to higher temperature leading to expansions of sea water and melting of glaciers. Global warming affects agriculture and forestry.

In the stratosphere ozone acts a protective layer but in troposphere, ozone acts as a harmful pollutant. Depletions of ozone layer allow potentially dangerous ultraviolet rays in to the lower atmosphere. Exposure to uv-radiations causes skin cancers and damages our eyes. Increase UV radiations affects plants by reducing leaf size and increasing germinations time. This all is mainly due to industrial chemical reactions toxicity which may be in the by- products too.

Conclusion :

Chemistry is thus a blessing and a curse. as long as it tries to promote human welfare and comforts , chemistry is a blessing. When it is used for destructive purpose, it is a curse.

Acknowledgements

I thanks to Dr. M. K. Pejaver, Principal, B. N. Bandodkar College of Science, Research and Science Square Committee, of B. N. Bandodkar College for the encouragement and facilities provided.

REFERENCES:

1.

https://online.vmou.ac.in/oldweb/studymaterial/mafinalengpapIX.pdf

2. www.livescience.com/3505-chemistry-life-**human**-**body**.html

3. www.sciencedirect.com/science/journal/01437208

4. en.wikipedia.org/wiki/**Forensic_chemistry**

5. en.wikipedia.org/wiki/**Pollution**

6.www.epa.gov/**climatechange**/science/causes.html

JATROPHA CURCAS USED AS BIOFUEL

Shewta Kumbhar

S.Y.B.Sc.(Chemistry)

B.N.Bandodkar College of Science, Thane-1.

Biofuel-A need and a gift to the social structure that can boost our capacity and development. Fuel sources being workly diminishing, bio-fuel can act as a refiner. When one talk about Biofuel-Jatropha plant runs with an efficiency rate of 40% flash in the spotlight.

Being use for several decades Jatropha is historic, functional, economic, environmental, moral, political and the last part- it can be use unrefined- indirect from the use to the engine.

Introduction:- It is belong to Euphorbiaceae family having potential to provide economic benefits at the local level. It grows in dry marginal non-agricultural lands, thereby allowing villagers and farmers to leverage non-farm land for income generation. On a large scale, speaking nationally, Jatropha can help reduce fossil fuel expenditure. Since, Jatropha oil is carbon-neutral; it can help to reduce country's carbon emission profile. Other biofuels which displace food crops from viable agricultural land such as corn ethanol or palm biodiesel have caused serious price increases for basic grains and edible oils in other countries.

National status:-

India's total biodiesel requirement is projected biodiesel to grow to 3.6 million tonnes 2011-12, with the positive performance of the domestic automobile industry. Analysis from frost and Sullivan, strategic Analysis of the Indian Biofuels Industries, reveals that the market is an emerging one and has a long way to go before it catches up with global competitors.

The Government is currently implementing an ethanol-blending program and considering initiatives in the form of mandates for biodiesel. Due to

these stratergies, the rising population, and the growing energy demand from the transport sector, biofuels can be assured of a significant market in India. On 12 September 2008, the Indian Government announced its 'National Biofuel Policy'. It aims to meet 20% of India's diesel demand with fuel derived from plants. That will mean setting aside 140,000 square kilometers of land. Presently fuel yielding plants cover less than 5,000 square kilometers.

Implementation :

The ex President of India, Dr. Abdul Kalam, is one of the strong advocates of jatropha cultivation for production of bio-diesel. In his recent speech, the Former President said that out of the 600,000 km^2 of wasteland that is available in India over 300,000 $km^2$are suitable for Jatropha cultivation. Once this plant is grown the plant has a useful lifespan of several decades. During its life, Jatropha requires very little water when compared to other cash crops.

The following cities frequently are known to be cultivating Jatropha in a remarkable quantity- Andhra Pradesh, Chattisgarh, Tamil Nadu, Rajasthan, Maharashtra, Eastern India etc.

State status:- In September 2007, the Hindustan Petroleum Corporation Limited (HPCL) joined hands with the Maharashtra State Farming Corporation Ltd. (MSFCL) for a Jatropha seed-based bio-diesel venture. As a part of the projects, Jatropha plants would be grown on 500 acres in Nashik and Aurangabad. In November 2005, the Maharashtra Government aimed to cultivate Jatropha on 600 km2 in the state with half the land going to the public sector on 1 July 2006. Pune Municipal Corporation took the lead among Indian cities in using bio-diesel from Jatropha in over 100 public buses.

Concluding, Jatropha incentives in India is a part of India's goal to achieve energy independence by the year 2012. Jatropha oil is produced from the seeds if the Jatropha curcas, a plant that can grow in wastelands across India, and the oil is considered to be an excellent source of bio-diesel. However, in recent times the bio-fuel policy has come under critical review, on the way it has been promoted.

COLD DRINKS PESTICIDES

Anurag Tiwari and ashish Jaiswal

S.Y.B.Sc (Chemistry)

B.N.Bandodkar College of Science Thane-1

ABSTRACT: Present review article focused on the types of pesticides , chemical composition and their mode of action. its effects on human health due to additives and its exposure of it in coca cola .

Keyword: pesticides; health;

INTRODUCTION:

Pesticides: Pesticide is a substance which kills, repel, or control certain forms of plant or animal life that are considered to be pests. Pesticides include herbicides for destroying weeds and other unwanted vegetation, insecticides for controlling a wide variety of insects, fungicides used to prevent the growth of molds and mildew, disinfectants for preventing the spread of bacteria, and compounds used to control mice and rats. Because of the widespread use of agricultural chemicals in food production, people are exposed to low levels of pesticide residues through their diets.

Types of Pesticides: Pesticides are often referred to according to the type of pest they control. Pesticides can also be considered as either biodegradable pesticides, which will be broken down by microbes and other living beings into harmless compounds, or persistent pesticides, which may take months or years before they are broken down: it was the persistence of DDT, for example, which led to its accumulation in the food chain and its killing of birds of prey at the

top of the food chain. Another way to think about pesticides is to consider those that are chemical pesticides or are derived from a common source or production method.

Some examples of chemically-related pesticides are.[(access 5)]:

Organophosphate pesticides: Organophosphates affect the nervous system by disrupting the enzyme that regulates acetylcholine, a neurotransmitter. Most organophosphates are insecticides. They were developed during the early 19th century, but their effects on insects, which are similar to their effects on humans, were discovered in 1932. Some are very poisonous. However, they usually are not persistent in the environment.

Carbamate pesticides:

Carbamate pesticides affect the nervous system by disrupting an enzyme that regulates acetylcholine, a neurotransmitter. The enzyme effects are usually reversible. There are several subgroups within the carbamates.

Organochlorine insecticides: They were commonly used in the past, but many have been removed from the market due to their health and environmental effects and their persistence (e.g., DDT and chlordane).

Pyrethroid pesticides:

They were developed as a synthetic version of the naturally occurring pesticide pyrethrin, which is found in chrysanthemums. They have been modified to increase their stability in the environment. Some synthetic pyrethroids are toxic to the nervous system.

Sulfonylurea herbicides :

Includes nicosulfuron, triflusulfuron methyl and chlorsulfuron broad-spectrum herbicides that kill plants by inhibiting the enzyme acetolactate synthase. In the 1960s, more than 1 kg/ha (0.89 lb/acre) crop protection chemical was typically applied, while sulfonylureates allow as little as 1% as much material to achieve the same effect.

Biopesticides :

Biopesticides are certain types of pesticides derived from such natural

materials as animals, plants, bacteria, and certain minerals. For example, canola oil and baking soda have pesticidal applications and are considered biopesticides. At the end of 2001, there were approximately 195 registered biopesticide active ingredients and 780 products. Biopesticides fall into three major classes:

Microbial Pesticides:

Microbial pesticides consist of a microorganism e.g., a bacterium, fungus, virus, or protozoan as the active ingredient. Microbial pesticides can control many different kinds of pests, although each separate active ingredient is relatively specific for its target pest. For example, there are fungi that control certain weeds, and other fungi that kill specific insects.

The most widely used microbial pesticides are subspecies and strains of Bacillus thuringiensis, or Bt. Each strain of this bacterium produces a different mix of proteins, and specifically kills one or a few related species of insect larvae. While some Bt's control moth larvae found on plants, other Bt's are specific for larvae of flies and mosquitoes. The target insect species are determined by whether the particular Bt produces a protein that can bind to a larval gut receptor, thereby causing the insect larvae to starve.

Biochemical Pesticides:

Biochemical pesticides or herbal pesticides are naturally occurring substances that control (or monitor in the case of pheromones) pests and microbial diseases.

Plant-incorporated protectants:

Plant-incorporated protectants (PIPs) have genetic material from other species incorporated into their genetic material (i.e. GM crops). Their use is controversial, especially in many European countries.

Pesticides that are related to the type of pests are shown in table 1:

Table 1 Pesticides that are related to the type of pests

Type	Action
Algicides	Control algae in lakes, canals, swimming pools, water tanks, and other sites
Antifouling agents	Kill or repel organisms that attach to underwater surfaces, such as boat bottoms
Antimicrobials	Kill microorganisms (such as bacteria and viruses)
Attractants	Attract pests (for example, to lure an insect or rodent to a trap). (However, food is not considered a pesticide when used as an attractant.)
Biopesticides	Biopesticides are certain types of pesticides derived from such natural materials as animals, plants, bacteria, and certain minerals.
Biocides	Kill microorganisms
Disinfectants and sanitizers	Kill or inactivate disease-producing microorganisms on inanimate objects.
Fungicides	Kill fungi (including blights, mildews, molds, and rusts)
Fumigants	Produce gas or vapor intended to destroy pests in buildings or soil
Herbicides	Kill weeds and other plants that grow where they are not wanted.
Insecticides	Kill insects and other arthropods
Miticides	Kill mites that feed on plants and animals
Microbial pesticides	Microorganisms that kill, inhibit, or out compete pests, including insects or other microorganisms.
Molluscicides	Kill snails and slugs
Nematicides	Kill nematodes (microscopic, worm-like organisms that feed on plant roots)
Ovicides	Kill eggs of insects and mites
Pheromones	Biochemicals used to disrupt the mating behavior of insects
Repellents	Repel pests, including insects (such as mosquitoes) and birds.
Rodenticides	Control mice and other rodents

REFERENCES: http://en.wikipedia.org/ ,

Coca Cola :

Coca-Cola is a carbonated soft drink, It contain Sucrose, Caramel colour , Caffeine , Phosphoric acid Coca extract , Lime extract , vanilla and Glycerin.

Effect of Coca Cola:

Sperm Count

The possibility of spermicidal effects of Coca-Cola was first reported in 1985 in the New England Journal of Medicine. Two years later, researchers at Veterans General Hospital in the Republic of China found that while Coca-Cola did reduce sperm motility, it did not have a marked effect. In March 2010, Reuters reported the results of a Danish study showing that men who drank 32 ounces or more of Coca-Cola daily could reduce their sperm count by nearly 30 percent. The researchers believed that overall nutrition played a role as non-cola drinkers tend to eat more fresh fruits and vegetables, consume less caffeine and have an overall healthier lifestyle.

Stomach Acid : Coca-Cola is one of the most acidic beverages on the market. An interview with Dr. James McKay, formerly of the Naval Medical Research Institute, found that colas are closest in pH level to vinegar--between 2.0 and 3.4, according to the Food and Drug Administration. A 2006 study published in the journal Inflammopharmacology showed that rats fed Coca-Cola exhibited an increased secretion of stomach enzymes used to balance pH.

Caffeine

A 12-ounce service of Coca-Cola contains 64 mg of caffeine, according to "Neuroscience for Kids," the website of a University of Washington professor, Dr. Erik Chudler's. Dr. Chudler writes that caffeine takes effect when absorbed into the bloodstream by the stomach and small intestine, which can happen between 15 and 60 minutes after consumption. While many people rely on caffeine to keep them alert, caffeine can be dangerous as it constricts arteries and veins and boosts heart rates.

Sugar

Doctors and nutritional experts caution against consuming large amounts of soft

drinks because of their high sugar levels. A 12-ounce serving of Coca-Cola contains 39 grams of sugar, or 13 percent of the Food and Drug Administration's recommended daily allowance. Writer Wade Meredith traced the path of a Coca-Cola after it is consumed. Within the first 20 minutes, the body synthesizes the equivalent of 10 teaspoons of sugar, causing a blood sugar spike and massive insulin secretion by the pancreas. Within 60 minutes of drinking the soda, the sugar and insulin have passed through the digestive system. This generally leads to a "crash," or decline in stamina, as the sugar has been quickly absorbed and burned by the body for energy.

Chemical Composition of Coca Cola: Here's what's really in Coca-Cola's famous Coke soda:

Carbonated tap water – Whatever is in unfiltered municipal water is also in your Coke. The carbonation that is added increases gastric secretions and can make you flatulent. Here is what your tap water looks like, by the way.

E150D – This is a food coloring, which is made from processing sugar at certain temperatures. Ammonium sulfate is then added (also a constituent of Round Up Ready Chemicals used by Monsanto). This chemical has been known to increase asthma attacks.

E952 – This is a sugar substitute. It is 200 times sweeter than sugar and can cause your glycemic levels to sky-rocket. This can lead to diabetes, obesity and other diseases.

E950 – This is Acesulfame Potassium, and it aggravates the heart, vascular system, and nervous system. It is especially bad for children and pregnant women.

E951 – **Aspartame** – A GMO product which can cause seriously negative impact on your body. Symptoms of aspartame poisoning include: unconsciousness, headaches, fatigue, dizziness, nausea, palpitation, weight gain, irritability, anxiety, memory loss, blurry vision, fainting, joint pains, depression, infertility, hearing loss and more. Aspartame can also provoke the following diseases: brain tumors, MS (Multiple Sclerosis), epilepsy,

Graves' disease, chronic fatigue, Alzheimer's, diabetes, mental deficiency and tuberculosis. Later, this substance was initially illegal due to its dangers but was again made legal in a suspicious manner.

E338 – Orthophosphoric Acid –

This causes skin and eye irritation, It is used for production of phosphoric acid salts of ammonia, sodium, calcium, aluminum and also in organic synthesis for production of charcoal and film tapes, for production of refractory materials, ceramics, glass, fertilizers, synthetic detergents, medicine, metalworking, and textile and oil industries. Food orthophosphoric acid is used in the production of carbonated water and for preparation of ingredients in pastry. It is known that orthophosphoric acid interfere with the absorption of calcium and iron from the body, which can cause weakening of bones and osteoporosis. Other side effects are thirst and skin rashes.

E330 – Citric Acid – This is preservative that is also used in the medical field for preserving blood. In small doses it is fine, but in large doses it can eat away at your stomach and esophageal lining.

Aromas: Unknown aromatic additives.[(access 5)]

E211 – Sodium Benzoate – According to a study completed by Peter Piper at the Sheffield University in Britain, sodium benzoate can harm DNA.

Reactions in Coca Cola:

Doctors are using Coca-Cola to treat a painful stomach condition, sparing patients from surgery.

They have discovered that the fizzy drink is highly effective at dealing with a condition known as a gastric phytobezoar.

This is a stomach blockage which, unless it is successfully removed or destroyed, can subsequently lead to a bowel obstruction.

It is often caused by certain fruits which do not digest properly - for instance, in Asia many cases are a result of eating persimmons which are particularly prone to form blockages.

A variety of treatments are available to treat it, from lasers and non-surgical endoscopies to the last resort of full surgery.

Now, new research has shown that Coca-Cola has a success rate of more than 90 per cent in treating the condition.

This is because it has chemical ingredients that do a similar job to gastric acid - in helping to digest fibre - while the bubbles help speed up the process.

Bacteria in Coca Cola: Lactic and acetic acid bacteria are the most common spoilage bacteria found in soft drinks. Their ability to tolerate environments with low pH is essential for growth in soft drinks.

Lactic acid bacteria (LAB) are microaerophilic, Gram-positive bacilli or cocci. They can grow in properly sealed bottles and cans low in oxygen, causing spoilage of beverages. LAB typically enters breweries from raw materials, juiceingredients and packaging materials. The most frequent spoilage species are *Lactobacillus paracasei and Leuconostoc mesenteroides* . In addition, Lactobacillus brevis, *Lactobacillus buchneri*, *Lactobacillus plantarum*, Lactobacillus perolens and *Weissella confusa* are commonly found in contaminated products. Many of these species are also potential or obligate beer spoilers. LAB ferment sugars predominantly to lactate.

Depending on the species and growth conditions, sugar catabolism can also lead to formation of ethanol, acetate, formate or succinate . Some strains produce diacetyl, which tastes and smells buttery, and is an unwanted metabolite in soft drinks. Formic acid formation has been detected in apple juice and proposed as a spoilage indicator. LAB can also cause a loss of carbonation and astringency.Furthermore, L. mesenteroides and W. confusa strains can produce extracellular fructose or glucose polymers from sucrose, which causes ropiness of the final product. The most common spoiling acetic acid bacteria (AAB) belong to the genera Acetobacter and Gluconobacter. In addition, Gluconacetobacter and Asaia spp. have been associated with soft drinks. The genus Asaia was described in 2000 and currently comprises eight or coccoid

motile or non-motile rods. They are widespread in nature particularly in sugar- and ethanol-enrichedhabitats (Suzuki et al. 2010). Their high number in process environments is considered to indicate poor hygiene , Raspor and Goranovic 2008). Many species share the ability to form biofilm on the production surfaces AAB acquire energy from the oxidation of

sugars, organic acids, sugar alcohols and alcohols with the production of acetic,gluconic, lactic and succinic acids, acetaldehyde and ketone compounds. The end products depend on the species and growth conditions. AAB do not haveamino acid requirements and ammonia can serve as sole source of nitrogen. B vitamins may be needed in certain conditions. AAB are acid-tolerant bacteria. Most species grow at pH 3.6–3.8, and some even at pH 3.0 (Raspor and Goranovic 2008,). The optimum temperature for growth lies at 25–30 °C (Back 2005). The growth in soft drinks may cause flavour changes, package swelling, ropiness, haze and sediments (Raspor and Goranovic 2008,). Ropiness is characterized by an increase in the viscosity of the beverage. Gluconobacter spp. is the most frequent spoilers in soft drinks. AAB are not as common in soft drinks as LAB, since they are strictly aerobic and demand at least some oxygen for growth (Lawlor et al. 2009). They are mainly a problem in beverages packed in oxygen-permeable containers, e.g. in certain types of PET bottles. Many AAB tolerate commonly used preservatives (benzoates, sorbates, dimethyldicarbonate) rather well (Raspor and Goranovic 2008).

Propionibacterium cyclohexanicum : It was isolated from a spoiled pasteurized orange juice with off-flavour, but it is also capable of growing in other juices even at refrigerator temperatures (Kusano et al. 1997). It is a Gram-positive pleomorphic rod that produces propionic acid as the main product of sugar fermentation. Acetic and lactic acids are also formed. Amino acids stimulate growth but are not necessary. All strains require the vitamins pantothenate and biotin . Growth occurs at 20–40 °C. High concentrations of potassium sorbate (500 mg/l) and natrium benzoate (1 000 mg/l) inhibited their growth in orange juice (Walker and

Phillips 2008). The minimum pH for growth in juice was around 3.6 (Walker and Phillips 2008). The organism was able to survive heat treatment at 95 °C for 10 min and thus is not killed in regular juice pasteurization procedures **Enterobacteria** (e.g. Klebsiella, Citrobacter, Serratia) are a heterogenic group of facultatively anaerobic Gram-negative bacteria that carry out mixed acid fermentation resulting in unclean aroma and flavour as well as gas formation. They are not highly acid-tolerant but have been reported to multiply in citrus juices with pH values below 4.3 (Lawlor et al. 2009). Exocellular polymers and sulphuric compounds may also be produced.

Spore-forming bacteria of the genera Bacillus and Clostridium are usually inhibited in soft drinks due to low pH. However, spores may remain viable in these products. Bacillus and Clostridium species are typical spoilage organisms in vegetable juices that are less acidic (pH > 4) than fruit juices (Back 2005, Tribst et al. 2009). With the development of mixed beverages containing cereal fibres and vegetable or fruit juices their importance as beverage spoilers is expected to increase (Tribst et al. 2009). Anaerobic butyrate-forming clostridia such as Clostridium butyricum and Clostridium sporogenes can spoil sugar syrups used in the beverage industry during syrup manufacture or storage, causing a rancid off-flavour in the final products. These bacteria were active even at pH values of 3.6–3.8 (Hawthorne et al. 1991, Stenius et al. 1991). Elimination of spore-forming bacteria is difficult due to their inherent resistance to many physical and chemical factors.

Method:

What Happens To Our Body After Drinking Coca Cola?

After 10 minutes

Ten tea spoons of sugar contained in a glass of Cola, cause devastating “strike” on the organism and the only cause, by reason of not vomiting, is the phosphoric acid which inhibits the action of sugar.

After 20 minutes

A leap of insulin levels in bloodstream occurs. The liver converts all the sugar into fat.

After 40 minutes

Ingestion of caffeine is finally completed. The eye pupils are expanding. Blood pressure rises, because the liver disposes more sugar into bloodstream. The adenosine receptors get blocked, thereby preventing drowsiness.

After 45 minutes

Body raises production of dopamine hormone, which stimulates the brain pleasure center. Heroin has the same principle of operation.

After 1 hour

Phosphoric acid binds calcium, magnesium and zinc in the gastrointestinal tract, which supercharges metabolism. Releasing of calcium through urine also rises.

After more than 1 hour

Diuretic effect of the drink enters in "the game". The calcium, magnesium and zinc are removed out of the organism, which are a part of our bones, as well as sodium. At this time we have already become irritable or subdued. The whole quantity of water, contained in a coca cola, is removed by the urine.

Actually, when having a cold bottle of Coke and enjoying its undeniable freshness, do we know what chemical "cocktail" we pour into our throats?

The active ingredient of Coca-Cola is orthophosphoric acid. Due to its high acidity, cisterns used for transporting of the concentrate have to be equipped with special reservoirs designed for highly corrosive materials.

The anatomy" of one of the most advertised products of "Coca-Cola Co." – Coca-Cola Light without caffeine. This drink contains Aqua Carbonated, E150D, E952, E951, E338, E330, Aromas, E211.

CONCLUSION: The above help to society for awareness in the field of chemical agricultural research. attention is due to number of person drinking sofetdrinks having additives and pesticide which gave toll on its health.

References:

1. www.epa.gov/**pesticides**/about/**types**.htm

2. Walker and Phillips 2008 The effect of preservatives on Alicyclobacillusacidoterrestris and Propionibacteriumcyclohexanicum in fruit juice

3. Riikka Juvonen, Vertti Virkajärvi, Outi Priha & Arja Laitila (2011)Microbiological spoilage and safety risks in non-beer beverages . VTT Technical Research Centre of Finland, Vuorimiehentie 5, P.O. Box 1000, FI-02044 VTT, Finland phone internat. +358 20 722 111, fax +358 20 722 4374

4. Audrey P. McElroy Rami A. Dalloul Frank W. Pierson Carrie L. Walk David E. Gerrard dissertation on The Effects of Dietary Calcium and Enzyme Supplementation on the Occurrence of Necrotic Enteritis. December 4th, 2012 Blacksburg, VA

5. 9.naturalsociety.com/chemicals-really-in-coca-cola-coke-soda/ Oct 10, 2013

STUDENTS CORNER

Available online www.vpmthane.org

JBNB

Vermicomposting: A Novel Approach For Microbiological Waste Treatment

Kalpita Mulye, Aaditya Chhatre, Aniket Bagul, Hanzel Saldhana, Raghavi Murai, Jayashree Pawar

Department of Biotechnology and Microbiology, B. N. Bandodkar College of Science, Jnanadweep, Chendani, Thane. Pin. 400601.

Phone no.: + 91-22-25336507/ 98195 97054, E mail: kalpitamulye@gmail.com

ABSTRACT:

Microbiology laboratory wastes are often hazardous and need to be sterilized by autoclaving before disposal, which is an energy consuming process. Vermicomposting as an effective method to treat bio-degradable municipal or household waste is an age old proven methodology. Vermicomposting is known to convert the infected biodegradable waste containing various pathogenic microorganisms to an innocuous waste containing commensals. Hence, vermicomposting was applied for treating microbiology laboratory waste that consisted of nutrient agar containing *E coli*. After vermicomposting, count of *E coli* was found to be decreased within thirteen days. Since microbiological media are rich in agar, effect of vermicomposting on agar was analyzed. It was observed that the volume of agar containing waste added was remarkably decreased during vermicomposting. Detrimental effect of *E coli* culture on earthworms, if any, was also determined by comparing the number of earthworms in control and test systems. It was found that the culture was not having any detrimental effect on the growth of earthworms. Thus, vermicomposting can be used as an energy efficient and safe method for disposing infectious microbiology laboratory waste.

Key words: vermicompost,

INTRODUCTION:

Vermicomposting is a process of production of compost by breeding earthworms, resulting in homogeneous and stabilized humus used as manure. Worms in the process of feeding on waste cause bio-oxidation by relentless turning,

fragmentation and aeration of waste by devouring resulting in homogeneous and stabilized humus like product. The fine granular peat-like end product, vermicompost that is produced is reported to contain elevated levels of nitrogen, phosphorus, and potassium (NPK) in available form, micronutrients, micro flora, enzymes, and growth regulators [8].

Earthworms are voracious feeders of organic wastes and they utilize only a small portion of these wastes for their growth and excrete a large proportion of wastes consumed in a half digested form [4], [5]. Earthworm's intestine contains a wide range of microorganisms, enzymes and hormones which aid in rapid decomposition of half-digested material transforming them into vermicompost in a short time (nearly 4–8 weeks) [10], compared to traditional composting process which takes the advantage of microbes alone and thereby requires a prolonged period (nearly 20 weeks) for compost production [12]. As the organic matter passes through the gizzard of the earthworm it is grounded into a fine powder after which the digestive enzymes, microorganisms and other fermenting substances act on them further aiding their breakdown within the gut, and finally passes out in the form of "casts" which are later acted upon by earthworm gut associated microbes converting them into mature product, the "vermicompost" [3]. Vermicomposting of biodegradable Municipal Solid Waste & household waste has been well documented [2], [3], [4]. The study by Mathur et al [8] has revealed that vermicomposting converts the infected biodegradable waste containing various pathogenic microorganisms to an innocuous waste containing commensals like *Citrobactor frundii* and aerobic spore bearing microorganisms usually found in the soil all over. However, limited literature is available on use of vermicomposting technique for treatment and disposal of infected microbiological waste that is hazardous.

Work in microbiological laboratories generates contaminated waste that contains agar and pathogenic cultures. The way their disposal is achieved is material dependent, but mostly involves autoclaving the used media before discard. This is an energy consuming process. The present study was conducted to verify the

possibility of vermicomposting as an effective method to convert infective microbiology lab waste to non infective, eco friendly end product.

MATERIALS AND METHODS:

Earthworm cultures:

The earthworm *Eisenia foetida* was collected from culture bank of Advanced Study Centre, VPM college campus, Thane, Maharashtra, India. It was mass cultivated and used for the study.

Setting up of the vermicompost unit for mass multiplication:

Vermicomposting of infected biodegradable microbiological laboratory waste was carried out in fabricated vermicomposting containers, and measures were taken to prevent contaminants, and crawling insects.

The vermicompost unit was setup in a plastic bin of dimension (2.5ft x 1.5ft x 1ft) which was perforated at the bottom and covered with a net for drainage of water. Round pebbles and small stones were the first layer which was 1”-1.5” in height. Bricks were collected and broken into small pieces which made second layer of same length as first one. Above this, a thin layer of coarse sand was put. The sugarcane bagasse was collected and soaked in water for at least 30-45 minutes and again washed to remove all sugar content from it. This bagasse was dried totally for 1-2 days to remove all water content from it. The dried bagasse formed the third layer of 2”-3” over which a layer of dried cow-dung was put (1”-2”). This was layered by vegetable waste (3”-4”) and sprinkled with water. Two such bins were prepared and in each bin 16 earthworms were added. This setup was kept in shade on a tub filled with water and inside the tub bricks were kept on which vermicompost bins were placed carefully. This was done to prevent the unit from ants and other crawling insects. The bins were covered with nets completely and monitored daily to culture the earthworms. After obtaining a significant earthworm number three other systems were set.

1.

ontrol: Prepared with the same procedure as stated above this tray represented normal earthworm culture using vegetable waste. .

2.

ompost control: Two liters of Nutrient agar was prepared as per the standard composition and was spread over on to the pile instead of vegetable waste

3.Test system: Two liters of Nutrient agar was prepared as per the standard composition and was spread over on to the pile instead of vegetable waste. Overnight grown culture of *E. coli* was inoculated in the system.

All the systems were kept in shed in isolation and monitored routinely. The moisture was maintained with intermittent water sprinkling. Observations were recorded routinely with respect to appearance of pile, volume reduction, and twice for number of earthworms.

RESULTS & DISCUSSION

Earthworm's breakdown large soil particles and leaf litter and thereby increase the availability of organic matter for microbial degradation. They transform organic wastes into valuable vermicompost by grinding and digesting them with the help of aerobic and anaerobic microbes [7]. Earthworm's activity is found to enhance the beneficial micro flora and suppress harmful pathogenic microbes. Soil worm casts are rich source of micro and macro-nutrients, and microbial enzymes [6].

Coliforms are present in large numbers in the intestinal flora of most warm-blooded animals, and therefore their presence in the environment is associated with sources of fecal contamination. Because of this, they are used as indicators of the potential presence of enteropathogens in water and soil environments [13]. Although coliforms may also be found in the soil environment as part of the native micro flora [1], their screening is of special relevance in vermicompost produced from animal manures [2]. Microbiology laboratory also uses *E coli* as a routine experimental system. Hence *Escherichia coli* was used as a test organism in present study.

The experimental system that was set up in the present study consisted of one system that represented a control with normal earthworm culture using vegetable waste. No agar waste was added to this system. The second system contained nutrient agar containing *E coli* without earthworms

(Compost control). The third system contained nutrient agar to which *E coli* culture was added (Test system). Comparison of *Escherichia coli* counts in the second and third system would signify the effect of earthworms on pathogenic waste.

The results indicate that though the count of *E coli* has decreased in both the systems after 13 days, the reduction in number is more in the system with earthworms. It was also observed that the volume of agar containing waste added was remarkably decreased in the system with earthworms as compared to system with agar without earthworms.

***E.coli* viable count**	***E.coli* + Agar (CFU/ ml)**	**Earthworms + Agar + *E. coli* (CFU/ ml)**
Initial	5×10^{13}	5×10^{13}
After 13 Days	2.7×10^{6}	3×10^{5}
After 24 Days	0	0
After 55 days	0	0

Table 1: *E coli* count during vermicomposting process

Association of earthworms with microbes is found to be complex. Certain groups of microbes have been found to be a part of earthworm's diet which is evident by the destruction of certain microbes as they pass through the earthworm's digestive system. It has been reported that few yeasts, protozoa and certain groups of fungi such as *Fusarium oxysporum, Alternaria solani*, and microfungi were digested by the earthworms, *Drawida calebi, Lumbricus terrestris* and *Eisenia foetida*. *Bacillus cereus var mycoides* were reported to decrease during gut passage while *Escherichia coli* and *Serratia marcessens* were completely eliminated during passage through earthworm gut [11]. A wide array of digestive enzymes such as amylase, cellulase, protease, lipase, chitinase and urease has been reported from earthworm's alimentary canal [9]. Earthworm comminutes the substrate, thereby increases the surface area for microbial degradation constituting to the active phase of vermicomposting.

To investigate the effect of *E. coli* & agar on the survival of earthworms, the counts of earthworms taken at regular intervals were analyzed.

Table 2: Earthworm count during vermicomposting process

Earthworm count	Only earthworms	Earthworms + Agar	Earthworms + Agar + *E. coli*
Initial	11	11	12
After 37 days	19	21	14
After 64 days	457	530	606

Highest number of earthworms was observed in the system with *E coli*. Thus, *E coli* culture is not having any detrimental effect on the growth of earthworms.

Thus, vermicomposting can be used as an effective environment friendly strategy for disposal of agar waste containing *E coli*. Hence this strategy can also be tested for other pathogenic cultures, and if successful, be used as a method of disposing off the microbiology laboratory waste. Along with waste disposal, the method has an added advantage of saving the energy consumption during autoclaving helping in greening the process to achieve energy efficiency.

REFERENCES

Byappanahalli, M.N., and Fujioka, R.S., "Evidence that tropical soil environment can support the growth of *Escherichia coli*', Water Sci Technol, Vol 38, pp 171–174, 1998.

Contreras-Ramos, S.M., Escamilla-Silva, E.M. & Dendooven, L., "Vermicomposting of biosolids with cow manure and wheat straw", Biological Fertility of Soils, Vol 41, pp 190–198, 2005.

Dominguez J, Edwards C. A., "Vermicomposting organic wastes: A review", In: Shakir Hanna SH, Mikhail WZA (eds) Soil Zoology for sustainable Development in the 21st century., Cairo, pp 369–395, 2004.

Jambhekar H., "Use of earthworm as a potential source of decompose organic wastes", Proc Nat Sem Org Fmg, Coimbatore, pp 52–53, 1992.

Kale R. D., Bano K., "Earthworm cultivation and culturing techniques for the production of vee COMP83E UAS", Mysore J Agric Sci, Vol 2, pp 339–344, 1988.

Lavelle P., Martin A., "Small-scale and large-scale effects of endogeic earthworms

on soil organic matter dynamics in soils of the humid tropics", Soil Biol Biochem, Vol 12, pp 1491–1498, 1992.

Maboeta M. S., Van Rensburg L., "Vermicomposting of industrially produced wood chips and sewage sludge utilizing Eisenia foetida", Ecotoxicol Environ Saf, Vol 56, pp 265–270, 2003.

Mathur U., Lalji K Verma L. & Srivastava J., "Effects of Vermicomposting on Microbiological Flora of Infected Biomedical Waste", ISHWM Journal Vol 5, No. 1, pp 28-33, 2006.

Munnoli, P. M., Teixeira da Silva, J. A and Bhosle, S., "Dynamics of the Soil-Earthworm-Plant Relationship: A Review", Dynamic Soil, Dynamic Plant, Vol 4 (Special Issue 1), pp 1-21, 2010.

Nagavallemma K. P., Wani S. P., Stephane L, Padmaja V. V., Vineela C., Babu Rao M., Sahrawat K. L. "Vermicomposting: Recycling wastes into valuable organic fertilizer", Global Theme on Agrecosystems Report no.8. Patancheru 502324, International Crops Research Institute for the Semi-Arid Tropics, AndhraPradesh, pp 20, 2004.

Pathma J. and Sakthivel N., "Microbial diversity of vermicompost bacteria that exhibit useful agricultural traits and waste management potential", SpringerPlus, 1:26, 2012.

Sánchez-Monedero M. A., Roig A., Paredes C., Bernal M. P. "Nitrogen transformation during organic waste composting by the Rutgers system and its effects on ph, EC and maturity of the composting mixtures", Bioresour Technol, Vol 78, pp 301–308, 2001.

Sidhu J. P. S., Toze S. G., "Human pathogens and their indicators in biosolids: A literature review", 2009 Environ International, Vol 35, pp 187–201,

STUDENTS CORNER

Available online www.vpmthane.org

JBNB

Isolation and identification of novel agar digesters in earthworm (*Eisenia fetida*) gut

Jayashree Pawar, Kalpita Mulye, Darshan Mahajan, Vaishnavi Samant, Tanishka Bagwe.

Department of Biotechnology and Microbiology,

B. N. Bandodkar College of Science, Jnanadweep, Chendani, Thane. Pin. 400601

Phone no.: + 91-22-25336507/ 98195 97054, E mail: kalpitamulye@gmail.com

Abstract :

Agarase is an important enzyme having a lot of applications in medical, cosmetics and food industries. Earthworms gut has many VBNCs, which may have agarase producing potential. The gut washing was isolated on the minimal media containing gut washing and the essential salts.

Key Words – earthworm, agarase, VBNCs, incubation

Introduction

Agar is a complex molecule consisting of agarose and agaropectin, and additionally contains the residues of sulfate, pyruvate, and methoxyl. The enzymatic breakdown of agarose can be performed by two types of agarases that is, by α-agarases and β-agarases. Agarase has a high commercial value as it has many applications in food industries, cosmetics, and medicine.Earthworm's gut is known to have VBNCs, which may have agarase producing potential.Minimal medium containing earthworm gut washing was used for isolation of novel agar digesters from earthworm gut. Addition of earthworm gut washing to the medium is expected to provide natural environment in the earthworm gut, e.g. in the form of missing growth factors, to help culturing

novel, yet uncultured agar digesters with very good agarase activity.

Materials and Methods

Earthworms were disinfected and sedated using 70 % ethanol and dissected.

Gut washing was taken in sterile distilled water.

A loopful was inoculated on sterile media containing-

Components	**Quantity**
$NaNO_3$	0.2 %
K_2HPO_4	0.05 %
$MgSO_4.7H_2O$	0.02 %
$MnSO_4.7H_2O$	0.002 %
$FeSO_4.7H_2O$	0.002 %
$CaCl_2.2H_2O$	0.002 %
Agar	3 %
pH	7.2
Gut Washing	40 % v/v
Total Volume	20 mL

Different isolates were stab inoculated in Nutrient agar tubes having varied percentages of agar. The tubes were incubated for 2 weeks for any observable depressions.

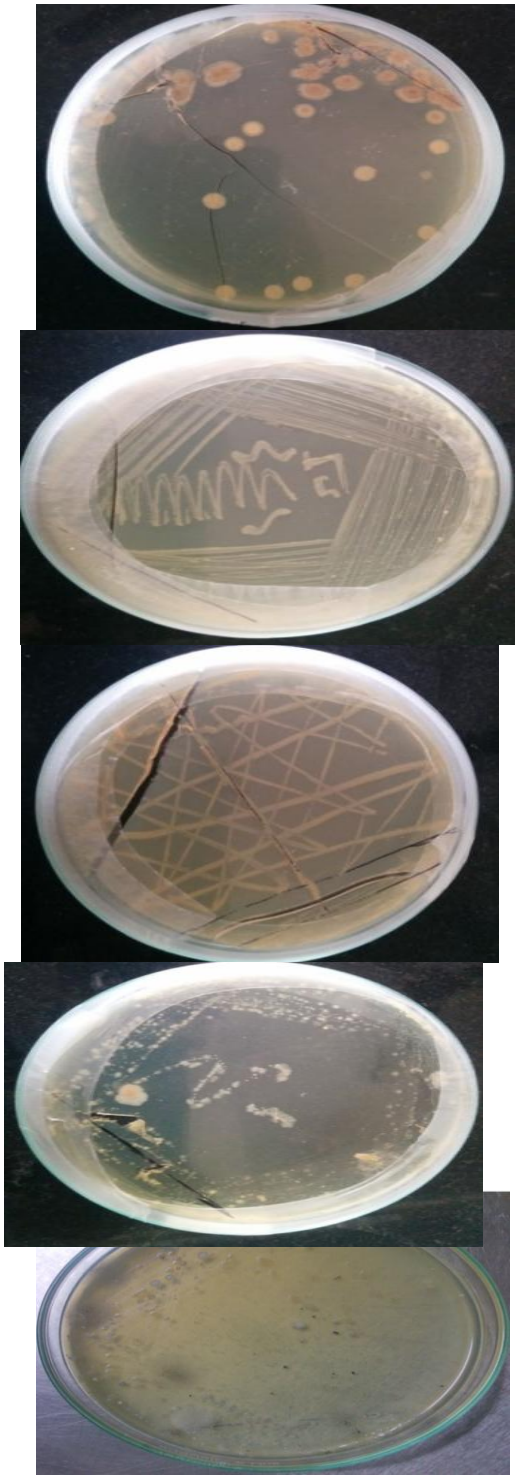
Result and discussion:

After incubation for 72hrs at room temperature various isolates of bacteria and fungi were seen.

Six isolates which were supposed to be capable of producing agarase enzyme were replated on St. Nutrient Agar plates and incubated at room temperature for 3 days to check the agarase activity. However no prominent depression was seen on these plates. The colonies might need a greater incubation period.

Agar digesting microorganisms were not seen in the gut of the earthworms. They might need longer incubation period. There might also be interdependence of the microbes among themselves, due to which the separate colonies did not show any particular agar digestion.

Assay



Photographs 1-5 Various isolates obtained after enrichment.

References:

1. Faturrahman, Anja M, Muhammud ZJ, Iman R, Isolation and identification of an agar liquefying marine bacterium and some properties of its extracellular agarases; Biodiversitasvol 12, Number 4, October 2011 Pages: 192-193
2. Xiao TF, Sang MK, Agarase: Review of Major sources, categories, purification method, enzyme characteristics and Application; Mar. Drugs 2010,8,200-218.
3. Yu-Fong S, Hui-chum Y and Yee L. International Journal of applied science and engineering 2009.7, 1:25-41; The discovery of agarolytic bacterium with agarase gene containing plasmid and some enzymology characteristics.

STUDENTS CORNER

Available online www.vpmthane.org

JBNB

Study of Effect Of Electromagnetic Radiations Emitted By Mobile Tower On Representative Microbial System

K. Mulye, V. Thorat, S. Sonawane, J. Talker, E. Talker, A. Raj, J. Pawar

Department of Biotechnology and Microbiology, B. N. Bandodkar College of Science, Chendani, Thane-01 India

Abstract: In Indian urban settings, Mobile phone towers are major source of electromagnetic radiations which can be mutagenic. India's permissible limit for radiation levels from mobile phone towers is 900 times higher than the safe limit. High environmental concentration of radio frequency radiation may place all biological systems under high risk of radio frequency radiation effects. The present study focuses on effect of electromagnetic radiations emitted by mobile tower on *E. coli.* Two locations were selected as sites for exposure. One in the vicinity of the mobile tower on building terrace and one devoid of any mobile tower in 500mtrs periphery. Suspension culture of actively growing E. coli (OD.=0.1) was prepared and was exposed at the selected sites for two weeks and checked for viability and phenotypic , morphological mutations at different time intervals . The unexposed culture was kept as control. Significant reduction in the cell viability was observed for the culture exposed to mobile tower radiation within one week and was confirmed after two weeks of exposure. The present study shows the lethal effect of EMR emitted by mobile towers on microbial culture of E. coli.

Key words: Mobile tower, EMR, E.coli, viability

Introduction:

Extraordinary growth in the global communication industry in recent years has resulted in a dramatic increase in the number of wireless devices and supporting infrastructure in the form of cell towers. With no regulation on the placement of cell towers, they are being placed haphazardly closer to schools, public playgrounds, on commercial buildings, hospitals, college campuses, and terraces of densely populated urban residential

areas. Thus, In Indian urban settings as well, Mobile phone towers are major source of electromagnetic radiations which can be mutagenic. India's permissible limit for radiation levels from mobile phone towers is 900 times higher than the safe limit globally accepted. The effect of radio-frequency electromagnetic field (RF-EMF) from cell towers and wireless devices on the biosphere have been reviewed. RF-EMF radiation exposure can change neurotransmitter functions, blood-brain barrier, morphology, electrophysiology, cellular metabolism, calcium efflux, and gene and protein expression in certain types of cells even at lower intensities. The biological consequences of such changes remain unclear.

Material and methods:

Culture: Laboratory strain of *E.coli* cultured in nutrient broth at 37^{o}c was washed with sterile saline twice. The culture suspension prepared in saline (OD= 0.1) was distributed in sterile tubes and then taken for exposure.

Site selection: Two different sites were selected for exposure of microbial culture.

Site 1 - site where two mobile towers were installed, on a residential building terrace.

Site 2 - was a building terrace with one tower located in vicinity.

Exposure time: The cultures were exposed for upto two weeks. Determination of cell viability was

Determination of cell viability: The exposed and unexposed cultures of *E. coli* were spread plated on Sterile MacConkeys' agar plates. After incubation of 24 Hrs. at 37^{o} C the developed colonies were considered to determine number of surviving viable cells and study of possible lactose non-fermenter mutants.

Results: shown in table 1

Table1: Plate count of *E. coli* after exposure to EMR at site 1 &2 for different periods

Time of exposure (weeks)	Control(cfu / ml)	Site 1 (cfu / ml)	Site 2 (cfu / ml)
0	$5.03x10^5$	-	-
1	$2.364x10^5$	0	$5.535x10^3$
2	$2.61x10^5$	0	0

Discussion:

Bacteria are simple and widely used models for examination of mutagenesis and DNA repair processes. The advantages of bacterial systems are their availability, easy cultivation, short time of cell division, and haploidity. Many DNA damaging agents and/or mutator genes cause mutations that are readily and clearly observed in changes of phenotype. Hence *E. coli* was used in this study to monitor the effects of EMR.

It is well known that mutagens cause changes to the DNA that can affect the transcription and replication of the DNA, which in severe cases can lead to cell death. Radiation from cell phone is known to produce DNA breaks in sperm cells that can mutate and cause cancer.

Results from table indicate massive cell kill in *E coli* cells within one week after exposure to EMR at site 1 with two mobile towers in vicinity. EMR exposure of two weeks was required for such a massive E coli kill for site two where only on mobile tower is present in vicinity.

Our study thus indicates that a simple bacterial system can be used to moniter the level of EMR in a particular area and observe its effects on cellular system.

References:

1. S Sivani*, D Sudarsanam Impacts of radio-frequency electromagnetic field (RF-EMF) from cell phone towers and wireless devices on biosystem and ecosystem – a review *Biology and Medicine, 4 (4): 202–216, 2012*

2. Rogacheva SM, Denisova SA, Shul'gin SV, Somov AIu, Kuznetsov PE. [Biological effects of electromagnetic radiation of extremely high frequencies combined with physiologically active compounds]. Radiats Biol Radioecol. 2008 Jul-Aug;48(4):474-80.

STUDENTS CORNER

Available online www.vpmthane.org

JBNB

Isolation and Identification of LDPE Degrading Organisms from Domestic Sludge Samples

Jayashree Pawar, Kalpita Mulye, Aniket Bagul, Aditya Chhatre

Department of Biotechnology and Microbiology, B. N. Bandodkar College of Science, Jnanadweep, Chendani, Thane. Pin. 400601

Phone no.: + 91-22-25336507/ 98195 97054, E mail: kalpitamulye@gmail.com

Abstract:

LDPE is a thermoplastic and is used in almost all industries. It shows very high resistance to dilute acids, alcohols, aldehydes, ketones and ionic salts and hence consider to be a major cause of pollution and poses a serious threat to the ecological balance of environment The microorganisms present in the neighborhood of the dumped LDPE are thus naturally exposed to it, and may have certain adaptations to degrade the polymer enzymatically as a potential nutrient source (for LDPE being a carbon chain). Sludge samples were enriched and micro-organisms isolated for it were screened for LDPE-degradation capacity. This approach of enzymatic breakdown of LDPE could be a good solution to ever increasing issue of bio-accumulation of LDPE.

Key words: LDPE, bio accumulation, environmental threat, enzymatic breakdown.

Introduction

LDPE (low density polythene) is a synthetic polymer made up of repeating units of ethene. It is a thermoplastic and is used in almost all industries such as packaging, production of common household commodities (utensils, bags etc). LDPE has no functional groups or ionic charge on any of the repeating unit, hence being highly hydrophobic and inert. It has very high resistance to dilute acids, alcohols, aldehydes, ketones and ionic salts. Reports suggest that LDPE has chemically non-reactive nature to even strong acids such as Hydrofluoric acid. Thus it can be only split into its oligomers and dimers under the influence of strong

oxidizing agents under special reaction conditions.

Owing to the inert properties of LDPE, it is long known to be dumped in the environment from landfills to flowing water bodies, and get accumulated in the process.

This poses a serious threat to the ecological balance of that environment. The microorganisms present in the neighbourhood of the dumped LDPE are thus naturally exposed to it, and may have certain adaptations to degrade the polymer enzymatically as a potential nutrient source (for LDPE being a carbon chain). This approach of enzymatic breakdown of LDPE could be a good solution to ever increasing issue of bio-accumulation of LDPE.

Materials and Methods

Sample Collection

Sludge samples were collected from 4 different sewers around Thane City, in May 2014, in sterile conical flasks. Care was taken that the sewers which were selected had good amounts of plastic clogged into it so as to ensure the organisms exposed to the plastics were obtained.

Media Preparation and Enrichment of samples

McBeth's Medium was selected as media for enrichment as it contains only certain inorganic salts, and cellulose as a sole carbon source. However, cellulose was replaced by LDPE, cut into 10 squares, of 2cm X 2cm dimensions each. 150mL of sterile McBeth's Broth was dispensed into 5 sterile conical flasks equally aseptically, thus 30mL in every flask, and each flask was then charged with 10 pieces of LDPE (2cm X 2cm). 10mL of sludge samples were inoculated separately in each flask. One of the flasks was maintained as negative control, which did not have any sample added. The flasks were incubated at room temperature in static conditions.

Media Preparation

Agar media was prepared by dissolving 1.3 gram of nutrient broth powder in 100mL distilled water, and 2 grams of agar agar powder was added to it. The media was sterilized in autoclave at 121.6C at 15psi. The molten agar was poured into 5 sterile petri-plates. Another set of 5 petri-plates was prepared, using 0.013 gram nutrient broth powder, dissolved in 90ml distilled water. Agar was added, molten by

heating it inwater bath at 100C and dispensed in 5 separate flasks. Into each flask, 2mL of sludge effluent was added, so as to make up the volume of each media to 20mL. The media was sterilized as before, and poured into petri-plates. This protocol of media preparation was followed in order to provide the microoroganisms from each enrichment flasks, a natural growth environment (sludge effluent may have important signalling molecules) as much as possible, and a nutrient poor conditions. This would ensure sustenance of the microorganisms as they may not receive a nutrient shock, otherwise leading to cell attenuance.

Isolation of Enriched samples

The enriched samples were isolated on the media plates. Also, an LDPE piece was taken from every flask with a surface-sterilized forceps, cut into half using sterile scissors, and each half placed on another set of media plates (Nutrient Agar and nutrient poor agar). This protocol was followed to obtain the microorganisms which may have formed a biofilm on the LDPE piece. Reports suggest formation of biofilm is vital for LDPE degradation. The obtained colonies were subcultured repeatedly on agar slants, and preserved at 4C.

Screening of Microorganisms for LDPE-degradation capacity

1) Pulverization of LDPE

7 grams of LDPE was shredded into bits, and boiled in 50mL xylene in conical flask. The liquid thus obtained was cooled to about 50C. 50mL ethanol was added so as to dissolve the xylene. The beaker was kept at R.T overnight in order to vaporize ethanol. The LDPE was finely ground in stainless steel grinder, to obtain fine LDPE powder.

2) Pulverized LDPE assay

The powdered LDPE was added as a sole carbon source in McBeth's Agar medium. The media was sterilized and poured into sterile petri-plates. The obtained isolates were spot inoculated on the plates in quadrants. A loopful of enriched sludge sample was also spot inoculated, to study the degradation of LDPE by microbial consortia. A piece of LDPE was also added as before on the media to study the degradation of LDPE by bio-film forming organisms, if any. The plates were incubated at R.T.

RESULTS AND DISCUSSIONS

A total of 22 bacterial isolates, and 3 isolates belonging to Actinomycetes species were obtained from 4 sludge samples. Fungal isolates however were not obtained as respective media was not used for isolation. All of the obtained microorganisms are potential LDPE degraders as they were able to survive for prolonged period (5-6 months) in media containing LDPE as only carbon source. However, this can only be confirmed by the assay performed. A colony grown on McBeth media with pulverized LDPE would show a characteristic clear zoneformation, if the microorganism was a fast LDPE degrader.

No such clear-zones were however observed on the agar plates. The microbial consortia too did not show any significant observation with respect to clear zones. The agar with inoculated LDPE piece showed depression in the petri-plate but no clear zone as such. The depression may be caused due to presence of agar-digesting organisms, but no LDPE digesters were however confirmed.

CONCLUSIO

No isolated strains were confirmed to digest LDPE abundantly within 24 hours of incubation. The strains however are indeed potential LDPE degraders as observable results are only obtained 2-4 months after incubation. The assay needs to be repeated and the media plates have been incubated further to confirm the presence or absence of LDPE degrading micro-organisms in the tested sludge samples.

REFERENCES

Journal of environmental polymer degradation, July 1993, Volume 1, Issue 3, pp 227-233, "Distribution of poly(β-hydroxybutyrate) and poly(ε-caprolactone)aerobic degrading microorganisms in different environments" Haruo Nishida, Yutaka Tokiwa

Journal of Biotechnology, Volume 86, Issue 2, March 30 2001, Pages 113-126, "Degradation of natural and synthetic polyesters under anaerobic conditions", Dunja-Manal Abou-Zeid, Rolf-Joachim Müller, Wolf-Dieter Deckwer.

Research Journal of Biological Sciences, Volume 6, Issue 4, Pages 141-145, "Bio-Degradation of Low Density Polyethylene

(LDPE) by Fungi Isolated from Marine Water", P. Sindujaa, M. Padmapriya, R.Pramila, K. Vijaya Ramesh.
Libyan Agriculture Research Center Journal International, Volume 2, Issue 4, Pages 200-204, "Screening of Polyethylene Degrading Microorganisms from Garbage Soil", R.Usha, T.Sangeetha, M. Palaniswamy.

STUDENTS CORNER

Available online www.vpmthane.org

JBNB

Formulation and efficacy of hand sanitizer

Elizabeth Talker, Judith Talker, Vinaya Thorat, Jayashree Pawar, Kalpita Mulye

Department of Biotechnology and Microbiology, B. N. Bandodkar College of Science, Jnanadweep, Chendani, Thane. Pin. 400601

Phone no.: + 91-22-25336507/ 98195 97054, E mail: kalpitamulye@gmail.com

ABSTRACT:

Microbes are present all around, though they are not visible to the naked eye. Hands are regarded as a major source of transmitting different kinds of infections. Hand contamination with above & other organisms can cause varied infections like common cold, coughing, diarrhea etc. Hand hygiene can produce a significant benefit in terms of reducing infections particularly gastrointestinal tract infections, respiratory tract infections and many skin infections therefore hand cleanliness is very essential. The attempt was made to prepare new formulation of hand sanitizer with less % of alcohol more efficacy. The efficacy of the formulated hand sanitizer screened using thumb print analysis on Nutrient agar plates , was found to be good. hence the aim to prepare a hand sanitizer with only 40%alcohol (both ethanol and Iso- propyl alcohol together) as compared to the commercially available ABHS which have about 60%- 70 % alcohol and also to curb or in fact eliminate the use of chemicals like triclosan and BKC (benzalkonium Chloride) was successful.

Keywords: Microbes, contamination, ABHS

Introduction:

Microbes are present all around, though they are not visible to the naked eye. Hands are regarded as a major source of transmitting different kinds of infections. Skin being the outermost layer of the body has been estimated to have >10000 organisms per sq.cm. Skin micro flora are the microbes that reside on the skin, they are usually non- pathogenic, commensals or mutualists. These microbes include *Staphylococcus aureus, S. pyogenes, Streptococcus mitis, Propionibacterium acnes, Corynebacterium spp. ., Acinetobacterjohnsonil, Pseudomonas aerugenosa, Escherichia coli etc*. which can also be opportunistic and cause infection. Hand contamination with above & other organisms can cause varied infections like common cold, coughing,diarrhea etc. Hand hygiene can

produce a significant benefit in terms of reducing infections particularly gastrointestinal tract infections, respiratory tract infections and many skin infections therefore hand cleanliness is very essential. Decontamination of hands can be carried out by many means which include washing hands with soap and water, using alcohol, waterless hand sanitizers etc.Application of alcohol on its own to sanitize hands makes them feel dehydrated and grimy , also alcohol leaves a very peculiar smell which is not liked by many. Washing hands with soap is the best method for hand safety as to the usage of hand sanitizers, has been a debatable issue ever since hand sanitizers have got popular but to wash hands every time is impractical. Sometimes adults and children need to clean their hands quickly, as they may not have the time to stop what they are doing to fully engage in a hand wash, although hand sanitizers can then be an acceptable alternative but it should surely not replace hand washing. Sanitizers are basically antimicrobial agents which kill or irreversibly inactivate bacteria and fungi. Rinse less hand sanitizers are broadly classified into two types : alcohol based hand sanitizers (ABHS) also called as alcohol rubs, and hand sanitizers without alcohol (i.e. 0% alcohol). Although many would prefer hand sanitizers without alcohol believing the fact that alcohol enters the blood stream throughthe skin causing several neuraldisorders; these are less effective, having a shorter shelf life. Also hand sanitizers without alcohol invariably have a component benzalkonium chloride, which complements the activity of alcohol and acts as a major antimicrobial agent but its seen that this BKC is carcinogenic and also a severe eyeand skin irritant if its concentration is even a little more than 0.1%. In comparison to these, ABHS are more effective in their antimicrobial activity and also in their shelf life which ranges anywhere between 6 months to a year. Also it is stated in quite a few studies that the amount of alcohol that enters the blood stream even in case of over usage of these ABHS is too little to cause anything at all hence these can be used . The antimicrobial activity of alcohol in alcohol based hand sanitizers is based on its capacitytoinduce protein denaturation, thuskilling bacteria, fungi

and many viruses. ABHS are therefore proven boosters to hand cleanliness in the food service arena also, as unlike residual chemicals ABHS do not carry the risk of possible food contamination. On the other hand, in child – care, classrooms there are times when ABHS can be used. Hence the aim wastoformulate a hand sanitizer with lesser alcohol content in comparison to the ones available commercially andalso avoid the use of chemicals like triclosan, BKC etc. which are proven hazards to human health.

Materials and Methods:

Preparation of hand sanitizer:

50 grams of aloe Vera gel(used as an emollient in the sanitizer)was taken in a bowl and to this about 50ml of rubbing alcohol (surgical spirit – which is proven to kill 99% of bacteria within 30 secs of its application was added to get a viscousgel. Now 10 -12 teaspoonful lavender oil(essential oil which has antiseptic property)was added to give it a sweet smell and eliminate the smell of alcohol. Then 2 tea spoons of rose water was added. The viscosity was checked and it was seen to be less also now the sanitizer was dehydrating the skin hence1 tea spoon of glycerin (which hydrates the skin and compensates for the dehydration caused by alcohol) was added to this mixture. Lastly, ethanol (which is a proven anti-bacterial agent) was added to this. All these contents were then mixed thoroughly to get a completely homogenized, moderately viscous solution. This was then kept for 24 hours with vigorous intermediate mixing and then tests were performed for its efficacy check.

Efficacy check:

For testing the efficacy of the formulated hand sanitizer a few qualitativetests were performed using nutrient agar plates.

Thumb prints were taken with and without using the sanitizer on the agar plate, to check the growth of microbes that settle on the hands during the day's routine and check if the formulated hand sanitizer has enough inhibitory action to these microbes.

Dust was taken on the fingers and then these thumb prints were taken on the agar plates with and without the use of sanitizer to check for efficacy of preparation.

Efficacy analysis during shelf life:

During shelf life with interval of a month the tests were repeated and he findings were noted.

Results:

The thumb prints taken without the use of the sanitizer showed a large number of colonies on the plate but on the contrary, the thumb prints taken on the plate after the hands were sanitized with the sanitizer showed visibly very few colonies in both the cases (i.e. both agar plates). Hence proving that the sanitizer is efficient to kill or inactivate most of the microbes that were present on the hand.

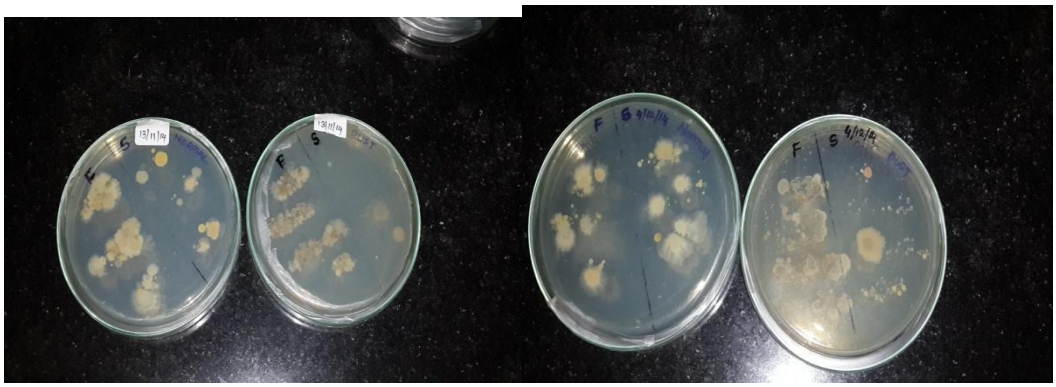


Fig. Plates for 1 month old sanitizer(November)Fig. Plates for 2 months old sanitizer (December)

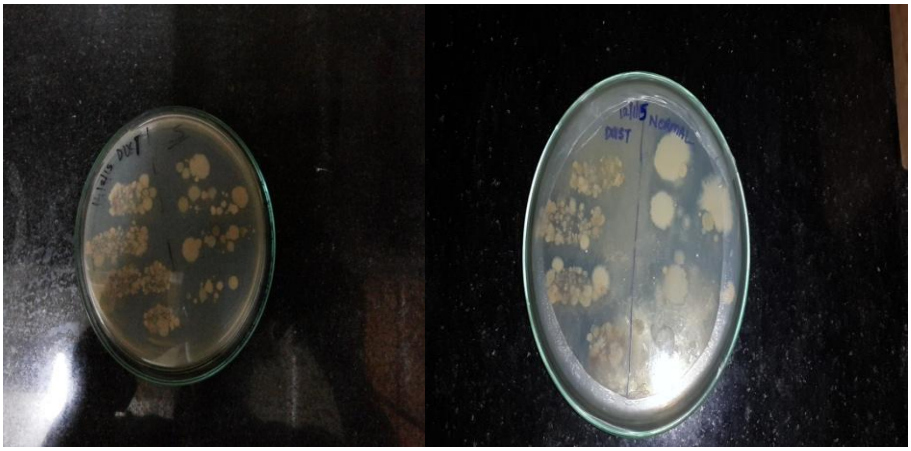


Fig. Plates for 3 months old sanitizer (January) b) plates for 4 months old sanitizer (February).

Conclusion and discussions:

The efficacy of the formulated hand sanitizer was found to be good. hence the aim to prepare a hand sanitizer with only 40%alcohol (both ethanol and Iso- propyl alcohol together) as compared to the commercially available ABHS which have about 60%- 70 % alcohol and also to curb or in fact eliminate the use of chemicals like triclosan and BKC(benzalkonium Chloride) was successful . Also the shelf life is kept under check to confirm it to be 6 months.

In future we plan to quantitatively estimate its efficiency and reduce on the net cost(i.e. use natural sources instead of buying them directly).

References:

1. Effectiveness of Liquid Soap and Hand Sanitizer against Norwalk Virus on Contaminated Hands, Pengbo Liu1, Yvonne Yuen1, Hui-Mien Hsiao1, Lee-Ann Jaykusand Christine Moe1*Appl. Environ.* Microbiol. January 2010 vol. 76 no. 2 394-39

2. Ansari, S. A., S. A. Sattar, V. S. Springthorpe, G. A. Wells, and W. Tostowaryk. 1988. Rotavirus survival on human hands and transfer of infectious virus to animate and nonporous inanimate surfaces. J. Clin. Microbiol. 26**:**1513-1518

AUTHORS INDEX