ERUDITION 2023

'A RESEARCH COMPENDIUM'

Interdisciplinary & Multilingual

Edited by

Dr. Jilna Alex N. | Theresa J. Heloise

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ERUDITION

by **Dr. JILNA ALEX N., TERESA J. HELOISE**

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EDITORIAL

Celebrating Interdisciplinary Research with "Erudition"

"Erudition" is a remarkable compilation of well-researched papers produced by the faculty of Little Flower College, Guruvayoor. These papers display the breadth and depth of knowledge across the fields of science and humanities, and are a testament to the power of interdisciplinary research. This compendium demonstrates the potential of interdisciplinary research to yield new insights, spark innovation, and address complex challenges that require holistic solutions.

The papers in this compendium cover a wide range of topics which include a review on the antimicrobial effects of curcumin, an analysis on the efficacy of natural oils as green anaesthetics on ornamental fish, black molly, and a study on the synthesis and characterization of layered double hydroxides of Mg and Al as anion exchange material.

Other papers delve into current issues, such as the new education crisis and its implications on higher education in India, women entrepreneurship and self-employment prospects, and the awareness and use of selected e-resources among faculty.

In addition, the compendium includes research on the biotoxicity and larvicidal property of three common Allium species, and the journey from candidate to an employee. The cultural celebration of Bomma Golu, and an analysis of the notion of fair skin in Helen Oyeyemi's Boy, Snow, Bird, are also featured.

Overall, the papers in "Erudition" offer valuable insights and contribute to the growing body of interdisciplinary research. At a time when the world is facing complex challenges that require interdisci-

plinary solutions, “Erudition” is a timely and inspiring publication. It reminds us of the importance of collaboration and cooperation across different fields of study, as well as the potential for innovation that arises from such collaboration.

We would like to extend our heartfelt gratitude to the faculty of Little Flower College for their contributions to this compendium. Their commitment to research is a testament to their intellectual curiosity and dedication to advancing knowledge.

We hope that readers will find “Erudition” to be a thought-provoking and enlightening read, one that inspires them to embrace the spirit of research and engage with the world in new and innovative ways.

Dr. JILNA ALEX N.
&
TERESA J. HELOISE

FOREWORD

It is with great pleasure that I bring forth a new instalment of "Erudition", a research compendium that showcases the remarkable work of the faculty at Little Flower College. As the Principal of this esteemed institution, I am immensely proud of the contributions made by our faculty to the fields of science and humanities, and their unwavering commitment to research.

The papers featured in "Erudition" are the result of rigorous research and scholarly inquiry, covering a wide range of topics that highlight the diverse expertise of our faculty. From delving into the intricacies of scientific phenomena to exploring the depths of human history and culture, these papers exemplify the intellectual prowess and interdisciplinary mindset of our faculty members.

As an institution that fosters a culture of interdisciplinary research, Little Flower College takes pride in nurturing an environment that encourages collaboration, critical thinking, and innovation. Our faculty members are not limited by disciplinary boundaries but are driven by curiosity and a passion for advancing knowledge in meaningful ways. "Erudition" is a celebration of their hard work, dedication, and intellectual rigor.

I extend my deepest appreciation to our faculty for their exemplary contributions to "Erudition". Their tireless efforts in pushing the boundaries of knowledge and engaging in interdisciplinary research are truly commendable. I also express my gratitude to the editorial team for their meticulous efforts in bringing this compendium to fruition.

I invite readers to delve into the pages of "Erudition" and experience the rich and diverse research conducted by our faculty. May it inspire and ignite curiosity, fostering a culture of interdisciplinary research and innovation that transcends disciplinary boundaries and helps us better understand the world we inhabit.

Dr. Valsa M. A. (Rev. Sr. Jeesma Therese)
Principal, Little Flower College

INDEX

SYNTHESIS, CHARACTERISATION, X-RAY CRYSTALLOGRAPHIC AND THERMAL DECOMPOSITION KINETICS OF Ni(II) AND Ag(I) COMPLEXES OF N'(PHENYL METHYLENE) ISONICOTINOYL HYDRAZONE

Dr.Lali Thomas Kotturan and Joveena Francis

Department of Chemistry, Little Flower College, Guruvayoor.

Abstract

The ligand N- (phenyl methylene) isonicotinoyl hydrazone is synthesised by the condensation of isonicotinoyl haydrazine and benzldehyde. Ni(II) and Ag(I) complexes were prepared and analysed by elemental analysis, conductance measurement, infrared specta, UV spectroscopy, X-ray and thermal studies. The studies confirms tetrahedral geometry for Ni(II) and square planar geometry for Ag(I) complexes respectively. The crystal type of the complexes were analysed by the software X-pert High Score Plus. Both the complexes were found to be rhombohedral. [NiL(NO3)2] resembles Eskolite,syn. [AgL(NO3)H2O], resembles calcite .Thermogravimetric kinetics of all the stages were determined by the non mechanistic equations of Coats Redfern, Horowitz -Metzger and Mac Callum Tanner and the nine mechanistic equations by Sestak and Satava. The kinetic parameters arrived at from all these equations are compared to assign the mechanism of decomposition of loss in each stage.

Keywords

N'-(phenylmethylene)isonicotinoyl hydrazone),

Thermogarvimetry, Infrared studies, X- ray studies, X-pert high score plus, electronic spectra, mechanistic equations, non mechanistic equations.

1.1 Introduction

The ligand Ný- (phenyl methylene) isonicotinoyl hydrazone is a bidendate ligand derived from isonicotinoyl haydrazine and benzldehyde. The CHN analysis results were in close proximity with the assigned structure. The Ni (II) and Ag(I) complexes were found to be tetrahedral and square planar geometry with structures [NiL(NO3)2] and [AgL(NO3)H2O] .Both the complexes were found to be non conducting in nitrobenzene at a concentration of 10^{-3} M .The infrared spectral studies and UV-Visible spectra confirmed the geometry. The crystal type of the complexes were analysed by the software X-pert High Score Plus. NiL(NO3)2] resembles Eskolite,syn, with reference code 00-038-1479. The structure is rhombohedral, with space group R-3c . The cell dimension are a=9588, b= 4.9588, c=13.5942, The density=5.23g/cm^3, cell volume= 289.49 (10^6pm^3). [AgL(NO3)H2O], it resembles calcite, syn with reference code 00-005-0586. The structure is rhombohedral, with space group R-3c . The cell dimension are a=4.9890, b=4.9890, c=17.0620 , The density = 2.71g/cm^3, cell volume=367.78(10^6pm^3). The analysis of TGA shows that the complex [AgL(NO3)H2O] decomposed in five stages and [NiL(NO3)2] in six stages.. The studies are in conformity with the structure elucidated from the physicochemical studies. The final product is found to be Ag2O. The silver complex started the decomposition at 321K while the nickel complex started the decomposition at 331 K . Even though the initial temperature of decomposition can be taken as the determining factor of stability of a compound, the difference of only 10 K shows that both the complexes are some what of same stability. [NiL(NO3)2] showed the removal of NO3,NO3, N2,C6H4N,CHO and C7H6 respectively in the six stages.[AgL(NO3)H2O] decomposed in five stages by removing H2O, NH, CO, NCH and the rest of the ligand in the last stage. Thermogravimetric kinetics of all the stages were determined by three non mechanistic equations by Coats Redfern, Horowitz - Metzger and Mac Callum Tanner and the nine mechanistic equations by Sestak and Satava. The kinetic parameters arrived at from all

these equations are compared to assign the mechanism of decomposition of loss in each stage.

2. Experimental

For the synthesis of ligand and complexes the chemicals used were of annular grade and the experimental methods followed are given below.

2.1 Synthesis of Ligand - Ný- (phenyl methylene) isonicotinoyl hydrazone A mixture of alcoholic solutions of pyridine-4-carbohydrazid (0.137g;0.1 M) and benzaldehyde (0.106g; 0.1 M) were mixed in a round bottomed flask and refluxed on a water bath for 4 hrs. The resulting solution was concentrated and cooled when slight yellow coloured precipitate separated, which was filtered, washed with minimum amount of alcohol and dried in a dessicator over anhydrous calcium chloride. (Melting point=198ÚC)

2.2 . Synthesis of complex [NiL(NO3)2]

A mixture of alcoholic solution of ligand (0.11g ; 0.05 M) and aqueous solution of nickel(a!)nitrate hexahydrate (0.072g ; 0.025 M) were mixed in a round bottomed flask and refluxed on a water bath for 1 hr. Cooled and sodium acetate was added with stirring until the pH of solution become 7. The precipitate was formed. The complex was filtered, washed with alcohol and dried in a dessicator over anhydrous calcium chloride.

2.3 . Synthesis of complex [AgL(NO3)H2O]

A mixture of alcoholic solution of ligand (0.11g ; 0.05M) and aqueous solution of silver nitrate (0.042g ; 0.025 M) were mixed in a round bottomed flask and refluxed on a water bath for 1 hr. Cooled and sodium acetate was added with stirring until the pH of solution become 7. The precipitate was formed. The complex was filtered, washed with alcohol and dried in a dessicator over anhydrous calcium chloride.

2.3 . Physicochemical Studies

Elemental analysis of the ligand was carried out by ELEMENTAR Vario EL b! CHN Analyzer at STIC INDIA, Cochin.the metalpoercentage was determined by standard procedure(Furman,1962). Molar conductances of NiL(NO3)2 and AgL(NO3)H2O were measured at Little Flower college, Guruvayur using freshly prepared 10^{-3} M solutions in nitrobenzene at room

temperature using SYSTRONICS conductivity metre model number 304 with a dip type cell and a platinum electrode. The spectrophotometric studies were carried out at Little Flower college, Guruvayur, using a LABTRONICS double beam spectrometer with dual silica 1 cm cuvettes.The complexes were analysed by TGA. TGA analysis were taken at STIC INDIA, Cochin. The curves were investigated using a TGA-DTA Perkin Elmer STA6000 diamond machine. 6 g of sample is placed in aluminium sample holder and it's temperature is increased at a constant rate of 20^0C/min (Ö) by means of an electronic furnace. Curves were plotted upto 750^0 C. The complexes were analysed using a PANALYTICAL, Aries Research X-ray Diffractometer at St. Thomas college, Thrissur.The powder lines were recorded for 2è values from 5- 89.9707 at a temperature of 25^oC
with CuK-alpha radiation. The XRDML data received from St. Thomas college is analysed using the softwareXpert Highscore Plus.

3. Result and Discussion

3.1 ELEMENTAL ANALYSIS OF N-(phenyl methylene) isonicotinoyl hydrazone

The elemental analysis of ligand is found out. The physico-chemical characteristics of ligand is given in the table 1. Calculated values are given in parenthesis. From these studies, structure of the ligand arrived at is as fig 1. The ligand has a general formula C13H11N3O and molecular weight 225.2483 amu.

Table 1

COMPOUND	% of C	% of H	% of N
N´-(phenyl methylene)	65.27 (69.32)	4.76 (4.92)	17.42 (18.65)

isonicotinoyl

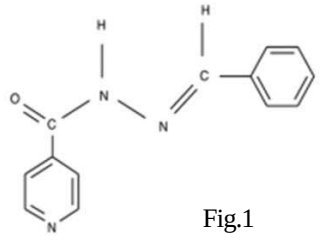

Fig.1

3.2 Physicochemical analysis of [NiL(NO3)2] and [AgL(NO3)H2O]

The metal percentage of the complexes were determined by standard procedure(Furman ,1962). The conductance of the complexes were found out in 10^{-3} M solutions in nitrobenzene.The studies indicates the 1:1. Low conductance values indicate that the complexes are non- electrolytes.

Table 2.

COMPLEX	METAL PERCENTAGE		CONDUCTANCE
	THEORETICAL	EXPERIMENTAL	$Ohm^{-1}cm^{-1}$
$NiL(NO_3)_2$	14.38	14.35	0.01
$AgL(NO_3)H_2O$	26.10	28.96	0.012

3.3 Infrared spectral studies

The selected infrared absorption frequencies of the ligand and complexes are given in table 3. The broad band in the region 3325-3618 is attributed to coordinated water in Ag(‘!) complex as per the references given by L.J Bellamy, I. Gamo, G.O Dudek and R.H Holm. [L.J Bellamy(1978), I. Gamo(1961) G.O Dudek(1961)]. This band is absent in ligand and Ni(a!) complex.The band in the region 1504-1589cm^{-1} present in the ligand is shifted to 1458-1604 cm^{-1} in both the complexes.

The band in the region 1627-1589 is also lowered. The band due to coordinated C=N and C=O merges together in the complex to give a broad band in the region 1458-1604 cm^{-1} in Ag(‘!) and the band at 1381-1442 shifts to 1242-1458 which is again due to the C=O group. The band corresponds to C=N at 1033-1103 shifted to 964-1041 and 995-1064 in [NiL(NO3)2] and [AgL(NO3)H2O] complexes. In [NiL(NO3)2] , the band at 501-516 and 516-570 is due to the M-ONO2 and M-O bonds [J.R Ferrare(1971)]. But in [AgL(NO3)H2O] , three types of M-O bonds ie, C=O’!Ag, Ag

ONO2, Ag-OH2 exist and hence all these bands merges and form a broad band in the region 501-586. The band shift in the wave region 1150-994 cm^{-1} is due to the structural changes in the carbon skeleton after complexation which cause some changes in C-C bondlength.

[A. Libavius, c.19] The nitrate exhibits D3h point group when complexes with metal ion. It may retain it‘s symmetry. The nitrate group is expected to give a band near 1750 cm^{-1} due to symmetric stretch (A1 in D3h). and doubly degenerate in plane bending mode (E‘ in D3h). But if a harmonic oscillator, this band is forbidden. Some times when the NO_3^- group coordinates to metal atom the symmetry may change to C2V or lower. So the doubly degenerate in- plane bending mode splits into two components (A2 and B2 in C2V). Combination of these modes with the symmetric stretch (A1 in C2V) will give rise to two combination frequencie. The type of bonding depends on the splitting (T). The coordination to metal causes some polarisation of the nitrate group and may lead to covalent, ionic mechanism or may be a mixture [W.M. Farrow (1954), S.K Chakraborthi (1973), J.Sengupta (1966)].

The structures of (NiL(NO3)2 and AgL(NO3)H2O are given in fog.2 and fig.3.

Table 3

Group	Ligand (frequency in cm^{-1})	[NiL$(NO_3)_2$] (frequency in cm^{-1})	[AgL$(NO_3)H_2O$] (frequency in cm^{-1})
M-ONO_2	-	501-516 (509)	501-586 (540)
M-O	-	516-570 (540)	501-586 (540)
M-OH_2	-	-	501-586 (540)
ν Ar C-H out of plane	594-725 (678)	609-663 (632) 663-678 (671)	609-663 (632) 663-686 (671)
ν Ar C-H out of	725-786 (763)	725-779 (756)	763-848 (794)
plane ν C=N	1033-1103 (1056)	964-1041 (1018)	995-1064 (1018)
C-N bond	1103-1188 (1149)	-	1064-1149 (1103)
ν C=O	1381-1442 (1411)	1242-1458 (1404)	1350-1458 (1404)

ν azomethyne -C=N /-NH	1504-1589 (1558)	1458-1604 (1527)	1458-1604 (1535)
ν α,βunsaturated -C=N /C=O	1627-1782 (1681)	-	1458-1604 (1535)
Benzene ring + NO_3	1627-1782 (1681)	-	1604-1689 (1635) 1689-1759 (1712)
ν Ar C−H stretch	3024	-	-
Coordinated water	-	-	3335-3618 (3417)

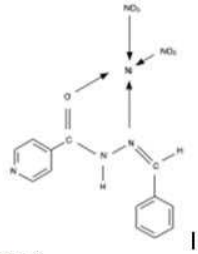

Fig.2

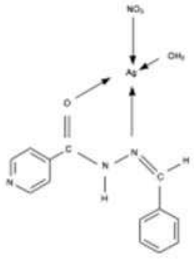

Fig.3

3.4 Electronic spectra of [NiL(NO3)2] and [AgL(NO3)H2O] The bands at 40000 cm^{-1} in ligand and band at 31746 cm^{-1} shifts to red region in complexes indicating the involvement of ligand in coordination. In [NiL(NO3)2]and [AgL(NO3)H2O] the bands are present in 38461 cm^{-1} – 30769cm $^{-1}$ and 38461cm $^{-1}$ - 31746 $cm^{-1.}$

3.5 X-Ray CRYSTALLOGRAPHIC STUDIES) OF [NiL(NO3)2] and [AgL(NO3)H2O] The XRDML data of both the complexes obtained from St.Thomas college is fed to X -Pert high score plus and plotted against the Intensity against 2ýÿýÿ

values.The plots are given in fig.-4.7 and fig.-4.8.The peaks are selected and similarity check is done with the data available in the Joint Committee on Powder Diffraction Standards (JCPDS) which was established in 1941.All the dhkl values of peaks are assigned. The unit cell and the cell dimensions found out and crystal structure and refinement are given in the table- 4.6 and table-4.7. The similarity check results are given in fig-4.9 and fig.-4.10.

From the study it is found that [NiL(NO3)2] resembles Eskolite,syn with reference code 00-038-1479. The structure is rhombohedral, with space group R-3c . The cell dimension are a=9588, b= 4.9588, c=13.5942, z#=90°, â=90° and ýÿýÿ=120°. The density=5.23g/cm^3, cell volume= 289.49 (10^{6}pm^3).

In the case of [AgL(NO3)H2O], it resembles calcite, syn with reference code 00-005-0586. The structure is rhombohedral, with space group R-3c . The cell dimension are a=4.9890, b=4.9890, c=17.0620 , z#= 90^0, â=90^0 and ýÿýÿ=120^0. The density = 2.71g/ cm^3, cell volume=367.78(10^{6}pm^3).

THERMAL STUDIES

The thermal decomposition data of the [NiL(NO3)2] is given in table 4. The complex [NiL(NO3)2] decomposes in 6 stages the final oxide being NiO.The complex of nickel is not completely decomposed at the 850 K. But the mass loss upto stage 5 is in agreement with the theoretical value.

Table 4.

	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6	Total
Temperature range	333-398	573-603	591-610	698-728	758-783	828-854	loss
Peak in DTG temperatu	367.26	574.26	607.36	713.06	768.86	834.56	
rePercentage loss TG	15.14489	15.769366	6.09412	19.45324	6.95000	8.7190	72.130616
Percentage loss	15.19888	15.19888	6.86688	19.14284	7.11310	18.309	81.8295
Pyrolysis Theoretic							14.35
Probable assignmen	-NO_3	-NO_3	-N_2	-C_5H_4N	-CHO	-C_7H_6	

The complex [AgL(NO3)H2O] decomposed in five stages as shown in Table 5.TThe studies are in confirmity with the structure elucidated from the physicochemical studies.The final product is found to be Ag2O. The silver complex started the decomposition at 321K while nickel complex started the decomposition at 331 K .Eventhough the initial temperature of decomposition can be taken as the determining factor of stability of a compound,the difference of only 10 K shows that both the complexes are some what of same stability.

Table 5

	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	M%
Temperature range in DTG	321-349	388-453	468-546	600-617	725-846	
Peak	349.06	451.86	514.86	660.46	776.96	
temperature Percentage loss	4.473745	3.65334	6.77261	6.23344	20.89129	26.86345
TG Percentage loss Theoretical	4.36048	3.63429	6.77986	6.54150	22.5940	26.10967
Pyrolysis						28.96
Probable assignment	$-H_2O$	-NH	-CO	-N=CH	$-NO_3$ $-C_5H_4N$ $-C_6H_5$	

+Ag +O

THERMAL KINETIC STUDIES OF [NiL(NO3)2]

In the case of [NiL(NO3)2] all the stages except 6 followed the order 0.33, stage 6 being 0.66. The kinetic parameters from 3 non mechanistic equations and 9 mechanistic equations are given in the table 6. The stage 1 and stage 2 represents the removal of nitrate groups. But the mechanism of removal are different.First stage is by random nucleation obeying avarami equation. The second stage is by two dimensional diffusion cylindrical symmetry.Stages three follows random nucleation ,one nucleus on each particle by Mampel equation. Stages four and six are by random nucleation process by Avrami equation while stage five follows one dimensional diffusion method .the last product is the oxide NiO.

Table 6-CONCLUSION TABLE FOR [NiL(NO_3)$_2$]

Compound	**Parameters**	**Coats Redfern**	**Horowitz Metzge**	**Maccallum**	**Mechanistic equation**	**Followed reaction mechanism**	**Order of reacti**
Stage 1	E	-7.09E+01	7.9E+01 **r**	-2E+01 **Tann**	-3E+01	Random nucleation;avr ami equation 2	**on**0.33
	Z	3.67E-01	6.7E-12	5E+12	2E+16		
	S	2.55E+02	4.6E+02	4E+00	7E+01		
	R	-0.99910	0.9974	0.997	-0.99217		
Stage 2	E	-2.55E+01	3.6E+01	-6E+00	-4E+01	Two dimensional diffusion, cylindrical symmetry	0.33
	Z	7.51E-09	1.1E-04	1E+05	1E-20		
	S	4.06E+02	3.3E+02	2E+02	-6E+02		
	R	-0.98705	0.985	0.9841	-0.99612		
Stage 3	E	-3.04E+02		-7E+01	-5E+01	Random nucleationone nucleus on each particle;Mamp	0.33
	Z	2.41E+14	6.4E-28	5E+28	3E+183		
	S	-2.45E+01		-3E+02	3E+03		
	R	-0.99989	0.9998	0.9999	-0.99931		
Stage 4	E	-66.16969	6.7E+01	-2E+01	-2E+02	el equation Random nucleation;avr ami equation 2	0.33
	Z	0.00000	5.5E-12	3E+07	5E+32		
	S	370.85929		1E+0	4E+02		

				2			
	R	-0.99467	0.987	0.990 2	-0.98079		
Stage 5	E	-152.53097 1.6E+02		- 4E+01	-5E+01	One dimensional diffusion	0.33
	Z	0.05230	3.3E-12	7E+1 2	5E-19		
	S	277.48517		7E+0 0	-6E+02		
	R	-0.99870	0.9963	0.996 1	-0.99162		
Stage 6	E	- 82.15491	6.2E+0 1	- 8E+01	-5E+02	Random nucleation;a vr ami equation 2	0.66
	Z	0.00000	8.4E-07	2E+2 2	4E+96		
	S	372.38571		- 2E+02	2E+03		
	R	-0.98999	0.9888	0.990 3	-0.97519		

THERMAL KINETIC STUDIES OF [AgL(NO3)H2O] The silver complex is decomposed in five stages.Stages one, three and four are of the order of 0.33 while the second stage is 0.5 and fifth stage by 0.66. The kinetic parameters from 3 non mechanistic equations and 9 mechanistic equations are given in the table 7. Stage 1 followed twodimensional diffusion cylindrical symmetry.The decomposition stages 2 and three are by phase boundary reaction, cylindrical symmetry. Stages 4 and 5 are of the same decomposition mechanism by random nucleation, Avrami equation.

Table 7- Conclusion of [AgL(NO3)H2O]

Compound	**Parameters**	**Coats Redfern**	**Horowitz**	**Maccallum**	**Mechanistic**	**Followed reaction**	**Order of**
Stage 1	E	- 7.79E+01	**metzg**	-02- 2.0E+ 01 **Tanner**	-105.81 **equatio**	Two **mechanism** dimensional diffusion, cylindrical symmetry	0.33 **react**
	Z	7.32E+0 0		16 5	2.56E+18 5		

	S	2.30E+02		+02-01	3.30E+03		
	R	-0.99960	0.99981	-0.99978	-0.99942		
Stage 2	E	-2.56E+01		+0-00	-22.71	phase boundary reaction;cylin drical symmetry	0.5
	Z	2.96E-08		07 06	1.22E-60		
	S	3.93E+02		+02 02	-1.40E+03		
	R	-0.99295	0.99599	-0.99569	-0.99295		
Stage 3	E	-5.77E+01		+02-01	-68.93	phase boundary reaction;cylin drical symmetry	0.33
	Z	4.82E-06		35 28	5.17E+24		
	S	3.51E+02		+02-02	2.24E+02		
	R	-0.99983	0.99994	0.99991	-0.99980		
Stage 4	E			6.00E+(-	-66.36	Random nucleation; Av rami equation 1	0.33
	Z			1.71E-11 .24-39			
	S			.58E+021 0E+02			
	R	-0.99261	0.99513	-0.99418	-0.99045		
Stage 5	E			2.09E+021	-167.89	Random nucleation; Av rami equation 1	0.66
	Z			3.47-15 3.90E+3			
	S			5.25E+028 3E+0			
	R	-0.99999	0.99999	-0.99998	-0.99996		

4.Conclusion

The elemental analysis, infrared spectra, electronic spectra and DTG studies confirms the tetrahedral geometry and square planar geometry of Ni and Ag complexes respectively. The complexes

can be represented by the formula [NiL(NO3)2] and [AgL(NO3)H2O].

The X-ray crystallographic studies confirms the structure of [NiL(NO3)2] as that of reference code 00-038-1479 of JCPDS data. [AgL(NO3)H2O] resembles calcite with reference code 00-005-0586. Both of the complexes are rhombohedral.In determining the crystal type the software X-pert High Score Plus is used.

Thermal data of complexes were very well informative and could be identified easily. The mechanisms are arrived at with the help of computers.Both the complexes decomposed in 5 or 6 stages. The heating rate of 20 C per minute has made the east recording which made difficult to find out the stable stages manually.

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DETECTION OF ADULTERATION IN EDIBLE OILS

***Dr. Jessy Anto, Mariya Suszane, Mariya A. T., Mridula Rose., Krishna Priya, Nikita A. T., Nadya Rose C.J., Kartika P.B.**
Department of Chemistry, Little Flower College, Guruvayoor

Abstract

Adulteration of oil is a biggest concern of all time. High priced oils ad ulterated with low pricedoils has become one of the major adulteration strategies.Apart from adulterants like paraffinwax, artificial coloringagents, cyanide were also detected invarious oils. The inclusion f adulterants not only mislead the consumers but also can cause hazardous health issues. Mustard oil adulterated with argemoneoil and butter yellow cause gallbladder cancer. Argemoneoil mixed with other edible oils can also lead to epidemic dropsy, glaucoma and loss of eyesight. Besides these, adulteration in oil can also cause cancer, paralysis, allergy, liver damage and even a cardiac arrest.So it is really important to put a lid on this widespread threat of adulteration. Many methodshavebeen devised to detect adulterants invarious products.Spectroscopic, chromatographic and other techniques have been employed in determining diverse adulterants inedible oils.

Key Words: Adulteration , Edibleoil, Paraffin wax ,Argemoneoil, Tri-ortho-cresyl phosphate , Metanil yellow

Introduction

Food is a primary requirement for human existence. The new marketing strategies and greed of acquiring profit has led to different kinds of unfair practices in food materials all over the world. Adul-

teration is usually referred to as the contamination of food materials by including various harmful or other undesirable matter.It is one of the major challenges that the contemporary world is facing. The common adulteration includes, mixing decayed fruits or vegetables with good ones, addition of cheaper or inferior substances to good ones which increases the weight of the product, mixing clay, pebbles or stones to grains and pulses to vary their weight and so on. Adulteration has become one of the most spreading business in India as well as in Kerala. One of the most adulterated stuff in Kerala is oil which is an indivisible part of our cuisine and other cultural traditions.

Oil is any non polar chemical substance which consists of hydrocarbons. They are both hydrophobic (does not mix with water)and lipophilic(mixes with other oils). They are liquids at room temperature. Edible oils consist of about 96% triacylglycerides, composed of different fatty acids. Some other compounds or groups of compounds such as free fatty acids, phospholipids, phytosteros, tocopherols,other antioxidants or waxes can also be found. Cooking oil is plant, animal, or synthetic liquid fat used in frying, baking, and other types of cooking. It is also used in food preparation and flavoring not involving heat, such as salad dressings and bread dips, and may be called edible oil. Cooking oil is typically a liquid at room temperature, although some oils that contain saturated fat, such as coconut oil, palm oil and palm kernel oil are solid.There are a wide variety of cooking oils from plant sources such asolive oil, palm oil, soybean oil, canola oil (rapeseed oil), corn oil, peanut oil and other vegetable oils, as well as animal-based oils like butter and lard.

Oil can be flavored with aromatic food stuffs such as herbs, chillies or garlic. Cooking spray is an aerosol of cooking oil.

Examples for edible oils are:

1) Palmitic Acid($C_{16}H_{32}O_2$)
2) Stearic Acid($C_{18}H_{36}O_2$)
3) OleicAcid($C_{18}H_{34}O_2$)
4) LinoleicAcid($C_{18}H_{32}O_2$)

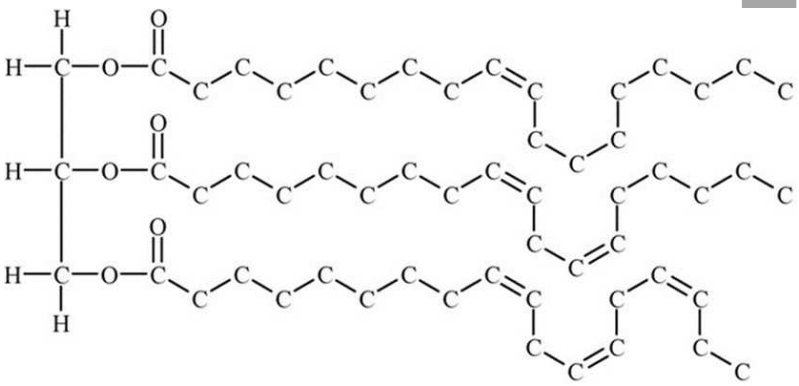


Figure1: MOLECULAR STRUCTURE OF VEGETABLE OIL

Edible oils have economical and nutritional benefits. These oils are essential to human health because they are primary source of mono and polyunsaturated fats. Moreover, edible oils are used in home cooking and industrial food manufacturing. Therefore, edible oils have a considerable demand worldwide. However, some edible oils, such as olive oil, are more expensive than any other vegetable oils. Thus, oils, such as olive oil, are mixed with cheap edible oils due to the high price difference. Therefore, adulteration in edible oils to obtain additional profit for the producer becomes a major issue of high concern from consumers.

A research is held in 2015 on the topic 'Detection and quantification of adulteration of sesame oils with vegetable oils using gas chromatography' was performed to develop a hierarchical approach for detection and quantification of adulteration of sesame oil with vegetable oils using gas chromatography was constructed to discriminate the difference between authentic sesame oils and adulterated sesame oils using Support Vector Machine algorithm.746samples were prepared by mixing sesame oils with five types of vegetable oil. The result show that the limit for authentication is low as 5% in mixing ratio and the root mean square range from 1.19% to4.29%.

Vegetable oils and fats have a big role in our diet as cooking or frying oils, salad oil or in food products formulation. Some edible oils and fats such as olive oil, cocoa butter and milk fat are so expensive

that makes tempting to adulterate them with other lower price vegetable oils and fats to achieve more profit. The detection of adulteration of high priced edible oils is a particular concern in food quality and safety. Therefore, it is necessary to develop authenticity detection method for protecting the health customer. Using mass spectral characteristics of selected ion and equivalent chain length (ECL) 28 fatty acids were identified and employed to classify five kinds of edible oils by using unsupervised, supervised multivariate statistical methods. Moreover, adulterated oils were stimulated by Monle Carlo method to establish simultaneous adulteration detection model for five kinds of edible oils by random forests. As a result, this model could identify five kinds of edible oils and sensitively detect adulteration of edible oil with other vegetable oils about the level of 10%.

Triacylglycerol profiles were selected as indicator of adulteration ofargan oils to carry out a rapid screening of samples for the evaluation of authenticity. Triacylglycerol were separated by high performanceliquid chromatography_ evaporative light scattering detection. Here different peak area ratios were defined to sensitively detect the adulteration of argan oil with vegetable such as sunflower, soyabean and olive oil up to the level of 5%.Based on four reference arganoil, mean limits of detection and quantitation were calculated to approximately 0.4%and1.3%respectively.

Materials and Methods

Take 6 different kinds of edibleoils. Name those brands as A, B, C, D ,EandF. Conducted following testsonA,B,C,D,EandF respectively.

1)TESTTOFINDOUTPARAFFINWAXANDHYDROCARBONS

Heat a small amount of oil with acetic acid anhydride. Droplets of oil floating on the surface of unused acetic anhydride indicates presence of wax or hydrocarbons

2) TESTTOFINDOUTARGEMONEOIL

Take a small amount of oil in a test tube. Then add a few drops of concentrated nitric acid and shake layer. Appearance of red colour in the acid indicates the presence of argemone oil

Figure4:TEST FORARGEMONE OIL

2) TEST TO FIND OUT TOCP (TRI-ORTHO-CRESYLPHOSPHATE)

Take 2mL of the oil and add a small amount of yellow butter(solid) to it. Immediate formation of red colour indicates the presence of TOCP.

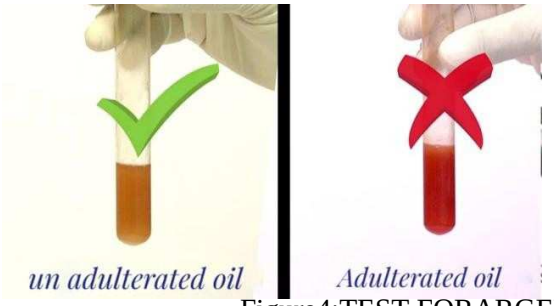


Figure4:TEST FORARGEMONE OIL

3) TEST TO FIND OUT TOCP (TRI-ORTHO-CRESYLPHOSPHATE)

Take 2mL of the oil and add a small amount of yellow butter(solid) to it. Immediate formation of red colour indicates the presence of TOCP.

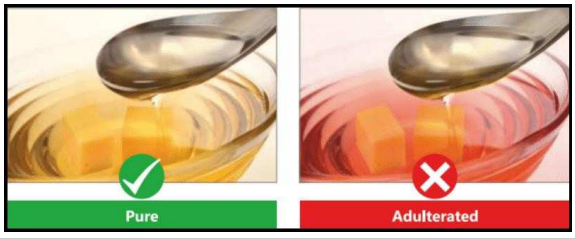


Figure5: TEST FOR TOCP

4) TEST TO FIND OUT PROHIBITED COLOUR METANIL YELLOW

Take 1 mL of oil in a test tube and add 4 mL of distilled water. Shake the test tube well. Now take 2 mL of the mixture in another test tube and add 2 mL of concentrated hydrochloric acid to it. Colour changes in the upper acid if Metanil yellow is present

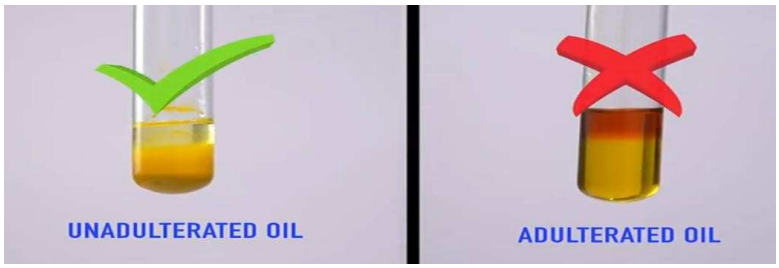


Figure6:TEST FOR METANIL YELLOW

Results and Discussion

	ADULTERANTS FOR WHICH THE TESTIS BEING CONDUCTED			
	PARAFFIN WAX OR HYDROCARBONS	ARGEMONE OIL	TRI-ORTHO-CRESYL PHOSPHATE	PROHIBITED COLOUR (METANIL YELLOW)
SAMPLE1 (A)	No droplets of oil floating on surface of unused acetic anhydride.	No red color in acid layer.	No immediate Formation of Red color.	No color change
SAMPLE2 (B)	No droplets of oil floating on surface of unused acetic anhydride.	Appearance of red color in acid layer.	No immediate Formation of Red color.	No color change

SAMPLE3 (C)	No droplets of oil floating on surface of unused acetic anhydride.	Appearance of red color in acid layer.	No immediate Formation of Red color.	No color change
SAMPLE4 (D)	Droplets of oil floating on surface of unused acetic anhydride.	No red color in acid layer.	No immediate Formation of Red color.	No color change
SAMPLE5 (E)	No droplets of oil floating on surface of unused acetic anhydride.	No red color in acid layer.	No immediate Formation of Red color.	No color change
SAMPLE6 (F)	No droplets of oil Floating on Surface of unused Acetic anhydride.	Appearance of red color in acid layer.	No immediate Formation of Red color.	No color change

From the above conducted experiment we can find that, In the first conducted test,sample 4 gave positive results with droplets of oil floating on surface of unused acetic anhydride indicating the presence of paraffin wax or hydrocarbons . While all others gave negative results.Paraffin wax is literally insoluble in acetic anhydride ,so it appears as oil droplets on the surface of unused acetic anhydride. C_nH_{2n+2} +$(CH_3CO)_2O$ '! Oil droplets (paraffin wax Acetic anhydride Or Hydrocarbons)

HARMFUL EFFECTS OF PRESENCE OF PARAFFIN WAX OR HYDRO CARBONS IN EDIBLE OILS

Liquid paraffin oil is a mineral oil and is a by product of crude oil distillation. Paraffin wax and oil have found many uses in industrial, medical and cosmetic fields. But when edible oils get adulterated by this can cause a wide range of health hazards. It upsets the intestinal trac. It can also lead to abdominal pain, nausea, vomiting and constipation. It is also considered as carcinogenic.

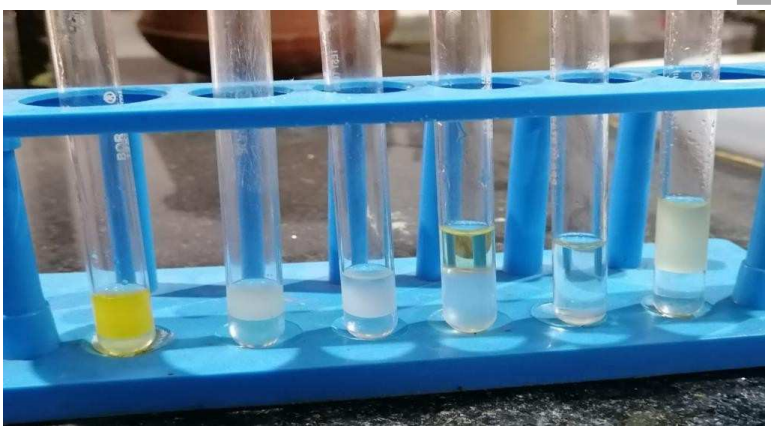


Figure 7:ADULTERATION TEST FOR PARAFFINWAX

In the second test, sample 2,sample 3 and sample 6 gave positive results by the appearance of red color in acid layer(concentrated HNO3) .This in turn indicates the presence of argemone oil in the samples and it is adulterated withit.The foremost component of argemone oil is sanguinarine. By this color test, by treating with concentrated nitric acid we get orange to reddish color due to the formation of sanguinarinenitratesalt.

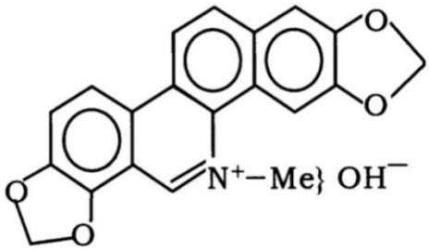
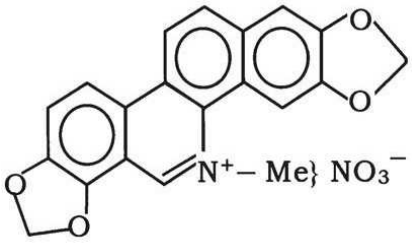


Figure8: SANGUINARINE



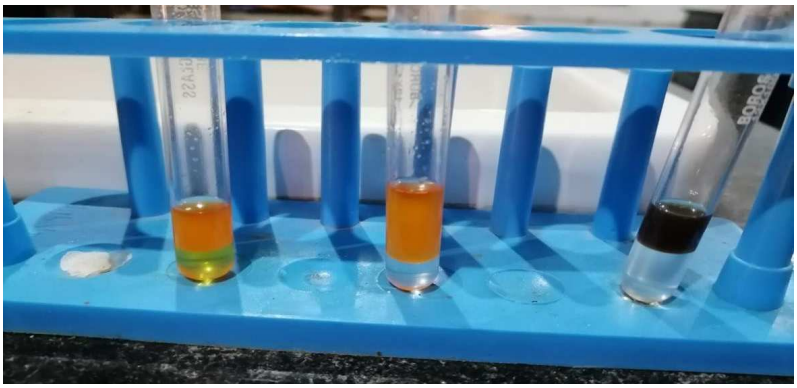


Figure 10: ADULTERATION TEST FOR ARGEMONE OIL

HARMFUL EFFECTS OF PRESENCE OF ARGEMONE OIL INEDIBLE OILS

The consumption of oil mixed with argemone leads to dropsy(suddeninflammatoryswellingoflegs),oftenaccompaniedwithdiarrhoea, dyspnea, cardiac failure and even death. Some may even develop glaucoma.

The third test was not shown positive by any of the samples denotingthatnoneofthesampleswereadulteratedwithTri-ortho-cresyl-phosphate.

Similarly, none of the samples gave positive result for the fourth test indicating that they were not adulterated with prohibited colors like metanil yellow.Thus, sample4 was adulterated with paraffin wax or hydrocarbons.

Sample2,sample3,sample6 was adulterated with argemone oil.

Wecan say that sample1 and sample5 were pure and was free from above mentioned adulterants.

Figure 11:

HARMFUL EFFECTS OF ADULTERATION IN EDIBLE OIL BYVARIOUS ADULTER-ANTS

Conclusion

The purpose of this project is that we found common adulterants inedible oils. We have attempted an overview of adulteration in edible oils that can be helpful for researchers to further investigate the adulteration in edible oils. Various edible fats and oils such as olive oil, castor oil, sunflower oil, rice ban oil were commonly adulterated by the inferior seeds oil and low-price vegetable oils. In this current situation, some acid-based or alkali-based color changing rapid detection kits were developed for the identification of fats and oils adulterations rapid and quickly in the market areas. To get purity of edible oils and fats, consumers should be aware of these adulteration processes and the law enforcement agencies should be more observant for proper implementation of the law.

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PANI AND PANI-MWCNT COMPOSITE THROUGH CHEMICAL OXIDATIVE POLYMERIZATION-STUDY OF THERMAL DIFFUSIVITY

[1]Haisel Mathew, [1]Anne Jose M, [1]Laly A.S, [2] Moly P.P

1. Dept. of Physics, Little Flower College, Guruvayur,

2. Dept. of Chemistry, Little Flower College, Guruvayur.

Conducting polymer based composites have found use in numerous high technology applications due to the multi functional properties of nano particle filled PANI composites. Poor thermal management of devices employing conducting polymers may lead to device failure. An estimate of heat diffusion in a material can be obtained from its thermal diffusivity value. The present study offers ample scope in tailoring the thermal diffusivity parameters of polyaniline composites according to device requirements. Polyaniline (PANI) and PANI-MWCNT (Multiwalled carbon nanotube) composites were prepared and measured their thermal diffusivity values. It is found that the thermal diffusivity value for the composite varies as the concentration of the sample varies and it is found to be greater for the composite material than that of the PANI. The absorption of exciting laser light by the conducting polymer generates oscillating electron which are called hot electron. These hot electrons rapidly transfer their energy to the MWCNT particle through electron-phonon scattering. This thermal energy is finally getting transferred to surrounding liquid by phonon scattering with particles as scattering centres.

Key Words: Polyaniline, Multiwalled carbon nanotube, Polymer composites, Thermal Lens, Thermal Diffusivity

INTRODUCTION

Conducting polymers or more precisely, intrinsically conducting polymers are organic polymers that conduct electricity. Electrical conductivity of conducting polymers can be changed from insulating to metallic through proper doping. Among the intrinsically conducting polymers, Polyaniline (PANI) is studied with keen interest due to its controllable electrical properties and chemical stability. Polyaniline is unique due to its ease of synthesis, environmental stability and simple doping/dedoping chemistry and it is one of the most studied conducting polymers for a few decades.

Nowadays nanoparticle-filled polymer composites have emerged as one of the important materials because they usually exhibit much better performance than that of traditional composites [1-4]. Conducting polymer based composites have found use in numerous high technology applications due to the multi functional properties of nano particle filled PANI composites. Poor thermal management of devices employing conducting polymers may lead to device failure. An estimate of heat diffusion in a material can be obtained from its thermal diffusivity value. Therefore, in the present study, attempts have been carried out to synthesize polyaniline (PANI) and PANI-MWCNT (Multiwalled carbon nanotube) composites and measure their thermal diffusivity values.

Synthesis of PANI& PANI-MWCNT composite

Polyaniline (PANI) is prepared using chemical oxidative polymerization. For this, 5ml of distilled aniline is added dropwise to 100ml of 1M Hydrochloric acid (HCl) solution. Ammoniumpersulphate (APS) is added with continuous stirring into this solution kept in an ice containing beaker and stirring is continued for five hours. The reaction is allowed to continue for 24 hrs. The dark green coloured polymer is filtered, washed with distilled water and dopant electrolyte solution, and dried in air oven at 60^0C. The dried polymer is finely powdered.

For preparing HCI doped PANI-MWCNT composite, pure MWCNT is dispersed in 1M HCl solution. Freshly distilled aniline is

added to it. Ammoniumpersulphate (APS) is added to the mixture with continuous stirring for 5 hrs. The reaction is allowed to continue for 24 hrs. The precipitate obtained is filtered, washed and dried.

Characterization Techniques

The characterizations of the prepared samples were done using analytical techniques like XRD, FTIR spectroscopy and SEM. The X-ray diffraction pattern of the samples is obtained by Bruker AXSD8 Advanced X-ray Powder Diffractometer using CuK^3 lines.The FTIR spectra of the the samples were recorded using FTIR spectrometer in the wave number range 4000 to 400 cm^{-1}. Scanning Electron Microscope (TESCAN VEGA3,SBH,0-30KV,Resolution3nm) was employed to check the morphology of the samples. The thermal diffusivity values of the samples are measured using themal lens technique as described below.The excitation source is a continuous wave (cw), 532 nm diode pumped solid state laser, (DPSS) with a maximum power of 150 mW.

Measurement of photothermal diffusivity - Thermal lens technique

Thermal lens technique is one of the easiest methods for measuring thermal diffusivity and quantum yield of the materials. The working principle of this technique is very simple. When a laser radiation is incident on the sample, the atoms or molecules are excited to higher energy states. From high energy states, they return to the lower energy states by releasing the excess energy either radiatively or nonradiatively. The nonradiative way of de-excitation causes the generation of heat in the sample. In the present case, a laser beam having a Gaussian intensity profile (TEM00 mode) irradiates the sample. So the absorption of laser radiation and consequent heat generation in the medium is stronger at the center of the beam profile than in the wings. Due to this absorption gradient perpendicular to the beam path, a corresponding thermal gradient is created in the medium, which in turn produces a refractive index gradient. As a result the medium acts as a lens-like optical element, called Thermal Lens[5-7]. Since the refractive index of the most materials in the transparency range decreases with increase in the temperature, the thermal lens is generally scattering; i.e., the transverse laser- beam size increases when the medium is heated.

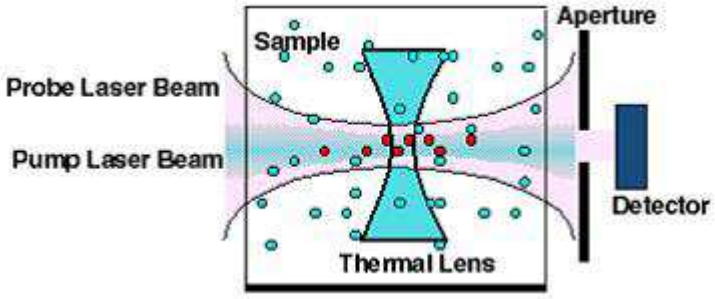


Fig1. showing the thermal lens formation of a sample.

Variations in the refractive index of the medium can be caused by changes in both the temperature T as well as density ρ of the medium. The thermal lens technique can be implemented using both single- and double-beam measurement schemes. In the single-beam scheme radiation of one laser is simultaneously used for excitation (generation of a thermal lens) and probing. Being absorbed, laser radiation heats the sample, and the change in its intensity gives information about absorption in the medium. The temporal shape of photothermal signal from a photodetector is recorded with a diaphragm, located in the farfield zone [8]. The double-beam scheme is more universal. Here, a thermal lens induced by excitation (pump) radiation is recorded by measuring defocusing of an additional probe beam. It allows one to study the spectral dependence of the absorption of materials; this cannot be done within the single-beam scheme. One of the configurations of the double beam measurement scheme is shown in Figure 2

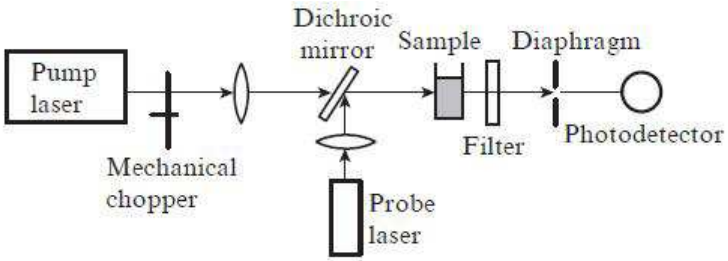


Figure 2. **Thermal lens technique** (longitudinal version): Double-beam measurement scheme; the pump and probe beams propagate coaxially.

A probe beam which is passed through the Thermal Lens(TL), gets diverged or focused depending upon the coefficient of refractive index with temperature, dn/dT. For most materials, dn/dT is negative, and the TL formed will be a diverging one leading to thermal blooming. A far field detection of the probe beam intensity can be utilized to calculate various thermo-optical parameters of the sample. In practice, it is not necessary to measure the spot size directly; a photodetector positioned at the center of the spot produces a photocurrent and it is proportional to the laser intensity and thus inversely proportional to the beam area. The focal length f of the induced TL, when a continuous-wave laser beam is passed through a liquid cell, at t = 0 is given by [9-11]

$$1/f = (P_{abs} dn/dT)/(\pi k \omega^2 (1+t_c/2t)) \quad \text{----------(1)}$$

where P_{abs} is the power absorbed by the sample, k is the thermal conductivity of the liquid, ω is the beam radius and t_c is called the characteristic time for thermal diffusion given by $t_c = \omega^2 \rho c_p / 4k$ where c_p is the specific heat and ñ is the density. When the TL is formed, the probe beam will be affected and the probe beam intensity decays according to the expression [9-10]

$$I_t = I_0[1 - \theta(1+t_c/2r)^{-1} + (\theta^2/2)(1+t_c/2r)^{-2}]^{-1} \quad \text{----------(2)}$$

Where the is parameter è related to power degraded as heat P_{th}, laser wavelength ëp and other thermo-optic parameters of the material as

$$\theta = (dn/dT)/\lambda p\, k$$

The thermal diffusivity D of the unknown sample is related to the parameters, tc and ù through the relation

$$t_c = \omega^2/4D$$

The time constant t_c of the TL decay process is evaluated by curve fitting the experimental data to Eq.2.

Results and Discussion

XRD analysis

The XRD spectra of PANI doped with HCl is given in figures 3.

The samples are taken in powder form.

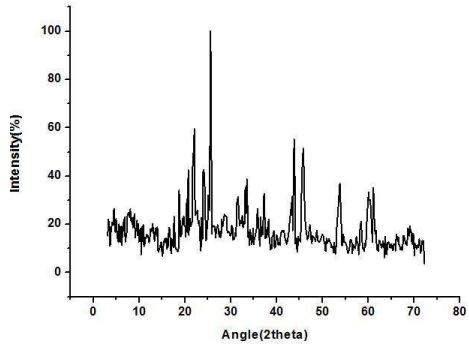


Figure 3. X.R.D spectrum of PANI

All the polyaniline (PANI) samples show a crystalline, sharp peak at 25°. The graphite-90 like diffraction peak at around *25°* [*12*, 13] is observed and is characteristic of the extent of π conjugation in PANI. In fact PANI is only partially crystalline, with conducting metallic islands separated by large amorphous regions as evident from the XRD spectrum.

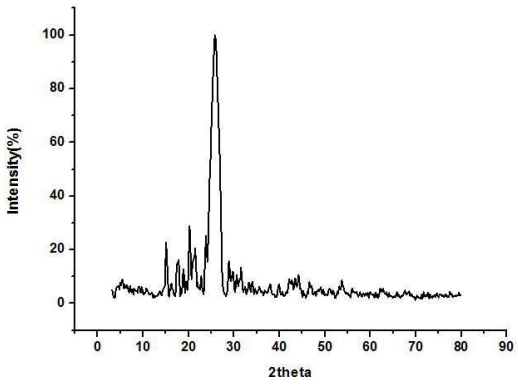


Figure 4 .X.R.D spectrum of PANI-MWCNT(HCl) composite

PANI-MWCNT (HCl) composite show the crystalline peak of MWCNT at 25° with high intensity and sharpness. The appearance of the graphite-like diffraction peak at 25°[12], which is common to both PANI and MWCNT, indicates the presence of long range Il conjugation, in both the samples. This peak is very much sharper in PANI-MWCNT composite because of the much enhanced ð

conjugation in MWCNT. The crystallinity of PANI-MWCNT composite increases drastically with the presence of MWCNT in the composite. All these point towards enhanced π conjugation in PANI-MWCNT composite compared to PANI.

FTIR Analysis

The FTIR spectra of PANI & PANI-MWCNT composite with hydrochloric acid (HCl) as dopant are shown in figure 5.

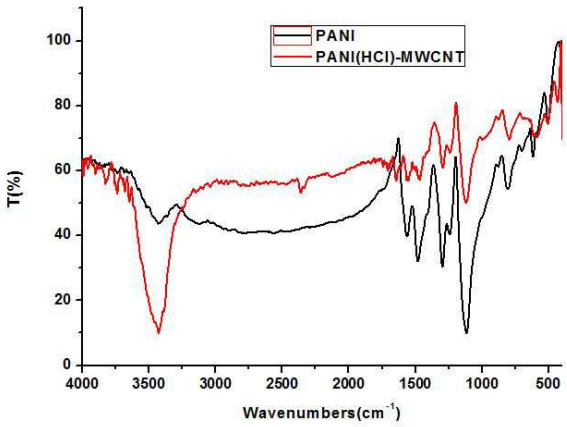
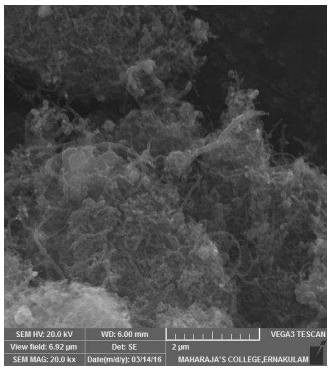


Figure 5. FTIR spectra of PANI & PANI-MWCNT composite

The major peaks are at around 3500cm^{-1}(NH stretching vibration), 1570 cm^{-}1(C=N stretch of the quinonoid unit of PANI), 1470 cm^{-}1(C=C stretch of the benzenoid unit of PANI), 1100 cm^{-1} (quinonoid unit vibration of doped PANI) as reported earlier and 800 cm^{-1}(C-C and C-H stretch for the benzenoid unit of PANI). [11-12].

The two spectra resemble each other closely with only small shifts in absorption wave numbers. Both the spectra show all the characteristic vibrations of HCl doped PANI [13]. Since the characteristic C=C vibrations of MWCNT are more or less in the same frequency range as those in HCl doped PANI, the presence of MWCNT in the composite cannot be clearly established from the FTIR spectra

SEM Analysis



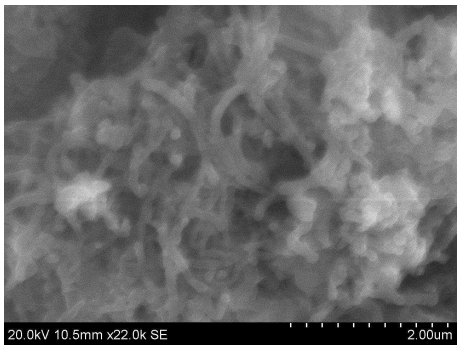


Figure 6a. The SEM images of MWCNT 6b. The SEM images of PANI (HCl)-MWCNT composite.

The SEM images give the surface morphology of the samples. From the figure 6a & 6b, it is clear that aniline is polymerized between the wedges of MWNTs as well as on the tube surfaces in the case of both samples. The rod like and coiled like structures of MWNTs are dispersed in the PANI matrix. PANI macromolecules can also be absorbed at the surface of MWCNTs, forming a tubular shell of the composite.

Thermal diffusivity of PANI and PANI-MWCNT composite

The thermal diffusivity measurements of PANI and PANI-MWCNT composite were carried out using the experimental setup shown in figure 2. A diode pumped solid-state (DPSS) laser (Coherent Inc.) of 20 mW power operating at 532 nm is used as the pump beam whereas a He–Ne laser (Melles Griot) of 1 mW power operating at 632.8 nm is chosen as the probe beam. The measured diffusivity values of both the samples are shown in table 1.

Table 1. Thermal diffusivity values of PANI and PANI-MWCNT composites

Sample	Concentration (g/l)	θ	t_c (s)	D (m^2/s)
PANI-S2	0.2	-0.187	0.0814	0.06909
PANI-S3	0.3	-0.0618	0.1189	0.047301
PCNT-S2	0.2	-0.1424	0.0515	0.1092
PCNT-S3	0.3	-0.3385	0.074	0.075

Conducting polymer, polyaniline(PANI) shows a thermal diffusivity of 0.069m^2/s for the concentration of 0.2g/l. But the thermal diffusivity of the PANI-MWCNT composite is found to be 0.1092 m^2/s for the same concentration. For the concentration of 0.3g/l also, thermal diffusivity is greater for the composite sample. The enhancement in thermal diffusivity is due to the high thermal conductivity of MWCNT. The best interpretation for this phenomenon is that, absorption of exciting laser light by the conducting polymer generates oscillating electron which are called hot electron. These hot electrons rapidly transfer their energy to the MWCNT particle through electron-phonon scattering. This thermal energy is finally get transferred to surrounding liquid by phonon scattering with particles as scattering centres [14].But thermal diffusivity value of the PANI as well as of the composite decreases as the concentration is increased. At this concentration, the thermal interfacial contact resistance and thermal barrier resistance may be high reducing the thermal diffusivity value of the composite [15]. There is a large difference in thermal diffusivity value between PANI and MWCNT. This thermal diffusivity mismatch [16] plays a major role in lowering the thermal diffusivity of the nanocomposite at higher concentration.

Figure7 shows the normalized TL time evolution signal for PANI dispersed in water. Figure8 shows the normalized TL time evolution signal for PANI-MWCNT composite dispersed in water.

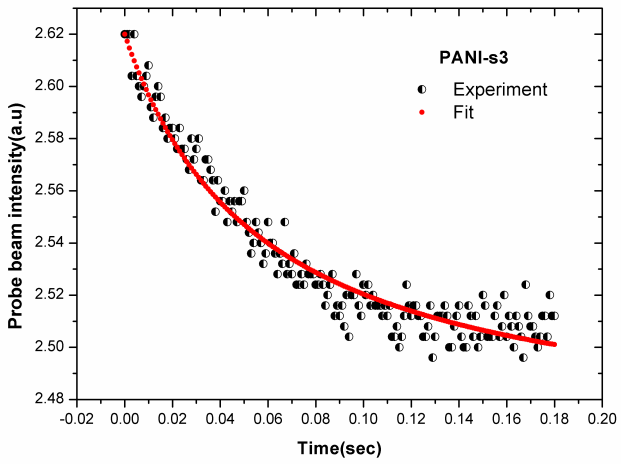


Figure 7. Normalized TL time evolution signal for PANI

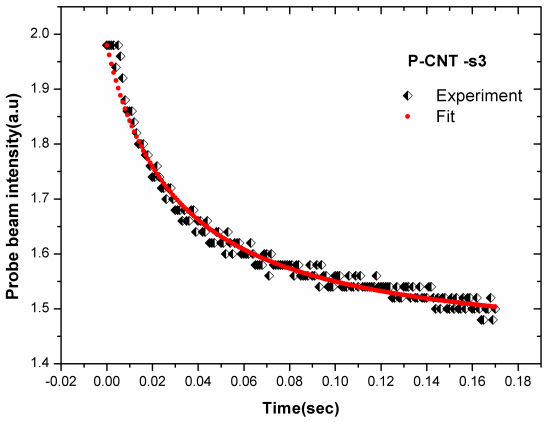


Figure 8. Normalized TL time evolution signal for PANI-MWCNT composite

The fact that the PANI- MWCNT composite has enhanced thermal diffusivity in comparison with PANI , can find practical uses as efficient coolants in various industrial applications such as heat transfer fluid in building heating systems, automobiles and heat exchangers. The present study offers ample scope in tailoring the thermal diffusivity parameters of polyaniline composites according to device requirements.

Conclusions

PANI and PANI (HCI)-MWCNT composites are synthesized using chemical oxidative polymerization. The formation of the composite is confirmed from the FTIR, XRD and SEM measurements. Thermal diffusivity measurements are performed on PANI (HCI) and PANI (HCl)-MWNT composites with varying concentration of composite samples. It is found that the thermal diffusivity value for the composite varies as the concentration of the sample varies and it is found to be greater than that of the PANI for the concentration of 2gm/l and 3gm/l. The absorption of exciting laser light by the conducting polymer generates oscillating electron which are called hot electron. These hot electrons rapidly transfer their energy to the MWCNT particle through electron-phonon scattering. This thermal energy is finally get transferred to surrounding liquid by phonon scattering with particles as scattering centres.

Scope

Thermal diffusivity of the composites can be measured by varying the concentration of MWCNTs and also by varying nanofillers.

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"ANALYSIS ON THE EFFICACY OF NATURAL OILS AS GREEN ANAESTHETICS ON ORNAMENTAL FISH, BLACK MOLLY"

Dr. Swapana Johny*, Nihala Nazar, Swetha P Shanmugan, Aleena Mariya, Arifa C K, Hasna T. H, Rajalakshmi S Sathyan, Shijina K A & Swaliha C A

*Assistant Professor, Dept of Zoology, L.F. College, Guruvayoor.

ABSTRACT

As most ornamental fish are destined for export, the fish must be robust enough to withstand the long journey by air transportation. The use of modern packaging technology for air transport to increase fish loading densities and improve the post shipment survival is critical to the business. Since ornamental fish are packed in small volume of water at a high loading density the metabolic waste accumulate rapidly in the transport water. An effective method is to use anaesthetics and cut down the excretion of ammonia and carbon dioxide. In addition to chemicals certain oils of plant origin like clove oil, spearmint oil, etc., has been used as anaesthetics in industry. This study is intended to find the efficiency of five different types of natural oils - Holy Basil Oil, Camphor Oil, Vetivert Oil, Gingergrass Oil and Palmarosa Oil as anaesthetic in fish handling. From the study it was found out that Holy basil oil, Palmarosa oil and Gingergrass oil has anaesthetic effect and can be used for handling fishes to reduce stress and mortality during transportation.

Keywords:- ornamental fishes, anaesthetics, natural oils, stress, live fish transportation

INTRODUCTION

In the ornamental fish business, the ability to meet customer's needs for high quality fish is always a critical factor. As most ornamental fishes are desired for export, the fish must be not only pleasing to eyes but also robust enough to withstand the long journey by air transportation. The polythene bags transport system has greatly reduced the shipping freight of ornamental fish consignments and made it feasible to ship them for air freight.

The factors influencing the transport of live fishes are the quality of fish transported; the most important single factor on transporting fish is providing an adequate level of oxygen. Fish density and activity of transported fish, biochemical changes and stress in transport of fish are also counted upon. Any trauma and stress associated with handling and transport of fishes will effect survival and overall quality of the fishes.

Ammonia and CO_2 are the other factors that influence the transport of live fishes. Ammonia and CO_2 are the waste products of metabolic reaction of fishes. During the live fish transport, the metabolic rate of fish is usually high. Ammonia accumulates in the transport system and produce harmful effect on the fishes. One solution to lower the amount ammonia is to reduce the metabolic activity of the fishes. Here the importance of anaesthesia or tranquilizers was revealed.

Anaesthesia is a useful tool for the fish veterinary surgeon and enables various tasks to be performed. Anaesthetics need to be encouraged to reduce the stress associated with fish handling and transportation procedures. Anaesthesia for fishes is usually delivered in water until the fish loses balance and become non-responsive.

A number of anaesthetics chemicals have been proved effective in fish, the major ones are MS-222, 2-phenoxyethanol, Benzocaine, Quinaldine, metomidate, etc. An ideal anaesthetic should permit a reasonable duration of exposure, produce anaesthetic within 3 minutes or less, allow recovery within 5 minutes or less and be reasonable at cost. In addition to chemicals certain oils of plant origin like

clove oil, spearmint oil, etc has been used as anaesthetics in ornamental fish industry.

In the present study we intend to find the efficiency of five different types of natural oils as anaesthetic in fish handling. The oils selected were Holy Basil Oil, Camphor Oil, Vetivert Oil, Gingergrass Oil and Palmarosa Oil all of which have good health benefits and available in the market. The experiments were carried out in a common ornamental fish, Black Molly, collected from nearby aquarist.

Objectives of study are

· To find out the anaesthetic efficiency by finding out the induction time and recovery time of Holy basil oil, Camphor oil, Gingergrass oil, Palma Rosa oil and Vetivert oil on the fish Black Molly.

· To compare the anaesthetic efficiency of Holy basil oil, Camphor oil, Gingergrass oil, Palma Rosa oil and Vetivert oil

· To find out which oil can be preferred to be used as anaesthetic in ornamental fish industry.

MATERIALS AND METHODS

The materials used for the experiment include five bio oils like Holy basil, Camphor oil, Palmarosa oil, Ginger grass oil, Vetivert oil. The ornamental fish studied for this experiment is black molly (*Poecilia latipinna)*. Five natural essential oils were used in this experiment. The pure natural oils were procured from the *Greenleaf Extractions* Pvt Ltd., KINFRA HI TECH Park, Kalamassery, Cochin.

The experiment was conducted on black molly weighing between 1.8 gm to 4.2 gms, was procured from local aquarists. Experimental fishes were acclimated for a minimum of two weeks prior to the onset of experiments. During acclimation period, fishes were fed with commercial pellets. Aquariums were cleaned by siphoning the faeces and non-consumed food. Preliminary studies were conducted with all five oils to evaluate the effect of all oils at a random concentration, based on which experimental concentrations were fixed. As Oils will not readily mix up with water, they are diluted with Ethanol (95%) in the ratio 1:9 (Oil: Ethanol) to prepare the stock solution. **Table I** gives the concentrations of the Oils used for the experiment.

TABLE I: CONCENTRATIONS OF BIO OILS USED FOR EXPERIMENT

Sl. No.	Holy Basil Oil (mg/l)	Ginger grass Oil (mg/l)	Palmarosa Oil (mg/l)	Camphor oil (mg/l)	Vetivert Oil (mg/l)
1	36	80	40	80	80
2	45	100	60	120	100
3	67.5	120	80	160	120
4	90	140	100	176	140
5	135	160	120	200	160

Water quality parameters of the experimental tanks as well as acclimatization tank are analyzed. The **Table II** gives the range of four parameters checked during the experiment.

Table II: Water quality parameters of experimental water

Parameters	Range
pH	6.8- 7.2
Temperature	27.5° – 28.2°C
TDS	112 -114
Salinity	90.6 -92.6 ppm

Feeding was stopped 24hrs prior to the experiment. Fishes were netted from acclimatization tanks and placed in the experimental bags with anaesthetic solution of specific concentration. Three fishes are taken for each concentration of oil for the experimental procedure. In this experiment the anaesthetic efficacy of bio oils for short term exposure are recorded by checking the induction time. During the experiment the behaviour of the fish are observed and the time of anaesthetic induction and recovery time measured using stopwatch. Immediately after reaching stage 5 or after 10 minutes of anaesthetic exposure, fish are transferred to recovery tanks with anaesthetic free water. Each set of fish are used only once. The time taken for induction and recovery are recorded for each concentration of all types of oils under experimentation.

Initially 5 concentrations of Holy Basil oil, Ginger grass oil, Vetivert oil, Palmarosa oil and Camphor oil were prepared induction time and recovery time were measured to the nearest seconds. Fishes were weighed and transferred to a recovery tank that had been filled with aerated freshwater at the same time of preparation of the anaesthetic baths. In recovery tank, the fishes were monitored continuously to determine time to come back to normal state.

The stages of induction were assessed following the method of Summerfelt and Smith (1990) **Table III**.

Table III: Stages of induction of anaesthesia in fish

Stages of Induction	Description	Behaviour response of fish
0	Normal reaction to external stimuli	Opercular rate and muscle tone normal.
I	Light sedation, slight loss of reactivity to external stimuli	Opercular rate slightly decreased: equilibrium normal
II	Deep sedation, total loss of reactivity to all but strong external stimuli	Slight decrease in opercular rate, equilibrium normal
III	Partial loss of equilibrium	Partial loss of muscle tone, erratic swimming, increased opercular rate, reactivity only to strong tactile and vibration stimuli
IV	Total loss of equilibrium	Total loss of muscle tone and equilibrium, slow but regular opercular rate, loss of spinal reflex
V	Medullary collapse	Respiratory movement ceases

RESULT & DISCUSSION

Anaesthetic depths can be determined by assessing activity, reactivity to stimuli, equilibrium, muscle tone and respiratory and heart rates. Induction usually takes 5-10 minutes and is marked by a decrease in caudal fin strokes, swimming, respiratory rate and reaction to stimuli. There is loss of equilibrium and the righting reflex is poor. No response to a firm squeeze at the base of the tail confirms a loss of reaction to stimuli and resulting general anaesthesia. (Harms 2003; Stetter 2001) Stages of anaesthetization include induction, maintenance and recovery. The stage achieved usually depends on the dose and the length of exposure.

Different oils administered at different concentration ranges ended up in anaesthetic induction. The time of induction is the period from the time when as experimental fish is placed in the anaesthetic tank, to the time it does not respond to external stimuli and the recovery time is the period from the time when an anaesthetised fish is placed in a recovery tank to the time it recovers from anaesthetization with full equilibrium motion. (Sajan *et al*, 2012) The recovery time started from few seconds to few minutes according to the concentration and types of anaesthetics used. The lowest effective concentration is the concentration that produces general anaesthesia within 3 minutes and allows recovery within 10 minutes. (Gilderhus, 1990; Weyl *et al.*, 1996)

All types of oils used in experiment, Holy Basil oil, Ginger grass oil, Vetivert oil, Palmarosa oil and Camphor oil showed resulting in progressive anaesthesia. Induction time and recovery time was noted for all of them. The increase in the concentration reduces the time to reach V stage of anaesthesia. In contrary to this, there is an increase in recovery time with increase in concentration of anaesthetic oil.

According to the results the effective concentrations of different oils in the induction of anaesthesia in Black Molly appeared to be in different ranges. The time taken to reach anaesthesia or maximum of 10 minutes' induction was recorded for all concentrations of the different bio oils used. The effective concentrations of all the oils with their anaesthetic stage, induction time and recovery time are given in **Table IV.**

Table IV: Effective concentrations of oils inducing anaesthesia

Bio oils	Concentration	Stage	Induction time	Recovery time
Holy Basil oil	36mg/l	IV	3 min	3 min
Palmarosa oil	60	IV	3 min	3 min
Gingergrass oil	80	IV	3 min	4 min
Camphor oil	176	IV	3 min	5 min
Vetivert oil	160	IV	7 min	21 min

In live-fish transport, anaesthetics are useful in lowering the metabolic activity of fish, which facilitates the transport of more fish in a given quantity of water for a longer time. Excessive dosage or prolonged exposure affects the medulla leading to the paralysis of the vital respiratory and vasomotor centers which ultimately causes death. (McFarland, 1959) On using the earlier mentioned five different bio oils as anaesthetics, it was noticed that the fish show a definite course of behaviour in the anaesthetization effect. Most of the fishes used in the experiment recovered within 5 min. Recovery time increased with longer exposure time. At higher concentrations, the time taken to reach stage IV was decreased, but more recovery time was needed. But these conditions varied with different bio oils as they had different level of anaesthetizing property. So the anaesthetic capacity of each bio oils used in this present study has to be discussed separately.

The mode of action of most anaesthetics is unknown and their effectiveness is determined by trial and error method, although chemically related compounds often have predictably similar results (Smith, 1982).

Holy basil oil has been used as anaesthetic in Black Molly for short term duration in the present study. The studies on different species of *Ocimum* have been reported. First study on *Ocimum gratissimum* oil on silver cat fish was conducted by Silva *et al.,* (2015) and reported to be good stress recovering agent. A preliminary study Johny and Inasu (2016) has reported the effect of holy basil oil on Platy fish for short term exposure. No other work has been done in this regard for cross checking the work. The study on Holy Basil Oil revealed lower concentration of oil has perfect anaesthetic effect on fishes. The concentration of 36mg/l gave stage IV in 3 minutes and recovered in 3 min. Based on its multitudes of health benefits in human beings as well as its sedative property with the presence of Eugenol as one of it component oil made us to select it for our study. It indeed has anaesthetic property and can be used to replace chemical anaesthetics in ornamental fish industry.

Palmarosa and Gingergrass are two grasses which come under the same family of Lemongrass. Lemongrass oil has been reported to be a good anaesthetic agent in *Etroplus maculatus* by Dominic (2014). Lemongrass oil is used as anaesthetic in Silver cat fish (dos Santos *et al.,* 2017) and Tambacu (Limma-Netto *et al.,* 2016) which gave good result as sedative and anaesthetic. The present study could also evoke anaesthetic responses by using the Palmarosa oil and Gingergrass oil as anaesthetic agent using Black Molly.

Palmarosa oil and Gingergrass oil proved to be a good anaesthetic for Black Molly in short term exposure. For Palmarosa oil, the lower concentrations of 40mg/l exhibited an anaesthetic effect in less than 3 minutes with a recovery time of 3 minutes. Higher concentration exhibited quicker responses and lore recovery time. Gingergrass oil also exhibited anaesthetic effect 80mg/l within three minutes with a recovery time of 3 minutes. Higher concentrations gave early anaesthetization effect but with a long recovery period.

Camphor oil exhibited anaesthetic efficiency in Balck molly. Anaesthetic effects and influences on water quality by Camphor oil in Clown Anemone fish, *Amphiprion ocellaris* was studied by Ostrensky *et al.,* (2016). His studies reported that Camphor oil can be used as an anaesthetic like clove oil. He had conducted extensive studies on

stimulated 24-hour transport and water quality parameters were checked giving effective results. No other study was reported on Camphor oil in India as well as abroad. The oil gave an anaesthetic response with a concentration of 176 mg/l with 3 minutes with a recovery time of 7 minutes. The behavioural response to Camphor oil was highly different from other oils used. Fish exhibited erratic swimming movements with sudden jerks. Fish were restless and hyper active and finally anaesthetized. Hence Camphor oil cannot be used for anaesthetic effect since it can injure the fish.

The Vetivert oil was tested for anaesthetic efficiency along with other oils of plant origin. There is no literature about the study. The oil gave anesthetic effect at a concentration of 160mg/l in 7 minutes but recovery time was too long of about 21 minutes. Fish here also exhibited erratic swimming patters and breathing difficulties. The reason may be the oil being too thick and odourous. So this oil cannot be used as anaesthetic in fish handling.

From the present study Holy basil oil, Palmarosa oil and Gingergrass oil can be used as anaesthetics in the ornamental fish industry for handling fishes. From the entire study it was revealed that the bio oils containing Eugenol as its component has got anaesthetizing effect. So it can be used to replace the chemical anaesthetic since it is rather animal friendly as well as cheap.

CONCLUSION

During the transportation there is a need to enhance the stress resistance of fish, maintain them in good conditions and reduce them to the fish during transport, thereby ensuring good survival on and after arrival at destination. All of the anaesthetics used for ornamental fish transport are of inhalation type; they are added either directly or fist dissolved in solvent, to the water whereupon the fish are then immersed in it. Since the fishes are exposed to the effect of drug throughout the transit time it is most critical to make the correct choices of anaesthetic drugs and dosages. The anaesthetics used for ornamental fish packing include MS-222, quinaldine sulphate, 2 phenoxyethanol, etc. These chemicals are of high cost and unfavourable odour causing concern for health of human beings.

Understanding the importance using natural oils as

anaesthetics instead of expensive chemicals we intended to find out the efficacy of different bio oils as anaesthetic in fish transport. Based on this the experiments were conducted in a common ornamental fish, Black Molly, using Holy basil oil, Palmarosa oil, Gingergrass oil, Camphor Oil and Vetivert Oil. From the study it was found out that Holy basil oil, Palmarosa oil and Gingergrass oil has anaesthetic effect and can be used for handling fishes to reduce stress and mortality during transportation.

More studies on stress factors and hematological components to be found out before finalizing the anaesthetic effect of it. Studies on loading density, effect of anaesthetics on long time transportation are needed too. All the oils selected were having lots of health benefits for human beings in field of medicine. Hence forth we conclude hoping it will be good enough as an anaesthetic also and could be widely used in fish transportation in the Ornamental fish industry.

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EFFICACY OF *MORINGA OLEIFERA* LEAF EXTRACT ON GROWTH OF SOME VEGETABLES

Sreeranjini K.

Assistant Professor, Department of Botany, L.F.College.

ABSTRACT

Moringa oleifera, of family Moringaceae is well konwon as a medicinal plant and a rich source of vitamins, antioxidants and amino acids. The growth of vegetables to cope with fast enhancing population is cumbersome and the agriculturists are working relentlessly for better yield with limited resources. At this point, the present study aims to analyse the effect of Moringa leaf extract in 25%, 50% and 75% concentrations on the germination rate, and also plant parameters like plant height, number of leaves, fruit yield etc. Five plants were selected for the present study *Amarathus cruentus, Capsicum annuum, Abelmoschus esculentus, Vigna unguiculata* and *Solanum lycopersicon*. The results exhibited more germination rate with 75% extract whereas the fruit yield was more observed in 25% extract.

KEYWORDS: *Moringa oleifera, Amarathus cruentus, Capsicum annuum, Abelmoschus esculentus, Vigna unguiculata, Solanum Lycopersicon,* leaf extract.

INTRODUCTION

Agriculture, is facing dual challenges of increasing crop production with limited spatial availability and highly vulnerable climatic variations. Rising temperature, drought, salinity, floods, desertification and

extreme weather are adversely affecting agriculture. To combat abiotic stress and enhance crop yields, application of mineral nutrients is widely used. Proper exogenous application of PGRs along with certain nutrients, antioxidants, organic and inorganic chemicals has been used to promote plant growth and development for inducing abiotic and biotic stress tolerance that results in higher economic return (Farooq *et al.,* 2009). The toxicological effects of synthetic antioxidants have resulted in increased application of natural antioxidants (Pizzale *et al.,* 2002). Among natural sources to extract PGRs and antioxidants, *Moringa oleifera* (Foidle *et al.,*2001) of family Moringaceae is reported as potential source of antioxidants (Siddhuraju & Becker,2003). Moringa leaf extract (MLE) enriched with zeatin, a phytohormone (Barcizweski *et al.,* 2000) known for stay green and stress tolerance capabilities. Based on these, leaf extract of *Moringa may* be beneficial for plant growth and development.

This study was conducted to evaluate whether the beneficial effects of Moringa leaf extract could be used for germination and development of vegetables and their dose optimization as a natural plant growth enhancer in some crop plants.

MATERIALS AND METHODS

The present study was conducted to analyse the effect of MLE on vegetative growth and seed germination of *Amaranthus* , *Abelmoschus, Capsicum annuum, Lycopersicon, Vigna* sp. The field study was conducted at botanical garden, Little Flower College, guruvayur and the area experienced warm humid climate during the period of study.

Moringa leaves cleaned thoroughly, weighed out as 25gm, 50gm and 75 gm, grinded to paste with 100 ml of distilled water to make up 25%, 50% and 75% respectively and stored in cool dark place. Equal number of seeds of selected plants were collected, and soked in three

concentrations. Also, same number of seeds of each plant was soaked in distilled water. All four treatments were kept undisturbed for 24 hours. Treated seeds were sowed in thoroughly ploughed soil in four plots I, II, III, IV starting with control (distilled water), 25%, 50% and 75% respectively. All these plots were watered regularly of which plot I with tap water and other three with diluted MLE. Growth of plantlets were measured regularly. The number of seeds germi-

nated, height of plants, flowering and fruiting, seeds set was observed and recorded. The rate of plant growth with control and test concentrations was compared. Also, the varied response of all five types of plants were noted and compared.

REVIEW OF LITERATURE

Moringa leaf extract proved an ideal growth enhancer in many experiments (Makkar & Becker, 1996; Noman, 2008). A plant growth spray made from moringa leaves increased crop production 20-35%. Spray affected the crops by long life span, heavier roots, stem and leaves, produced a greater number of fruits, larger fruit and increase in yield (Foidle *et al.,* 2001) highlighting its opportunity as a foliar spray to accelerate growth in young plants.

RESULT

Effect of *Moringa* leaf extract on *Amaranthus*

Amaranthus cruentus of family Amarantaceae, are herbaceous plants. It was found that application of MLE can alter the development of Amaranthus. The seeds of the plant soaked in 75% MLE showed greater germination rate. The application of diluted MLE influenced the growth and yield of Amaranths. An optimum concentration of 25% MLE application caused more enhancements in plant height and number of leaves. From the result, MLE of 75% is the optimal dose for seed germination and so the use of MLE has profound significance in germination, growth and yield of Amaranthus.

Effect of *Moringa* leaf extract on Green Chilly

Green Chilly (Capsicum *annuum),* of family Solanaceae is a shrub and the application of MLE was found to influence the plant. Seeds kept in 75% concentration of MLE showed highest rate of germination and least germination was observed in water-soaked seeds. While considering height of the plants also, same was the case. But yield was more from seed soaked in 25% MLE and least in 75%. From this analysis, high concentration of MLE can be optimised for high rate of seed germination and 25% for greater yield.

Effect of *Moringa* leaf extract on Tomato

Tomato (*Solanum lycopersicum)* of family Solanaceae, shrub showed similar results as in the case of Amaranthus and Chilly, with

high rate of seed germination in 75% and good yield in 25% MLE. The height of the plant was observed more in 25% MLE in contrast to Amaranthus and Chilly.

Effect of *Moringa* leaf extract on Pea

Pea (*Vigna unguiculata*) of family Fabaceae and subfamily Papilionaceae grown for its seed, showed varied results from other plants. In this plant, more seeds germinated in the absence of MLE and least germinated in 75% and 25%. But increase of height was noticed in 25% MLE and least in water. More yield was observed in seed soaked in 25% MLE. Yield was much lower in water-soaked seed. MLE proved to be required for maximum growth and yield of pea.

Effect of *Moringa* leaf extract on Lady's Finger

Lady's Finger (*Abelmoschus esculentus)* of family Malvaceae, biennial plant used for its edible fruit. In this case, lady's finger seeds germinated more in 25% MLE. Regarding plant height, 75% MLE showed maximum length but the yield was greater in 50% MLE.

DISCUSSION

Moringa oleifera of family Moringaceae is a rich source of vitamin A, B, C, D, E and K (Anwar & Bhankar 2003). The vital minerals in Moringa include Calcium, iron, potassium, copper etc. it may be attributed that MLE, rich source of zeatin, ascorbic acid, Ca and K ions (Fuglie, 1999) may be involved in improving plant growth and developmental process. In the present work, exogenous application of MLE affected the plants under study positively. In the present study, exogenously applied MLE effectively improved seed germination and seedling vigour as compared to untreated ones. The improving effect of MLE was observed to be concentration dependent. So, it is suggested that MLE has capability to enhance seed germination and seedling growth. However, the effectiveness of exogenous application of MLE depends on type of species, dilution of MLE and plant development stage. In view of published reports, it can be suggested that moringa leaf possess rich and rare combination of nutrients, amino acids, antioxidants and cytokinins and exogenous application of MLE might have enhanced endogenous hormone levels of plants thereby resulting in increased seed germination and enhanced growth.

This study provide preliminary data and is a primary attempt to evaluate potential of Moringa leaf extract as seed germination promoter and growth enhancer. More quantitative analysis is required for the identification and analysis of cytokinin and other growth promoting components in leaf extract.

CONCLUSION

The present study was focussed on the sustainable utilization of Moringa oleifera leaf extract for the germination effect and yield estimation of five different vegetables. The analysis showed significant influence in the germination rate and yield of vegetables in varying concentrations. In a scenario of polluted soil and water, the use of organic growth promoters is a green signal towards sustainable environment and ecofriendliness.

The need to feed a growing global population exerts a constant pressure on crop production. Plant growth regulators are organic chemical substances other than nutrients and vitamins that, when added to the soil, promote plant growth. In recent years, scientists have focused on the idea of regulating plant growth as the third most important factor in improving growth, yield, and efficiency through the use of plant growth regulators in a number of ways. Adverse effects of synthetic fertilizers on the environment are encouraging investigation of natural sources of fertilizers, biostimulants, and soil ameliorants. The present study highlighted the positive impact of Moringa oleifera extract on seed germination and enhanced yield of plants. In the current scenario of environmental pollution, more precisely soil pollution can be mitigated to a large extent by the use of natural available growth enhancers without compromising the yield. A scientific work proves to be useful only when its methodology can be easily accessed by the society and this work is fully justifiable in that context. The objective of the current study fully compromises with sustainable development using simple procedures and with which , new research thrusts can be kneaded out.

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SYNTHESIS AND CHARACTERIZATION OF LAYERED DOUBLE HYDROXIDES OF MG AND AL AS ANION EXCHANGE MATERIAL

Moly P.P.

Assistant Professor, Dept. of Chemistry, Little Flower College.

Abstract

Synthesis of nanosized nanoparticles of layered double hydroxides (LDH) as anion exchange material is a hot topic in the field of research. Layered double hydroxides can be used as an effective anion exchange material in membranes used as a separator in fuel cells and in batteries. Here we have synthesized LDH of Mg and Al, and characterized using SEM, XRD etc. The particles are found to be of few micrometers in size.

Key words: LDH, SEM, XRD, anion exchange material, Fuel cells, batteries

Introduction

(LDHs) are a type of synthetic clay with brucite [Mg(OH)2]-like cationic layers that contain anions in the hydrated interlayer to maintain charge balance [1]. LDHs have received a great deal of attention in recent years within the polymer community due to their tunable chemistry and high charge density, with the influences of LDHs on the crystallinity, thermal stability, and combustion behaviour of polymers being focal points [2][3]. Layered Double Hydroxides is the name of a class of substances that includes both natural minerals

and synthetic compounds with the typical layered structure. Layered Double Hydroxides have a structure that is very similar to clay minerals, and they are known as anionic clays because of their ability to exchange intercalated anions. Each Layered Double Hydroxide can be assigned to one subgroup based on the structural specification and lattice parameters that result in the specific structure [4].

Structure of LDH

A positively charged brucite-like layer and negatively intercalated guest anions in the interlayer region, along with water molecules, make up LDH materials. Similar to brucite (Mg(OH)2), the usual structure of LDHs. Generally, the chemical formula of LDH materials is $[M^{2+}_{1-x}M^{3+}_{x}(OH)_2]^{x+}[A^{n-}]_{x/n}\cdot zH_2O$. where M^{2+} and M^{3+} represent bivalent and trivalent metal cations in the host layers; x is the surface charge and the value of that is determined by the molar [5]ratio M^{3+}: $(M^{2+}+M^{3+})$; A^{n-} represents interlayer inorganic or organic guest anions of charge n; z is the number of water molecules in the gallery.

When intercalation into a layered double hydroxide (LDH) occurs, interactions between the positively charged layers and the initial interlayer anions are broken, and new bonding interactions form between the host and the new guest anions[6]

2.1 Materials

Magnesium nitrate hexahydrate (Mg(NO3)2·6H2O, e”99%), aluminum nitrate nonahydrate (Al(NO3)3·9H2O, e”99%), were purchased from Merck Life Science Ptivate Limited,Vikhroli (East),Mumbai. Poly vinyl alcohol,Glutaraldehyde solution – 25%W/V were purchased from Nice Chemicals Pvt.Ltd,Kochi,Kerala.

All other reagents were analytical grade and used without purification.

Ultrapure water was usedthroughout the experimental techniques.

2.2 Experimental Methods

2.2.1 Synthesis of MgAl-Layered-Double-Hydroxide (MgAl-LDH) nanoparticles

The MgAl-LDH in a molar ratio of M^{2+}: M^{3+} (Mg^{2+} : Al^{3+} = 1: 3) was prepared by a traditional co-precipitation method . Briefly,350 ml of the metal nitrate mixture which contained of 15.4221 g $Mg(NO_3)_2$•

6 H2O, 7.5806 g $Al(NO_3)_3$•9 H2O dissolved in1000 ml of water is then dissolved in 60 ml of liquid Ammonia with 120 ml of Water. Then, under constant agitation, the pH of the reaction system was controlled at 10 ± 0.5. The precipitates were stirred for another 30 minutes to obtain uniform mixture using a magnetic stirrer. The mixture is kept for an overnight and washed with deionized water. It is then centrifuged until the pH approached alkaline. The precipitate obtained after the suction is transferred to a petridish and thus the solid was obtained after drying at 60^{o} C for 12 hours by using a hot air oven is grinded to fine particles using the mortar and pestle. Then the powder is again washed with the water to remove the impurities and then repeated the same procedures again.

2.2.2 SEM

Scanning Electon microscopy was used to investigate the surface morphology of the samples.SEM images of the samples were acquired with a scanning electron microscope (JSM-5600, JEOL Co.,Japan).Samples were kept in vacuum oven at 30 ^{0}C overnight and were coated with a thin layer of gold by ion sputtering prior to microscopic examination. The energy dispersive analyzer was used for the elemental detection of the samples.

2.2.3 X - Ray powder diffraction

X-ray diffraction, or XRD, is a technique for analysing the atomic or molecular structure of materials. It is non-destructive, and works most effectively with materials that are wholly, or part, crystalline. The technique is often known as x-ray powder diffraction because the material being analysed typically is a finely ground down to a uniform state. Diffraction is when light bends slightly as it passes around the edge of an object or encounters an obstacle.

3. **Result and Discussions**

3.1 SEM Analysis

The SEM images of magnesium – alumimum layered double hydroxide are given in the fig. The SEM image shows the microstructure of the particles. The images revealed the information about grain,size,shape and powder agglomeration.The particles are found to be spherical in shape and are highly agglomerated. The average size of the particles was in 100 nm range.

The SEM images were recorded to investigate the morphology of different samples. The images of the as synthesized Mg/Al LDH shows a well developed layered structure with fine dispersion of the plate like particles[7].

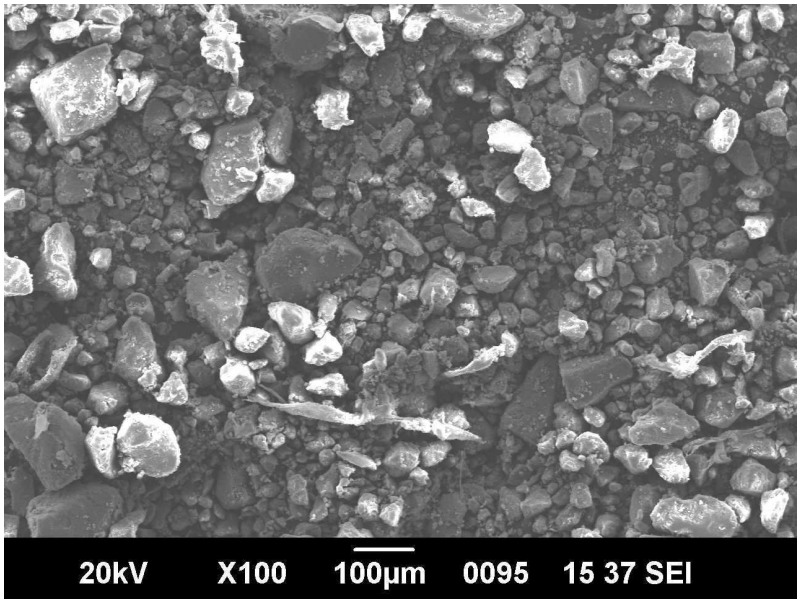

Fig. 1 SEM image of LDHs

3.2 XRD Analysis

Fig. 2 shows the PXRD patterns of the resulting Mg2Al-CO3-LDH samples. Fig. 1 shows the XRD patterns of the Mg-Al LDHs. Peaks close to 2è = 11æ%, 23æ%, 34æ%, and 60æ%, corresponding to the (003), (006), (012), (110), and (1013) reflections of Magnesium – Aluminium layered doible hydroxide respectively as marked in the graph[8].

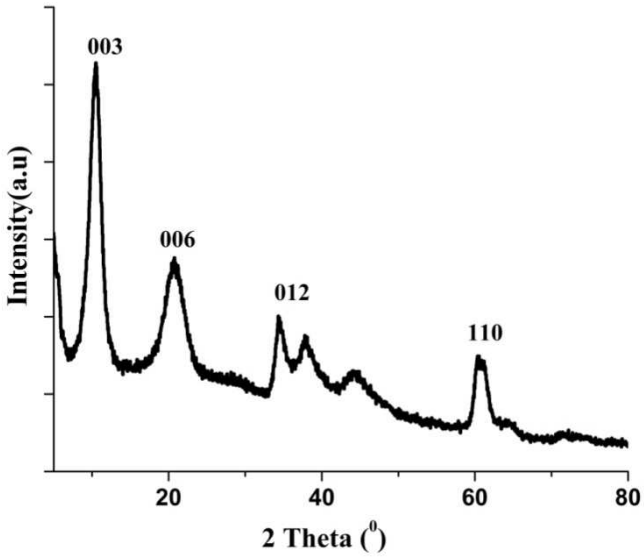

Fig. 2 XRD pattern of LDHs of Mg and Al

Conclusion

The Mg-Al LDH powders synthesized by the co precipitation method. The structures of LDHs were studied using XRD and SEM. The particle sizes of the synthesized LDHs are found to be 100 micrometers. The XRD shows peaks corresponding to LDHs of Mg and Al as reported in literature. This confirms the formation of LDHs. This method found to be an effective one for the synthesis of anion exchange materials.

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ON GENERALIZED EXPONENTIAL DISTRIBUTIONS

Dr. Mariamma Antony

Associate Professor, Department of Statistics, L.F.College.

Abstract

In this paper, we emphasis the importance of exponential distribution and a gneneralization of the same, namely generalized exponential distribution or exponentiated exponential distribution. The pdf and hazard rate properties are discussed along with other properties.

Key Words: Exponential Distribution, Hazard Rate, Parametric Family, Skewness

1.INTRODUCTION

One important parametric family among the life distributions is the exponential distribution which play a central role within the class of all life distributions. Exponential distribution has been studied by various researchers. The importance of exponential distribution is partly due to the fact that several of the most commonly used families of life distributions are parametric extension of this distribution. Such a parametric extension of a particular family of distributions will help to capture the skewness and peakedness inherent in the data sets, which enables a more realistic modeling arising many different life situations. It has applications in various fields such as reliability, random summation, geometric compounding and so on. As a generalization of exponential distribution, Gupta and Kundu (1999) introduced generalized exponential distribution .

2. GENERALIZED EXPONENTIAL DISTRIBUTION

Exponentiated family of distributions are one among the Lehman alternative family of distributions. Let T be a nonnegative random variable having distribution function F(t) with F(0)=0 and probability density function f(t). Now let T^* be a non negative random variable such that its distribution function G(t) is

$$G(t)=\{F(t)\}^{á},\ t>0, á>0. \quad (1)$$

Here F(t) is base line distribution function and á is a positive real number.

This class of distributions with distribution function (1) have importance in reliability and life time data modelling. This model gives rise to monotonic as well as non monotonic failure rates even though the failure rate of the baseline distribution is monotonic.

Many authors considered the exponentiated family of distributions corresponding to different choice of F(t) in equation (1),studied their flexibility in modelling data and their applications. In a series of papers Gupta and Kundu investigated the exponentiated exponential (Generalized Exponential) distribution and has shown that this distribution is a better alternative to the situations where the Gamma and Weibull models are applied.

A random variable X is said to follow exponentiated exponential distribution with parameter á if its distribution is given by

$$G(x)= \{1-e^{-\lambda x}\}^{\alpha}\ ,\alpha>0,\lambda>0,x>0$$

The probability density function is

$$g(x)=\alpha\lambda\ e^{-\lambda x}(1- e^{-\lambda x})^{\alpha-1}\ ,\ \alpha>0,\lambda>0,x>0$$

and the hazard rate function is

$$r(x)= \alpha\lambda\ e^{-\lambda x}(1- e^{-\lambda x})^{\alpha-1}\ /1-(1-e^{-\lambda x})^{\alpha}$$

Here á is the shape parameter and ë is the scale parameter. When the shape parameter á=1, it coincides with the one parameter exponential distribution. Therefore the exponentiated exponential distribution is a generalization of the exponential distribution having shape parameter ë.

The two parameter exponentiated exponential distribution can be

used quite effectively in analysing many skewed life time data and the properties of the two parameter exponentiated exponential distribution are quite close to the corresponding properties of the two parameter Gamma distribution.

The two parameter exponentiated exponential distribution can also have increasing and decreasing hazard rates depending on the shape parameter. If the shape parameter is greater than one, then for both gamma and exponentiated exponential hazard rates increases from zero to ë and if the shape parameter is less than one it decreases from infinity to ë.

The double exponential distribution was introduced by Laplace (1774) (see Kotz et al. (2001)) as the distribution form for which the likelihood function is maximized by setting the location parameter equal to the median of the observed values of an odd number of independent and identically distributed random variables. This result appeared in Laplace's fundamental paper on symmetric distributions for describing errors of measurement and is known as the first law of Laplace (see Kotz et al. (2001)). A random variable X on R is said to have Laplace distribution if its probability density function is

$$f(x)=\frac{1}{2\sigma}e^{-\frac{|x-\mu|}{\sigma}},\ \sigma>0,\ -\infty<\mu<\infty. \qquad (2)$$

Another mode of genesis of this distribution is as the distribution of the difference of two independent and identically distributed exponential random variables.

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PHYTOCHEMICAL SCREENING, BIOTOXICITY AND LARVICIDAL PROPERTY OF THREE COMMON ALLIUM SP.

Sithara K. Urumbil*, Nandhana A.S., Nandana K., Farzana, Keerthana M.R., Krishnendu Varma M.K.

Department of Botany, Little Flower College, Guruvayur,

*Corresponding author: sithara@littleflowercollege.edu.in.

INTRODUCTION

Nature provides all the necessary requirements for the living organisms including mankind from origin. Man depends on nature for the basic resources for sustainable development like food, clothing and shelter. Other than medicines and other health care products play a crucial role in the day-to-day life of humans. Plants and plant-based products were used in large scale production of drugs (Jain et al., 2020). India is always known to be the one of the biodiversity centres which includes many rare medicinal plants. Traditional medicine system in India always uses medicinal plants with high therapeutic values. Medicines from natural sources have less toxicity and side effects. There for pharmacological industries focuses on herbal medicines and plant-based formulations for various treatments.

Synthetic and chemical drugs increased the emergence of resistant varieties of pathogens and insect vectors. Researchers recognised this problem and always in search of alternative and cost-effective methods to harness this issue. Mosquitos were reported to play a crucial role in the transmission and spread of many deadly diseases (Das and Ansari, 2003). Mosquito borne diseases cause severe problems in socio economic perspectives of development of under developed and developing countries (Potter and Beavers, 2005). A strategic approach was to handle this problem was vector control.

Plant products were analysed for insect control and the effectiveness of plant-based compounds for vector control has been studied by different researchers. A number of plant-based formulations were screened for mosquito repellent properties which were noted as non-hazardous to humans (Rajkumar and Jebanesan, 2007, Rahuman et al., 2009).Different species of allium has analysed for its diverse bioactive potential like antioxidant, anti-microbial, antiseptic and for the treatment of different infectious diseases(Onyeagba, 2004). This study was undertaken to assess the larvicidal potential of the extracts from the bulbs of three common allium sp.

MATERIALS AND METHODS

Materials

Fresh Garlic (*Allium sativum*), Shallot (*Allium cepa* var. aggregatum) and Onion (*Allium cepa*) were obtained from market. The scales around the fresh bulbs were removed and the bulbs were washed and rinsed properly in tap and sterile distilled water, respectively. The bulbs were macerated and stored in a plastic container.

Methods

Preliminary phytochemical screening was conducted for the identification of flavonoids, coumarins, tannin, alkaloids, Steroids/Terpenoids, Saponins, phenols, proteins, carbohydrates

Biotoxicity study using Brine shrimp

Cysts of Artemia were purchased from amazon hatched in saline water (30% m/v) and kept for 36 h under proper aeration. The hatched Artemia salina was taken in glass beakers (Approximately 100/beaker of 100ml water).The extracts of bulbs of three Allium species were added to the beakers on varying concentration. The lethality of extract to brine shrimp larvae (Artemia salina) was analysed.

Larvicidal property

Larvicidal study using mosquito larvae: *Aedes aegypti* larvae were collected from rice field and stagnant water areas of Guruvayoor and nearby localities. The early instars of *Aedes larvae* s remained soft and gets darker and harder in the later instars.

30 number of 100ml beakers were set up with 10 mosquito larvae in each. In first 10 beakers add 3ml of different concentrations (1g/ 10 ml, 1g/20ml….1g /100 ml) of garlic extract in each beaker. Observations should be recorded in time intervals. Then to the next set of beakers onion and shallot extracts were added respectively and larvi-

cidal property of the extracts were observed. The numbers of dead larvae were counted in 1-5 hr time duration of exposure and the percentage of mortality was calculated.

RESULTS AND DISCUSSION

Different species of allium was always been a major ingredient in dish especially in Asian countries. Allium usually purchased from local markets because it is cultivated widely across these countries. Three common species of allium *Allium cepa, Allium cepa*. var aggregatum and *A. sativum* L. were used for present study because it was usually available in households.

Phytochemical screening of the garlic bulb extract revealed the presence of alkaloids, glycosides, saponins, flavonoids, steroids, proteins, carbohydrates, oils, reducing sugars and acidic compounds. The bioactivity studies of garlic indicated that these properties were due to the presence of these metabolites (Nweze et al., 2004). In this study the crude extract of *A. sativum* bulb showed positive results for alkaloids, glycosides, saponins, flavonoids, steroids, proteins, carbohydrates, oils, reducing sugars and acidic compounds (Table 1). Detailed studies on the phytochemical constituents of *Allium cepa* were conducted by various researchers (Vågen and Slimestad, 2008, Rose et al., 2005, Munday et al., 2004). The results of the present study suggested that several phytochemicals are present in *Allium sativum* bulb extracts like saponin, flavonoid, tannin, reducing sugar, steroid, and terpenoids. Phytochemicals imparts specific colour, flavour, odur to the plants and are recognised as major part of a plant‘s natural defence system. (Ibrahim, 2010).

Brine shrimp lethality bioassay is a preliminary toxicity assessment which is simple, cost effective and high throughput biototoxicity test. It is based on the killing ability of test sample-Allium bulb extracts- on a zoological organism-brine shrimp (*Artemia salina*). Brine shrimp lethality assay can be taken as a positive indication for biotoxicity property and which can further be analysed for larvicidal property against mosquito larvae. The lethality of the test sample in brine shrimp (Artemia salina) has been utilised by many researchers to estimate the percentage of mortality caused by the extract (Krishnaraju et al., 2005). The present study determined that the extent of lethality was directly proportional to the concentration of the

extract. After 24 h of observation all the shrimp were survived in the control. Even though, maximum mortalities were observed at higher concentrations of all the species of allium (Table 2,3,4).

Effective mechanisms for mosquito control were reported to be killing the mosquito larvae. Large scale application of synthetic chemicals causes health issues to humans and increases the generation of resistant varieties of mosquitos. This problem made the researchers to realise the importance to find an alternative environmentally safe, bio-degradable, low cost, and indigenous methods for eradicating or controlling mosquito breeding. Our investigations demonstrated the larvicidal potential of various allium sps extracts against *Aedes aegypti*. Based on the observations all three species of allium shows promising larvicidal property against the mosquito larvae. At higher concentrations the mortality rate was 100%, 80% and 50% respectively for Allium sativum, Allium cepa and Allium cepa var. aggregatum respectively. This result indicated the high larvicidal property of garlic compared to onion and shallot (Table 5,6,7).

Table 1: Phytochemical screening

Phytochemicals	Allium sativum	Allium cepa	Allium cepa var. aggregatum
Favinoids	+	+	+
Coumarins	+	+	+
Tannins	+	+	+
Alkaloids	+	+	+
Steroids	+	-	+
Proteins	+	-	+
Phenols	+	+	+
Terpenoids	+	+	+
Carbohydrates	+	+	+
Saponins	+	+	+

Table 2:Effect of Allium sativumbulb extract on Artemia (Brine shrimp) growth

Concentration of extract used (Allium sativum)	5 Minute	10 Minute	15 Minute	20 Minute	25 Minute	30 Minute
1 g/10 ml	12%	25%	40%	60%	85%	100%
1 g/20 ml	12%	25%	38%	57%	82%	100%
1 g/30 ml	11%	23%	35%	55%	83%	100%
1 g/40 ml	10%	20%	34%	52%	81%	98%
1 g/50 ml	10%	19%	32%	59%	75%	95%
1 g/60 ml	9%	18%	30%	48%	71%	94%
1 g/70 ml	8%	18%	30%	46%	70%	90%
1 g/80 ml	7%	14%	28%	45%	68%	88%
1 g/90 ml	6%	15%	26%	42%	65%	85%
1 g/100 ml	6%	12%	25%	40%	65%	84%

Table 3: Effect of Allium cepa var aggregatum bulb extract on Artemia (Brine shrimp) growth

Concentration of extract used (Allium cepa var aggregatum)	5 Minute	10 Minute	15 Minute	20 Minute	25 Minute	30 Minute
1 g/10 ml	10%	21%	38%	58%	83%	100%
1 g/20 ml	10%	21%	35%	56%	82%	100%
1 g/30 ml	9%	20%	35%	52%	80%	98%
1 g/40 ml	8%	20%	32%	49%	78%	95%
1 g/50 ml	8%	18%	30%	48%	75%	92%
1 g/60 ml	7%	16%	29%	45%	72%	90%
1 g/70 ml	7%	16%	29%	45%	69%	88%
1 g/80 ml	6%	14%	25%	42%	65%	86%
1 g/90 ml	4%	12%	23%	40%	63%	85%
1 g/100 ml	4%	10%	20%	38%	60%	82%

Table 4: Effect of Allium cepa bulb extract on Artemia (Brine shrimp) growth

Concentration of extract used (Allium cepa)	5 Minute	10 Minute	15 Minute	20 Minute	25 Minute	30 Minute
1 g/10 ml	10%	22%	38%	58%	83%	100%
1 g/20 ml	10%	21%	35%	56%	82%	100%
1 g/30 ml	9%	20%	34%	54%	80%	98%
1 g/40 ml	7%	19%	32%	48%	77%	94%
1 g/50 ml	7%	18%	30%	46%	75%	92%
1 g/60 ml	6%	16%	28%	43%	72%	90%
1 g/70 ml	5%	15%	26%	43%	70%	87%
1 g/80 ml	5%	15%	24%	42%	68%	85%
1 g/90 ml	4%	11%	22%	40%	64%	83%
1 g/100 ml	3%	9%	19%	37%	60%	81%

Table 5: Larvicidal Property of Allium sativum against Mosquito larvae

Concentration of extract used (Allium sativum)	1 Hour	2 Hour	3 Hour	4 Hour	5 Hour
1 g /10 ml	0%	0%	10%	10%	10%
2 g/10 ml	0%	0%	10%	10%	20%
3 g/10 ml	0%	0%	10%	10%	20%
4 g/10 ml	0%	0%	10%	20%	30%
5 g/10 ml	0%	0%	20%	40%	60%
6 g/10 ml	0%	0%	20%	40%	70%
7 g/10 ml	0%	10%	30%	60%	70%
8 g/10 ml	0%	10%	40%	60%	70%
9 g/10 ml	0%	20%	30%	80%	90%
10 g/10 ml	10%	20%	40%	60%	100%

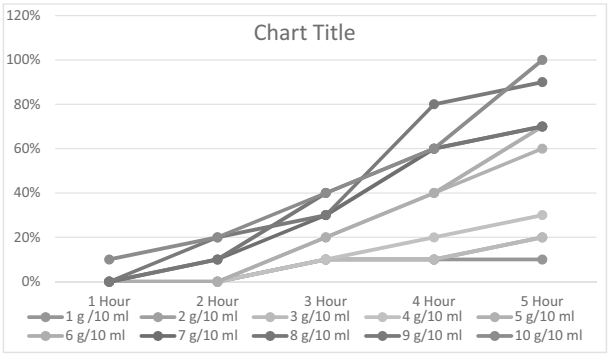
Table 6: Larvicidal Property of Allium cepa var aggregatum against Mosquito larvae

Concentration of extract used (Allium cepa var aggreegatum)	1 Hour	2 Hour	3 Hour	4 Hour	5 Hour
1 g /10 ml	0%	0%	0%	0%	0%
2 g/10 ml	0%	0%	0%	0%	0%
3 g/10 ml	0%	0%	0%	10%	10%
4 g/10 ml	0%	0%	0%	10%	20%
5 g/10 ml	0%	0%	10%	20%	40%
6 g/10 ml	0%	0%	20%	20%	40%
7 g/10 ml	0%	0%	20%	30%	40%
8 g/10 ml	0%	0%	20%	30%	50%
9 g/10 ml	0%	0%	20%	30%	60%
10 g/10 ml	0%	10%	20%	30%	80%

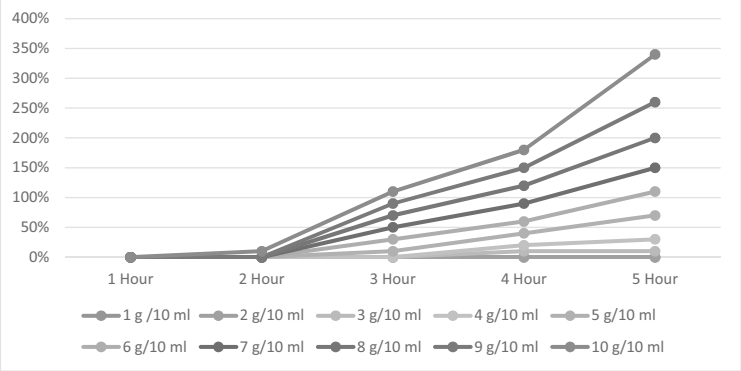
Table 7: Larvicidal Property of Allium cepa against Mosquito larvae

Concentration of extract used (Allium cepa)	1 Hour	2 hour	3 Hour	4 Hour	5 Hour
1 g /10 ml	0%	0%	0%	0%	0%
2 g/10 ml	0%	0%	0%	0%	0%
3 g/10 ml	0%	0%	0%	0%	0%
4 g/10 ml	0%	0%	0%	0%	10%
5 g/10 ml	0%	0%	0%	0%	10%
6 g/10 ml	0%	0%	0%	10%	20%
7 g/10 ml	0%	0%	0%	20%	30%
8 g/10 ml	0%	0%	10%	20%	30%
9 g/10 ml	0%	0%	10%	20%	40%
10 g/10 ml	0%	10%	20%	30%	50%

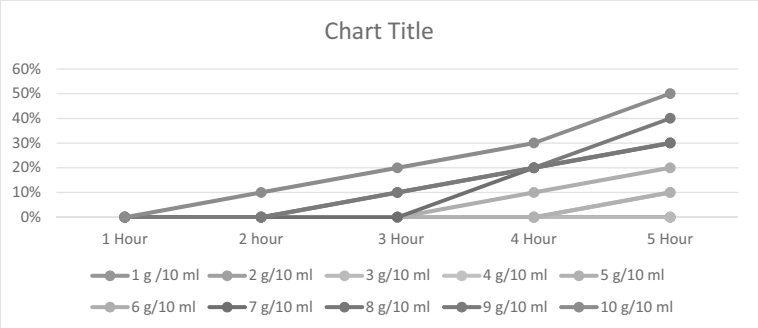
Graph 1: Larvicidal Property of Allium sativum against Mosquito larvae



Graph 2: Larvicidal Property of Allium cepa var aggregatum against Mosquito larvae



Graph 3: Larvicidal Property of Allium cepa against Mosquito larvae



CONCLUSION

The three Allium species and varieties used for the present study includes the common dietary components like garlic, onion and shallot. Phytochemical screening revealed a wide range of bioactive compounds in these Allium species. Garlic is a widely consumed spice with a characteristic odour. Garlic, onion and shallot contains many bioactive components, such as alkaloids, glycosides, saponins, flavonoids, steroids, proteins, carbohydrates, oils, reducing sugars and acidic compounds. To sum up, all these allium sps. included in the study showed an appreciable biotoxicity and larvicidal activity and the highest activity was exhibited by *Allium sativum*. The study further necessitates the detailed study on tissue specific degradation occurring in larvae

Figures: 1: Garlic (*Allium sativum*) bulb, 2: Onion (*Allium cepa*) bulb 3: Shallot (*Allium cepa* var. aggregatum), 4: Brine shrimp (*Artemia salina*) larvae, 5: Mosquito larvae (*Aedes aegypti)*

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STUDIES ON THE *CALLOSOBRUCHUS* INFESTATION ON STORED PULSES – BENGAL GRAM AND COW PEA

***Dr Thanuja A Mathew, Ancy Francis, Mable Paul, Haritha K.H, Anumol C.K and Sneha Thomson**

Assist. Professor, Dept.of Zoology, L. F. College, Guruvayoor.
thanuja@littleflowercollege.edu.in

ABSTRACT

Overall effects of infestation of *Callosobruchus* on the quality as well as the quantity loss of the stored Bengal gram and cow pea under lab conditions were determined to see that considerable weight loss has been taken place in Bengal gram and Cow pea though it is more in cow pea. Along with quantitative losses, qualitative losses are also seen. The pulses appeared spotty ,damped with holes and were totally unsuitable for consumption .

INTRODUCTION

Due to the increasing population day by day, the food security is the most global concern in order to fulfil the food demand for both developed and developing nations across the world. Bengal gram (*Cicer aritinum L.*) is the third most important pulse crop, produced in the world after dry bean and peas. Cowpea seed is valued as a nutritional supplement to cereals and an extender of animal proteins. It may be used green or as dry fodder. It also is used as a green manure crop, a nitrogen fixing crop, or for erosion control. Though, pulses have high protein content, they suffer from very high insect

infestation and thus undergo heavy losses during storage. Many pests gain access to the food grains from the standing crop in the field to various stages of grain processing and storage and might affect the quality and quantity of the grains. In India, post-harvest losses caused by unscientific storage, insects, rodents, microorganisms etc., account for about

10 per cent of total food grains. The major economic loss caused by grain infesting insects is not always the actual material they consume, but also the amount contaminated by them and their excreta which make food unfit for human consumption. The present study gives an overview of effects of infestation of *Callosobruchus* on the quality loss of the stored Bengal gram and cow pea. *Callosobruchus* (Coleoptera: Bruchidae), is an important pest of legume (Fabaceae) seeds both in the field and in storage. The comparative weight reduction of pulses due to its infestation is also studied to assess the damage levels.

MATERIALS AND METHODS

One Kilogram each of bengal gram and cow pea were collected from grocery stores in Erumapetty and Thriprayar in Thrissur district. All the adult pests were removed by hand picking and were examined under the Stereozoom microscope and identified as *Callosobruchus* with the help of the Literature. 150 g each of Bengal gram and cow pea were weighed using digital weighing balance and kept in clean plastic jars covered with muslin cloth. 10 pests were introduced into each sample. The jars were labeled properly with date, weight and number of pests introduced and kept at room temperature. Equal weights of Bengal gram and Cow pea were kept as control. The experiment was conducted for thirty two days and was repeated with the same weight of pulses and same number of pests. The evaluation of the quantitative losses was calculated according to Niass (2018) % Losses=

$$\frac{\text{Initial sample weight- final sample weight x 100}}{\text{Initial sample weight}}$$

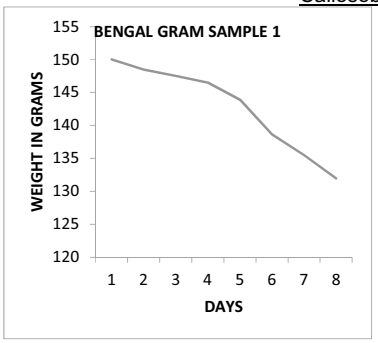
RESULTS

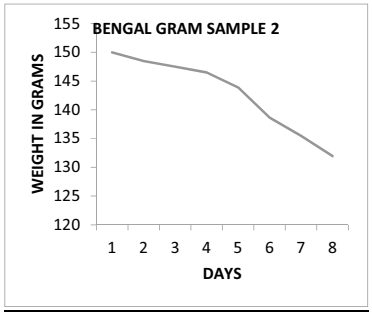
With the progress of the experimental study, the Bengal gram and Cow pea became thin and a fair amount of white powder was seen

pouring out of both the pulses. The skin of pulses was found to be loose and spotty and appeared moist and damped at the end of the experiment. The damage caused to such an extent renders the grains totally unfit for human and animal consumption. The weight of the pulses showed gradual reduction and by the end of the experiment considerable loss in weight was recorded for Bengal gram and Cow Pea. Weight reduction was more in cow pea compared to Bengal gram.

EVALUATION OF WEIGHT LOSSES

Figure showing the successive weight reduction of Bengal gram infested with Callosobruchus





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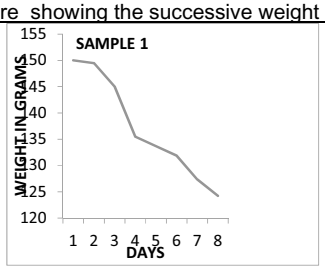

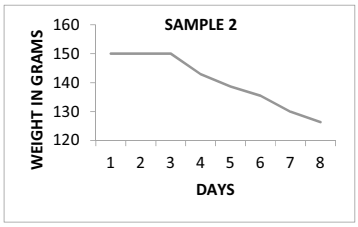

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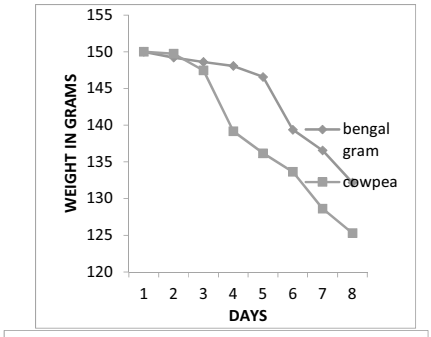

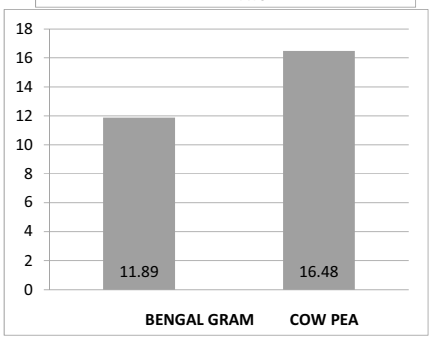

DISCUSSION

From the experimental study , it is evident that considerable weight loss has taken place due to the infestation of *Callosobruchus* on Bengal gram and Cow pea though it is more in cow pea. This is assumed to be the result of the feeding of the grain by the larva. This is manifested by the presence of white powder crumbs produced by the feeding of the larva inside the grain. Similar results were published by Khanna (2017) and Dembele (2021).

Along with quantitative losses, qualitative losses are also seen as reported in many studies. In grub stage, the beetle lives inside the grain and fills the burrows with their excrement and dead bodies. The dead bodies of insects and their excrement within the kernels are ground into flour or meal. This is a serious quality issue for human consumption (Qayyum and Zafar, 1978).

Another findings was the presence of moisture in both the pulses towards the end of the experiment. Earlier studies on the stored bengal

gram show that the moisture content increased with an increase in storage period due to insect's metabolism which released heat and moisture. It also may be due to temperature and moisture gradients within stored products under ambient storage conditions. Under ambient conditions the heating occurs within stored grains due to respiration of grain as well as insects and microorganism, which may also be responsible for loss in weight (http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/crop1204). So presence of mositure and weight reductions are considered to be related also. Studies show that the Physico-chemical changes were found in bengal gram (*Cicer arietinum*) infested by *Callosobruchus* , with increase in storage period, resulting in a decrease in weight, density, embedded larvae, protein and methionine contents, while all other components (moisture, ash, crude fibre, crude protein, crude fat, non-protein nitrogen and uric acid contents) increased.(Modgil-1995).

Though the number of adult pests introduced were only 10 in number, their number increased enormously towards the end of the experimental study. This must be also due to the adult emergence from the pupae and larvae which were already present inside the grains along with the development cycle of introduced adult beetles. Dembele (2021) reported that in stored rice in which pests were introduced for the experimental study, the pests appeared gradually over time and their abundance is higher for a certain period of time and this could be related to their development cycle.

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A REVIEW ON ANTIMICROBIAL EFFECTS OF CURCUMIN

Lovely Jacob A[1,2], Tom Cherian[3]

[1] Researcher, Christ College, Irinjalakkuda, University of Calicut
[2] Assistant Professor, Little Flower College, Guruvayoor.
[3] Assistant Professor, Department of Chemistry, Christ College, Irinjalakkuda, University of Calicut

Introduction

Because of the side effects and the resistance that pathogenic microorganisms build against antibiotics, recently much attention has been paid to extracts and biologically active compounds isolated from plant species used in herbal medicine [1]. However, the potential of higher plants as sources of new drugs is still largely unexplored. India is the largest producer of medicinal herbs and is appropriately called the botanical garden of the world [2]. Coincidentally, the last decade has also witnessed increasing intensive studies on extracts and biologically active compounds isolated from plant species used for natural therapies or herbal medicine [3].

Curcumin is an important nutraceutical obtained from the yellow spice *Curcuma longa*. It has been used traditionally as a folklore medicine in countries like India, China and Thailand for nearly 2000 years without any prior knowledge of the mechanism of action. This polyphenolic compound due to a variety of biological activities has gained significant attention from researchers all over the world [4]. Cell-based studies and clinical trials that have been reported so far

have provided evidence that curcumin could be effectively used as an antimicrobial, anticancer, antidiabetic, anti-inflammatory, antimalarial and antioxidant[5]. As with many other plant materials, there are differences in the curcumin content for the *Curcuma longa* from different geographical regions and it could be due to hybridization with other *Curcuma* species which could be an important fact to choose the plant with higher content of curcumin [6].

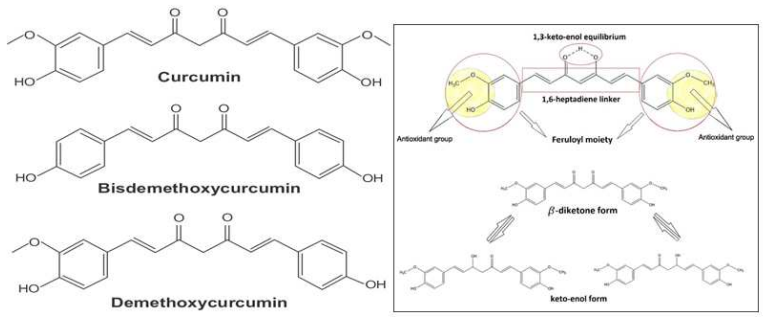
In this work, the chemical structure of curcumin is explained and its antimicrobial properties have been reviewed.

Curcumine and its Structure

Primary extracts from *C. longa* yielded 3 curcuminoids namely curcumin (PubChem CID: 969516), demethoxycurcumin (PubChem CID: 5469424) and bisdemethoxycurcumin (PubChem CID: 5315472) as depicted in fig 1, all of which are polyphenols, wherein the phenolic groups are interconnected with unsaturated carbonyl groups.

Curcumin (curcumin I, diferuloylmethane) is a dimeric derivative of ferulic acid, composed of two o-methoxyphenol rings connected by a heptadienedione chain. It has a chemical formula of $C_{21}H_{20}O_6$ (1,7-bis(4-hydroxy-3-methoxyphenyl)-1,6-heptadiene-3,5- dione) and a molecular weight of 368.38 g/mol. This lipophilic polyphenol is a natural pigment with a characteristic yellow-orange colour, predominantly found in the rhizomes of turmeric (Curcuma longa L.)from the ginger family, Zingiberaceae, native to tropical South Asia.

tropical South Asia.



2.2.Antimicrobial Activity

Curcuma longa rhizome has been traditionally used as an antimicrobial agent [7]. Several studies have reported the broad-spectrum antimicrobial activity of curcumin including antibacterial, antiviral, antifungal, and antimalarial activities. Because of the extended antimicrobial activity of curcumin and its safety property even at high doses (12 g/day) assessed by clinical trials in humans, it was used as a structural sample to design the new antimicrobial agents with modified and increased antimicrobial activities through the synthesis of various derivatives related to curcumin [8]. It was even studied as an antimicrobial agent suitable for textile materials. Results showed that curcumin in combination with aloe vera and chitosan could be a potential suppressor for microbial growth in cotton, wool, and rabbit hair assessed by the exhaustion method [9]. Strongly bound metal complexes of curcumin are also showing increased antimicrobial activities[10]. The novel antimicrobial films with a pronounced antimicrobial exhibition against *E. coli* proved to be potential antibacterial material for treating infections or wound dressing [11]. Curcumin-finished wool had semidurable antimicrobial activity, less durable to light exposure than home laundering with 45% and 30% inhibition rates against *Staphylococcus aureus* and *Escherichia coli*, respectively, after 30 cycles of home laundering[12]. A mixture of curcumin with other antimicrobial agents is used for the development of antimicrobial skin gels and emulsions with improved skin protection and wound dressing properties. The composition of curcumin with hydrogel silver nanoparticles is used to increase the function of hydrogel silver nanocomposites as marked substances for antimicrobial applications and wound dressing[13.] Curcumin-loaded myristic acid microemulsion with 0.86 5Øßg/mL of curcumin suitable for skin consumption inhibited 50% of the *S. epidermidis* growth as one of the nosocomial infectious agents. It showed a 12-fold stronger inhibitory effect compared to curcumin activity dissolved in dimethyl sulfoxide (DMSO) [14.]

2.2.1. Antibacterial Activity

Bacterial infections are among the important infectious diseases. Hence, over 50 years of extensive research have been launched for achieving new antimicrobial medicines isolated from different sources. Despite progress in the development of antibacterial agents, there

are still special need to find new antibacterial agents due to the development of multidrug-resistant bacteria [15]. The antibacterial study on aqueous extract of *C. longa* rhizome demonstrated the MIC (minimum inhibitory concentration) value of 4 to 16 g/L and MBC (minimum bactericidal concentration) value of 16 to 32 g/L against *S. epidermis* ATCC 12228, *Staph. aureus* ATCC 25923, *Klebsiella pneumoniae* ATCC 10031, and *E.coli* ATCC 25922 [16]. The study of hexane and ethanol turmeric extract and curcuminoids (from ethyl acetate extract of curcuminoids isolated from *C. longa* with 86.5% curcumin value) against 24 pathogenic bacteria isolated from the chicken and shrimp showed the highest antimicrobial activity for ethanol extract with the MIC value of 3.91 to 125 ppt [17]. The hexane and methanol extracts of *C. longa* demonstrated antibacterial effect against 13 bacteria, namely, *Vibrio harveyi, V. alginolyticus, V. vulnificus, V. parahaemolyticus, V. cholerae, Bacillus subtilis, B. cereus, Aeromonas hydrophila, Streptococcus agalactiae, Staph. aureus, Staph. intermedius, Staph. epidermidis,* and *Edward- siella tarda*. However, curcuminoids elicited inhibitory activities against 8 bacteria of *Str. agalactiae, Staph. intermedius, Staph. epidermidis, Staph. aureus, A. hydrophila, B. subtilis,B. cereus,* and *Ed. Tarda.* Turmeric oil as a byproduct from curcumin manufacture also was found effective against *B. subtilis, B. coagulans, B. cereus, Staph. aureus, E. coli,* and *P. aeruginosa* [18] . Nowadays so many works demonstrated promising antibacterial activity for different curcumin derivatives as well[19].

2.2.2.Antiviral Activity

Lack of effective therapeutics for most viral diseases, emergence of antiviral drug resistance, and the high cost of some antiviral therapies necessitate finding new effective antiviral compounds [20]. Additionally, the existing antiviral therapies are not always well tolerated or quite effective and satisfactory [21]. Hence, the increasing requirement for antiviral substances will be more highlighted. Plants as a rich source of phytochemicals with different biological activities including antiviral activities are in the interest of scientists [22]. It has been demonstrated that curcumin as a plant derivative has a wide range of antiviral activity against different viruses. Among the 15 different polyphenols, curcumin has the inhibitory activity against

IMPDH and it is suggested as a potent antiviral compound [23].

Many investigations suggest curcumin as a promising prophylactic, therapeutic candidate for COVID-19. First, curcumin exerts antiviral activity against many types of enveloped viruses, including SARS-CoV-2, by multiple mechanisms: direct interaction with viral membrane proteins; disruption of the viral envelope; inhibition of viral proteases; induce of host antiviral responses. Second, curcumin protects from lethal pneumonia and ARDS via targeting NF-êB, inflammasome, IL-6 trans signal, and HMGB1 pathways. Third, curcumin is safe and well-tolerated in both healthy and diseased human subjects. In conclusion, accumulated evidence indicates that curcumin may be a potential prophylactic therapeutic for COVID-19 in the clinic and public health settings [24].

Curcumin proved to be an effective compound to inhibit the HIV-1 LTR-directed gene expression without any major effects on cell viability [25]. Curcumin possibly interacts with the catalytic core of the enzyme. The study of energy minimization and the structural analogs of curcumin elicited that an intramolecular stacking of two phenyl rings of curcumin is possibly responsible for anti integrase activity via bringing the hydroxyl groups into proximity [26].

Curcumin showed anti-influenza activity against influenza viruses PR8, H1N1, and H6N1. The results showed more than a 90% reduction in virus yield in cell culture using 30 5ØßM of curcumin. curcumin can be a good candidate for developing the antiviral products used intravaginally by women for protection against sexually transmitted herpes virus infection [27]. Curcumin exhibited antiviral activity against coxsackievirus by reduction of viral RNA expression, protein synthesis, and virus titer. In addition, it was found to have a protective effect on cells against virus-induced apoptosis and cytopathic activity.

2.2.3.Antifungal Activity

Substances and extracts isolated from different natural resources especially plants have always been a rich arsenal for controlling fungal infections and spoilage. Due to the extensive traditional use of turmeric in food products, various types of research have been done to study turmeric and curcumin with the aspect of controlling fungal-related spoilage and fungal pathogens. The study of the addition of

turmeric powder in plant tissue culture showed that turmeric at the 0.8 and 1.0 g/L had appreciable inhibitory activity against fungal contaminations [28]. The methanol extract of turmeric demonstrated antifungal activity against *Cryptococcus neoformans* and *Candida albicans* with MIC values of 128 and 256 5Øßg/mL, respectively [29]. The study of hexane extract of *C. longa* at 1000 mg/L demonstrated an antifungal effect against *Rhizoctonia solani, Phytophthora infestans,* and *Erysiphe graminis*. It was also shown that 1000 mg/L of ethyl acetate extract of *C. longa* exhibited inhibitory effect against *R. solani, P. infestans, Puccinia recon- dita,* and *Botrytis cinerea.* Curcumin at 500 mg/L also showed antifungal activity against *R. solani, Pu. recondita,* and *P. infestans* [30] .Curcumin and turmeric oil exert an antifungal effect against two phytophagous fungi, namely, *Fusarium solani* and *Helminthosporium oryzae*. Turmeric oil also showed activity against pathogenic moulds such as *Sporothrix schenckii, Exophiala jeanselmei, Fonsecaea pedrosoi,* and *Scedosporium apiospermum* [31].The use of curcumin with light proved to be an effective method for noteworthy improvement in the antifungal activity against a planktonic form of the yeasts [32]. The strong antifungal activity of *C. longa* rhizome and its low side effect were the main reasons to investigate its probable synergistic effect with existing fungicides.

As if the second wave of COVID-19 was not enough to make you shiver with fear, the country is reporting a rash of cases involving a fungal infection. Mucormycosis (sometimes called zygomycosis) is a serious but rare fungal infection caused by a group of moulds called micromycetes. These moulds live throughout the environment. When someone breathes in these spores, infection in the sinus or lung can occur. Mucormycosis can also develop on the skin after the fungus enters the skin through a cut, scrape or another type of skin trauma. Mucormycosis primarily affects people who have health problems or take medicines that lower the body's ability to fight germs and sickness. A cause of worry is that presently, there are no feasible measures to prevent mucormycosis however, early detection is the best solution for now.

2.3. Limitations of Curcumine

Despite its status as a food-grade colourant (E100), the applicability of curcumin as an antimicrobial agent is yet to be accepted by industry and by the regulatory authorities. Unfortunately, the molecule's poor solubility, low bioavailability, and rapid metabolism hamper its use in clinical settings and resulted in no observable therapeutic effects in many clinical trials. The poor aqueous solubility of curcumin creates an obstacle to exploiting its antimicrobial potential in food systems. A substantial effort has been invested during the last two decades in developing adequate formulations and delivery systems to allow efficient delivery of the biological activity of curcumin.[7] These works generated numerous formulations and approaches used to solve solubility and delivery problems associated with curcumin.

3. Conclusion

All previous investigations have shown the extensive antimicrobial activity of curcumin. The extensive antimicrobial effects of curcumin against pathogenic bacteria suggest it has the potential to be considered as a candidate for the clinical therapies of bacterial infections. The extensive antiviral effects of curcumin against different viral pathogens nominate this compound as an antiviral drug candidate to develop new antivirals from natural resources against sensitive viruses especially by developing different curcumin derivatives. However, using curcumin or its derivatives as antiviral compounds needs further investigations. Regarding the studies on antifungal activities of curcumin, the most significant effect was found against Candida species and *Paracoccidioides brasiliensis,* although curcumin revealed fungicide effect against various fungi. Despite various biological activities of curcumin, no real clinical uses have been reported for this compound and still, clinical trials are undergoing for different ailments and diseases, namely, colon and pancreatic cancers, multiple myeloma, myelodysplastic syndromes, Alzheimer, and psoriasis. This polyphenol compound is now used as a supplement in several countries, namely, China, India, Japan, Korea, South Africa, the United States, Thailand, and Turkey. But, further research is required to fully understand curcumin's mode of action and to improve formulations to make it usable as a drug. Clinical trials will then

show whether its effect seen in the lab will hold in patients.

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പത്രമാധ്യമവും കേസരിയും

ഡോ. ഷൈജി സി. മുരിങ്ങത്തേരി
അസി. പ്രൊഫസർ, ലിറ്റിൽ ഫ്ളവർ കോളേജ്, ഗുരുവായൂർ

വർത്തമാനകാല സംഭവങ്ങളെ രേഖപ്പെടുത്തുന്ന ദൈനംദിന പ്രസിദ്ധീകരണങ്ങളാണ് പത്രങ്ങൾ. 'വാർത്തകൾ ശേഖരിച്ചു പ്രസിദ്ധീകരിക്കുന്ന കർമ്മമെന്നാണ് പത്രപ്രവർത്തനം കൊണ്ടർത്ഥ മാക്കുന്നത്. വാർത്താവിനിമയത്തിനുപുറമെ ആശയ പ്രചാരണ ത്തിനുള്ള ശക്തമായ ഒരുപാധികൂടിയാണ് ഇത്. നാം അധിവസിക്കുന്ന ലോകത്തിന്റെ സജീവമായ ഒരു ചിത്രമാണ് പത്രങ്ങളിൽ നിന്നും നമുക്കു ലഭിക്കുക.'[1]

1922 മുതൽ 1935 വരെയുള്ള കാലഘട്ടത്തിൽ പത്രത്തിന്റെ നെടുനായകത്വം വഹിക്കുകയും, പത്രത്തെ മലയാള സാഹിത്യത്തിന്റെ ഗതിവിഗതികളെ തിരിച്ചുവിടാൻ ഉപയോഗിക്കുകയും ചെയ്ത യുഗപുരുഷനായിരുന്നു കേസരി. സാമൂഹ്യ വിപ്ലവത്തിൽ സോഷ്യലിസ്റ്റ് യുഗം സ്വപ്നം കണ്ട് ശാസ്ത്ര സാഹിത്യ സാമ്പത്തിക സാംസ്കാരിക മേഖലകളിലെല്ലാം തന്റെ വൈജ്ഞാനിക പ്രതിഭയെ വ്യാപരിപ്പിച്ച ആ പ്രതിഭ മലയാള സാഹിത്യത്തിലെ കാല്പനികതയുടെ ജീർണ്ണതയെ തുടച്ചുമാറ്റുവാനും, റിയലിസത്തിനും ആധുനികതയ്ക്കും സുഗമമായ പാതയൊരുക്കുവാനും തന്റെ പത്രാധിപസ്ഥാനം ശക്തമായി ഉപയോഗിച്ചു. കാവ്യചരിത്രത്തിൽ ചങ്ങമ്പുഴയുടെ സ്ഥാനം ഉറപ്പിച്ച കേസരി തന്റെ കാലഘട്ടത്തിലെ മാർക്സിയൻ പ്രത്യയ ശാസ്ത്രസ്വാധീനവും, ശാസ്ത്ര ലോകത്തെ കുതിപ്പുകളും ഒരുപോലെ സ്വീകരിച്ചുകൊണ്ടാണ്. നോവൽ, ചെറുകഥ തുടങ്ങിയ ഗദ്യസാഹി ത്യത്തെ സ്വാഗതം ചെയ്തത്. തകഴി, ദേവ് തുടങ്ങിയ തുടക്കക്കാർക്ക് 'ഗോഗോളിന്റെ കോട്ട്' പോലെ ശക്തമായൊരു സംരക്ഷണമായിരുന്നു കേസരിയുടെ കരുതൽ. 'കെടാമംഗലം പപ്പുക്കുട്ടി'യുടെ 'കടത്തു വഞ്ചിക്ക്' അവതാരിക എഴുതുമ്പോൾ റിയലിസത്തിന്റെ കടന്നുവരവിന് അദ്ദേഹം ശക്തമായ പാതയൊരുക്കുകയായിരുന്നു. പത്രധർമ്മത്തിന്റെ

നിഷ്പക്ഷതയും സാഹിത്യമർമ്മജ്ഞന്റെ ആന്തരിക ഗൗരവവുമെല്ലാം വെടിഞ്ഞ് ഒരു യുഗമാറ്റത്തെ സ്വാഗതം ചെയ്യാനും മുൻകാല പ്രതിഭകളെ വെട്ടിയൊരുക്കാനും പുതിയ എഴുത്തുക്കാരെ മുളപ്പിച്ചെടുക്കാനും കേസരി ഒട്ടും മടിച്ചിട്ടില്ല എന്നത് സാഹിത്യചരിത്രത്തിലെ വലിയ പാഠമാണ്.

കേസരി പത്രപ്രവർത്തനത്തിലൂടെ, അദ്ദേഹത്തിന്റെ മുഖ പ്രസംഗങ്ങളിലൂടെ മലയാള സാഹിത്യത്തിൽ നടത്തിയ ശക്തമായ ഇടപെടലിനെക്കുറിച്ചുള്ള പഠനമാണ് ഈ പ്രബന്ധത്തിന്റെ ലക്ഷ്യം. 1922-ൽ 'സമദർശി'യുടെ പത്രാധിപത്യം ഏറ്റെടുത്തുക്കൊണ്ടാണ് കേസരി പത്രപ്രവർത്തനരംഗത്തേക്ക് കടന്ന് വന്നത്. പുരോഗമനപരമായ ആശയങ്ങൾക്കും വിപുലമായ ഭരണപരിഷ്ക്കാരങ്ങൾക്കും വേണ്ടി നിലകൊള്ളുന്ന പത്രമായിരുന്നു സമദർശി. രാജഭരണകാലത്തെ ദുഷ്പ്രഭുക്കന്മാർക്കെതിരെ നിശിതമായ വിമർശനം നടത്തിയ കേസരിക്ക് 1924-ൽ സമദർശിയുടെ പത്രാധിപത്യം ഒഴിയേണ്ടിവന്നു.

പത്രാധിപത്യത്തിലേക്ക്

1930- ജൂൺ 4-ാം തിയ്യതി തന്റെ സ്വന്തം ഉടമസ്ഥതയിലും പത്രാധിപത്യത്തിലും 'പ്രബോധകൻ' എന്ന വാരികാപത്രം കേസരി ആരംഭിക്കുകയുണ്ടായി. 'രാഷ്ട്രീയ സാഹിത്യാദി കാര്യങ്ങളെ നിഷ്പക്ഷമായി വിമർശിക്കുകയായിരുന്നു ലക്ഷ്യം'[2] 'മോപ്പസാങ്ങിനെ'പ്പോലുള്ള ഫ്രഞ്ച് എഴുത്തുക്കാരെ മലയാളികൾക്ക് പരിചയപ്പെടുത്താൻ പ്രബോധകനിലൂടെ കഴിഞ്ഞു. രാഷ്ട്രീയ വിമർശനങ്ങളുടെ നിശിതത്വം കൊണ്ട് 'പ്രബോധകനും അല്പായുസ്സായി.

മലയാള സാഹിത്യത്തിലെ ഒരു വഴിത്തിരിവായിരുന്നു 'കേസരി' പത്രം. കേസരിയുടെ തണലിൽ തിരുവനന്തപുരത്തും പരിസരത്തുമുള്ള സാഹിത്യകാരന്മാരെ സംഘടിപ്പിച്ച് പടിഞ്ഞാറൻ സാഹിത്യതത്വങ്ങൾ അദ്ദേഹം പ്രചരിപ്പിച്ചു. തകഴി ശിവശങ്കരപ്പിള്ള, സി.നാരായണപ്പിള്ള, കെ. ഭാസ്കരൻ നായർ തുടങ്ങിയ പലരും കേസരി സദസിൽ അംഗങ്ങളായിരുന്നു. ഗദ്യം, നാടകം, ചെറുകഥ, നോവൽ എന്നിവ പ്രചരിപ്പിക്കുന്നതിന് കേസരി വളരെ ഉത്സാഹിച്ചു. പല പാശ്ചാത്യകഥകളും നോവലുകളും അദ്ദേഹം തന്നെ തർജ്ജമ ചെയ്തു. ചുരുങ്ങിയ കാലം കൊണ്ട് പാശ്ചാത്യസാഹിത്യത്തിലെ സാങ്കേതിക പദങ്ങൾ, സാഹിത്യരൂപങ്ങൾ എന്നിവ കേസരി പത്രത്തിലൂടെ മലയാളത്തിൽ അദ്ദേഹം പ്രചരിപ്പിച്ചു. ഈ പത്രത്തിന്റെ പേരിലാണ് കേസരി ബാലകൃഷ്ണപ്പിള്ള എന്നറിയപ്പെട്ടത്.

മുഖപ്രസംഗങ്ങൾ

കേസരിയുടെ മുഖപ്രസംഗങ്ങൾ ചിന്തയുടെയും വിപുലമായ വിജ്ഞാനത്തിന്റെയും ഫലങ്ങളാണ്. രാഷ്ട്രതന്ത്രത്തിലെയും സാമ്പത്തിക ശാസ്ത്രത്തിലേയും അടിസ്ഥാനവും മൗലികവുമായ പ്രായോഗിക തത്വങ്ങളെ പ്രതിപാദിച്ച് അവയെ മുൻനിർത്തിയാണ് അദ്ദേഹം മുഖലേഖനങ്ങൾ എഴുതിയിരുന്നത്. വ്യക്തിനിഷ്ഠമായ പ്രതിപാദനരീതി കൈക്കാര്യം ചെയ്യുന്ന വിഷയത്തെപ്പറ്റിയുള്ള പ്രത്യേക അറിവും സാങ്കേതിക വൈദഗ്ധ്യവും, ഇതിലെല്ലാം ഉപരിയായി കർമ്മോജ്ജ്വലമായ പ്രേരണാശക്തി ഇതാണ് കേസരിയുടെ മുഖപ്രസംഗങ്ങളിൽ കാണാനാവുന്നത്. 'ഒരു പ്രൗഢ പ്രബന്ധം രചിക്കുന്ന തയ്യാറെടുപ്പോടുകൂടിയാണ് ഉദ്ധാരണങ്ങളും പ്രമാണങ്ങളും സ്ഥിതിവിവരക്കണക്കുകളും എല്ലാം ചേർത്തു വിവരിക്കുന്ന രീതിയിലായിരുന്നു ബാലകൃഷ്ണപ്പിള്ളയുടേത്. അനുവാചകരെ ആവേശഭരിതരാക്കുകയല്ല, വിജ്ഞാനധനികരാക്കുകയാണ് അദ്ദേഹം ചെയ്തുപോന്നത്.'[3]

'സമദർശിയിൽ' 'അമ്പോ വില്ലാളിയോ' എന്ന ഒരു മുഖപ്രസംഗം ഇതിന് ഉദാഹരണമാണ്. 'ആരു വെച്ച തീയായാലും വീടു വെന്തു എന്ന സ്ഥിതിയിലായി' തിരുവിതാംകൂർ രാജ്യം ഇതിന് ലോകദൃഷ്ട്യാ കാരണമായ ആക്ടിംഗ് ദിവാൻജിക്ക് ഒന്നുകൊണ്ടും കാലാവധി നീട്ടിക്കൊടുക്കുവാൻ പാടില്ല ... പണ്ടത്തെക്കാലമെല്ലാം പോയിയെന്ന് തിരുമനസ്സുകൊണ്ടു ധരിച്ചിരിക്കുമല്ലോ? സംഗതികൾ എങ്ങനെയായാലും തിരുവിതാംകൂർ ഗവൺമെന്റ് ഇപ്പോൾ ലോകമാസകലം ദുർഗ്ഗന്ധം പരത്തിതുടങ്ങിയിരിക്കുന്നു. ഈ നിലയിൽ നിന്ന് നാടിനെ രക്ഷിക്കാൻ ദേശാഭിമാനികൾ അഹിംസാപരമായ മാർഗ്ഗങ്ങൾ കണ്ടുപിടിക്കേണ്ട കാലം വൈകിയിരിക്കുന്നു. അതിന് അവർ തയ്യാറുണ്ടോ എന്നാണ് ഞങ്ങൾ ചോദിക്കുന്നത്.'[4] ഇത്തരം മുഖപ്രസംഗങ്ങൾ സാമാന്യ ജനങ്ങളിൽ പുതിയ ആവേശവും ആദർശവും ഉളവാക്കി.

ഇതര പത്രങ്ങളും ലേഖനവൃത്തിയും

മനോരമയുടെ വാർഷിക പതിപ്പിലേക്കും മറ്റ് വിശേഷാൽ പ്രതികൾക്കും ലേഖനങ്ങൾ ആവശ്യപ്പെട്ടിരുന്ന അവസരങ്ങളിൽ ബാലകൃഷ്ണപ്പിള്ള ചരിത്രസംബന്ധിയായ വിഷയങ്ങളെപ്പറ്റി എഴുതാറുണ്ടായിരുന്നു. കേസരി ബാലകൃഷ്ണപ്പിള്ളയുടെ 'വിശ്വ സാഹിത്യപരിചയപ്പെടുത്തൽശ്രമം' അധികവും നടന്നത് മാതൃഭൂമി ആഴ്ച്ചപ്പതിപ്പിലൂടെയായിരുന്നു. ആദ്യകാലത്ത് കവിതയ്ക്കാണ്

പ്രാധാന്യം നല്കിയിരുന്നത്. ചങ്ങമ്പുഴ, വള്ളത്തോൾ, ബാലാമണിയമ്മ, ശങ്കരകുറുപ്പ്, പി.കുഞ്ഞിരാമൻ നായർ, ഇടശ്ശേരി തുടങ്ങിയ അന്നത്തെ കവികളെ പ്രോത്സാഹിപ്പിക്കാൻ കേസരി മടികാണിച്ചില്ല. തകഴി, ദേവ്, ഉറൂബ്, പൊറ്റേക്കാട് മുതലായവരെക്കുറിച്ചും അവരുടെ ചെറുകഥകളെയും നോവലുകളെയും കുറിച്ച് മാതൃഭൂമി ആഴ്ച്ചപ്പതിപ്പിൽ കേസരി അവതരിപ്പിച്ചിട്ടുണ്ട്.

ദീർഘദർശിയായ പത്രാധിപർ

പത്രാധിപർ എന്ന നിലയിലാണ് ആദ്യമായി ബാലകൃഷ്ണപ്പിള്ള തിരുവിതാംകൂറിൽ അറിയപ്പെടാൻ ഇടയായത്. ആകെ രണ്ട് അവസരങ്ങളിലായി ഏഴുവർഷത്തോളം മാത്രമേ പത്രാധിപസ്ഥാനം അദ്ദേഹം അലങ്കരിച്ചിട്ടുള്ളൂ. അദ്ദേഹത്തിന്റെ പ്രവർത്തനരീതി അതുവരെ ഉണ്ടായിരുന്ന പത്രാധിപന്മാരുടെ രീതിയിൽ നിന്നും വളരെ വ്യത്യസ്തമായിരുന്നു. ഫ്രഞ്ച് ആഴ്ച്ചപ്പതിപ്പുകളെയാണ് അദ്ദേഹം തന്റെ മാതൃകയായി സ്വീകരിച്ചത്. ആദ്യം മുതൽക്കേ ചരിത്രവും പിന്നീട് രാഷ്ട്രതന്ത്രവും സമകാലിക സംഭവങ്ങളുമായി താരതമ്യപ്പെടുത്തി അനിതര സാധാരണമായ വിമർശനബുദ്ധിയോടുകൂടി അവതരിപ്പിക്കുന്ന രീതിയായിരുന്നു കേസരിയുടേത്.

'മലയാളിയുടെ രാഷ്ട്രീയ ഭാവിയെപ്പറ്റി അദ്ദേഹം പ്രവചിച്ചിരുന്നു. അന്ന് മൂന്നു പ്രത്യേക ഭരണഘടകങ്ങളായി കണക്കാക്കിയിരുന്ന തിരുവിതാംകൂർ, കൊച്ചി, മലബാർ എന്ന ഭൂവിഭാഗങ്ങൾ, ഭാഷാവേഷസംസ്കാരങ്ങളുടെ അടിസ്ഥാനത്തിൽ ഏക ഘടകമായി രൂപവത്ക്കരിക്കുന്നതായിരിക്കും മലയാളിയുടെ പൊതുവേയുള്ള ഐശ്വര്യത്തിന് നിദാനമായിത്തീരുക എന്നും അദ്ദേഹം അഭിപ്രായപ്പെട്ടിരുന്നു. അതുപോലെ ഹിന്ദുസമുദായത്തിന്റെ ഐക്യത്തിനും, ശാന്തവും സൗഹാർദ്ദവുമായ ജീവിതത്തിലും ജാതിസംബന്ധിയായ ഉച്ചനീചത്വങ്ങളെ നശിപ്പിക്കുന്നതിനും ദർശിക്കാവുന്ന ഏകമാർഗ്ഗം ക്ഷേത്ര പ്രവേശനാനുവാദം സകല ഹിന്ദുക്കളുടെയും മൗലികാവകാശമായി പ്രഖ്യാപിക്കപ്പെടുക എന്നതാണ്."[5]

കേരളീയ സമൂഹത്തിന്റെ സകലവിധമായ പുരോഗതിക്കും ആദർശ ഭരണ വ്യവസ്ഥയ്ക്കും അനുകൂലമായ സാഹചര്യങ്ങളെ ദീർഘദൃഷ്ടിയോടെ കാണാൻ കഴിഞ്ഞ ഒരു കാല പുരുഷനായിരുന്നു കേസരി എന്നതും സ്മരണീയമാണ്. സമകാലിക സംഭവങ്ങളെ വിമർശിക്കുമ്പോൾ ചിന്താപരമായ ഉയർന്ന നിലവാരം പുലർത്താൻ കേസരി എപ്പോഴും ശ്രദ്ധിച്ചിരുന്നു. ലോകസംഭവങ്ങളുടെ പുരോഗതി ഏതുവഴിക്കെന്നു കണ്ടറിയാനുള്ള കഴിവ് കേസരിക്കുണ്ടായിരുന്നു.

"പത്ര പ്രവർത്തനത്തെപ്പറ്റി സി.പി. സ്കോട്ട് പറഞ്ഞിരിക്കുന്നത് സ്മരണീയമാണ്. പത്രപ്രവർത്തനം സത്യസന്ധത, പരിശുദ്ധത, ധീരത, നിഷ്കപടത ഇവയ്ക്കെല്ലാം ഉപരിയായി അനുവാചകരോടും സമൂഹത്തോട് പൊതുവേയും അനുഷ്ഠിക്കേണ്ട കർത്തവ്യങ്ങൾ വ്യഞ്ജിപ്പിക്കുന്നു. പ്രഥമ ദൃഷ്ടിയിൽ പത്രങ്ങൾക്ക് ഒരു കുത്തകയുടെ സ്വഭാവം കണ്ടേക്കാമെങ്കിലും, കുത്തകകളെ തകർക്കുകയാണ് അതിന്റെ ധർമ്മം."[6] ഈ ആദർശങ്ങളെ സ്വീകരിച്ചുകൊണ്ടാണ് കേസരി പത്രലോകത്തിൽ പ്രവർത്തിച്ചത്.

കുറിപ്പുകൾ:

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3. എസ്. ഗുപ്തൻ നായർ, കേസരിയുടെ വിമർശം, പു. 15.
4. കെ.പി. ശങ്കരമേനോൻ, കേസരിയുടെ കഥ, പു. 48.
5. ,, ,, പു. 48.
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WOMEN ENTREPRENEURSHIP AND SELF EMPLOYMENT PROSPECTS

Dr. J Bincy

Department of Economics, Little Flower College, Guruvayoor

Introduction

The Indian economy has seen a substantial transition since the middle of 1991, when the Indian government implemented new policies of economic liberalization, globalization, and privatisation..India has enormous entrepreneurial potential.There are numerous business opportunities in India. However, while having a high employment rate, women's economic engagement is characterised by their employment in lower-skilled jobs and an inordinate concentration in the unorganised sector..

In this dynamic world, women entrepreneurs are an important part of the global quart for sustained economic development and social progress. In India though women have played a key role in to society, their entrepreneur ability has not been properly happed due to the lower status of women in the society. Their role has only been publicly acknowledged since the fifth five-year plan (1974–1988), when there was a noticeable shift in strategy from women's welfare to women's development and empowerment, and the growth of women's entrepreneurship was made a top priority in our plan. In India, a number of programmes and policies are being implemented to promote women's entrepreneurship.

Entrepreneurs do not necessarily emerge to benefit society because they are frequently the outcomes of either their own personal pressures or the socioeconomic conditions that are already pervasive

in society. Entrepreneurship always develops out of a need. Female entrepreneurs are paving the way in a field that has the potential to dramatically transform both individual and institutional life by developing intelligent and unique concepts. In all the cases necessity is the mother of entrepreneur. Poverty and unemployment are the main problem faced by our economy. Women entrepreneurship helps not only for reducing the level of poverty but also to create employment to others. The reason that advances in technology and the modern automation world demand the effective leadership and inflation from the educate women. However women entrepreneurs associated with the concept of women empowerment and emancipation. Balasundaramet.al (2015) are of the opinion that women are becoming more personally and economically empowered through business ownership or entrepreneurship development. C. Balarishana, J.Sridevi and B.Suchitra (2017) are of the view that the factors motivating women entrepreneurs and the specific internees hindrances they encounter during their entrepreneurial journey. Also women business leaders inspire other women to pursue their dreams. In today's world income of a single person in a family is not efficient to lead a good life. So there is a need to increase the opportunities for women.

Women employment trends in India

Employment pattern of the economy shows the strength of the economy in general and the nature of growth of a particular sector, greater the contribution of particular sector represent the domination of the sector and hence a major role in the economic development of nation. However the nature of employment also has its impact on the economy in general and the individual in particular. The nature of employment varies from self-employed, regular employed to casual employed.Women entrepreneurs organize ,mobilize and establish enterprises with a deep drive , passion and curiosity for making life meaningful since men and women are not in any way different in diligence and dexterity.A study of women entrepreneurs will inevitably raise important questions about the issue that go beyond the gender dimension and functional skill. These questions include their socioeconomic background as well as the perceived push and pull factors and institutional setups that support the emergence and existence of women entrepreneurs.The role of women as entrepreneurs

in terms of functional proficiency, determinants of entrepreneurship, and the support system existing for them can be characterised as the study's concerns taking into account all of these factors.. The study was conducted in regional context of Guruvayoor municipality of the Thrissur district of Kerala.

Data and Methods

The objectives of this study can be identified based on the aforementioned context, such as to analyse the trend and influencing aspects of women's involvement in the entrepreneurial sector. and to analyse the range of government interventions and assistance in women entrepreneurship for economic development.The study is based on both secondary and primary data. A semi structured interview schedule was used for data collection. Secondary data were collected from journals economic magazines and from the internet. Descriptive statistical analysis was used for analysis and interpretation .

Data Analysis and Interpretation

A country's economic progress is achieved through the entrepreneurial spirit, hence women business owners are characterised as survivalists and make a significant contribution to the expanding economy. Women now work in a variety of occupations, including those in trade, industry, engineering, and other fields.Better education, shifting socioeconomic norms, and a desire for more income are some of the causes contributing to the rise of women entrepreneurs.. The findings and interpretations drawn from the data gathered from the women operating businesses in the 15th ward of the Chavakkad Municipality are presented in the data analysis section that follows..

Profile Characteristics	Specifications	No of Respondents	Percentage
Age	Less than 35	6	12
	35 to 60	34	68
	60 above	10	20
Educational Qualifications	School up to 12^{th} level	27	54
	Diploma	9	18
	Degree	10	20
	Professional	4	8

Source : Primary Data

The age breakdown of women entrepreneurs in our study area is shown in Table 1. Six of the 50 respondents, or 12 per cent of the total, are under 30 years old, according to the data gathered from the respondents. The majority of them, or 34 of them, were in the age range of 36 to 60, or roughly 68 per cent . Only 10 responses, or nearly 20 per cent , of all respondents are in the 60+ age category. The data collected show that there are few young people working in this profession, proving that entrepreneurship and business are not appealing to young women. This may also shed light on the notion that women are not naturally successful businesswomen and that they only enter this field of employment as a result of stressful living circumstances, particularly poor financial situations.Out of the 50 respondents, data on respondent profiles show that 27 have only completed high school and 10 have degrees in a number of fields.

Table 2 . Status of monthly proceeds and scale of support from various sources

Education Qualification	Rate of Support received from outside			Return per month		
	Government	Private agencies (financial institution)	No support	Less than 5000	5000-10000	10000 above
School up to 12th level	1	0	26	18	6	2
Diploma /	2	5	2	1	3	5
Degree	2	8	0	1	5	4
Professional	2	2	0	0	0	4

Source :primary Data

According to the data in table2, educated women, particularly those with degree- or professional-level education, are more likely to get support from a variety of sources, including the government and other private entities. Additionally, they are experiencing greater financial success and business prosperity. An important qualification for a modern entrepreneur is having past experience managing a profitable business. The entrepreneur should have professional experience working in the relevant field or a business management degree to make up for their lack of business management experience. Unfortunately, women's education does not receive the attention it deserves in India. As a result, many aspiring female business owners lack the education needed to operate a successful company. As more women pursue higher education, the playing field is being levelled.

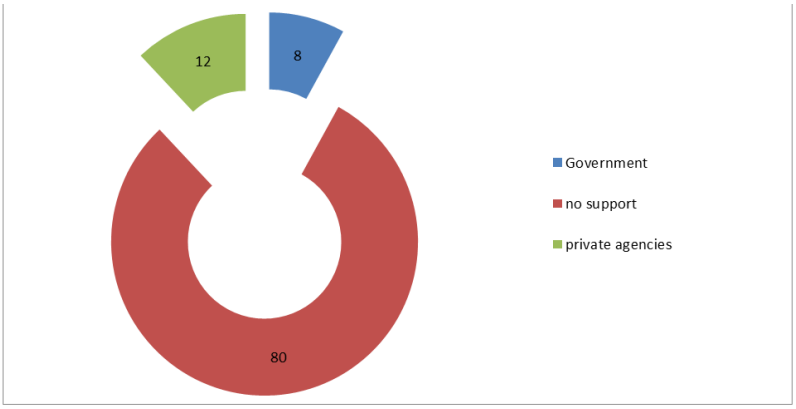

Figure No 1 Status of support received from various sources .

Table No 3 Financial return and mental satisfaction of business

Motivational Factor	Return per month			Level of Satisfaction		
	Less than 5000	5000-10000	10000 above	Highly satisfied	Satisfied	Not satisfied
As a source for income	3	20	5	0	39	2
Enthusiasm for creativity	1	14	3	6	0	0
Compulsion from family background	4	0	0	0	1	2

Source :Primary Data

Table 3 shows the satisfaction level of the entrepreneurs. There are 6 people highly satisfied and 40 respondents are satisfied and four respondents out of 50 are not satisfied ,because of the factor that lack of assistance from Government, seasonal changes, etc. The table shows the monthly return of women entrepreneurs in our study area. Out of the data collected of the 50 respondents belonging to the group of less than 5000is 16 per cent . Out of the total respondents 34 of them belonged to the monthly income group of 5000 to 10000. And the group of monthly income 10000 and above includes 8 respondents ie, almost 16 per cent Each of them captures the presence of an entrepreneurship-friendly feature that positively relates to job happiness, as evidenced by the significant, positive correlations between the motivating factors, financial return, and business satisfaction. Of

the 50 respondents, 38% of women work to develop something new or creative for themselves and for society, whereas 56% of women started their firm to make money or earn a profit. Only 6% of women launched their businesses as a result of outside pressure.

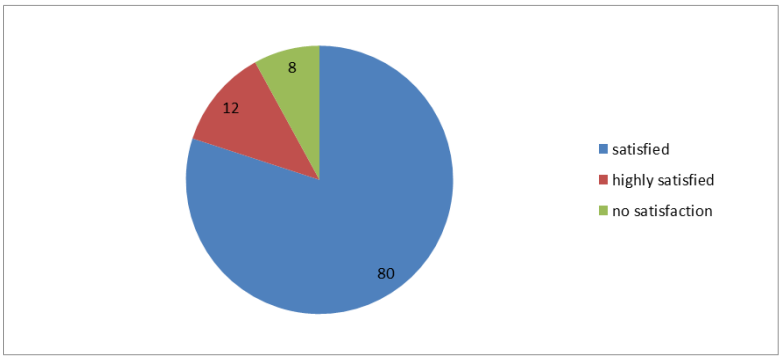

Figure 2 Business Satisfaction

Table No 4 Business Pattern of the Respondents

Return per Month	Business Ownership		Business Form	
	Single	Partnership	New	Traditional
Less than 5000	12	4	6	9
5000-10000	7	9	11	7
10000 above	2	16	14	4
Total	50		50	

Source : primary data

The theory of relative deprivation and aspiration, which contends that people who, because of their personal resources and circumstances, are unable to aspire to well-paying salaried jobs would be content with a rather low income from self-employment. Joint venture and partnership form of business would have more prospectus for business concerns and new type of business capture more financial return also, is one explanation for this phenomenon.

A major findings towards this topic of our study is the issue of financial requirements for future establishment purposes.There still arises the issue of expansion on establishment expenses where the profits in some case are sufficient only for routine expenditure.Most of them hesitant about taking government assistance due to its legal

difficulties.Another major issue of concern is the availability of rooms.Majority has found finances for their enterprises from informal sources and do not depend on government or other institutional supports, while those who have approached government had positive and quick responses.I t is imperative to Introduce various welfare schemes for women entrepreneurs.Loan should be given to members and interest free loans also to be given in special cases by local governments .Ensure the membership in trade union.Create awareness about government policies for the development of women enterprise.

Conclusion

We are in a better situation now when it comes to women entrepreneurs. As a result of economic efforts, Indian women now have the promise of equal chance in all spheres. But regrettably, only a small group of women have profited from government-sponsored development initiatives. Numerous programmes are offered by the Indian government to encourage female entrepreneurs. The primary issue that female business owners deal with is a lack of working capital. However, they are very happy with their present business situation. Women businesspeople now have a different outlook than they did in the past; they are self-assured and willing to take any kind of risk.

Women businesses should be continuously inspired, encouraged, motivated, and collaborated with. In order to inform women about the various government programmes available to assist them, a widespread awareness campaign should be launched. To encourage them to engage in manufacturing and other activities, women entrepreneurs should be given access to soft loans and subsidised loans. They should receive more help from the financial institutions to ensure the smooth operation of their business initiatives. In short, more promotion of the microfinance system is needed.

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BOMMA GOLU: A CELEBRATION AND AN AWAKENING OF FEMININE ENERGY

Reely Raphael
Assistant Professor,Department of English, L.F.College

In Kerala, Navarathri or Durga Puja is celebrated in the "Kolla Varsham" (Year Calendar) "Kanni" (Malayalam Month, Mid September to mid October), followed by the Nine days after "Karutha Vavu" (Amavasi)". It is a festival of Hindus based on the Myth of the victory of Goddess Durga over Asuras (The Demon Kings). Bomma Golu, the festival of dolls is traditionally been celebrated by the Tamil Brahmins during the Nine days of Navarathri Festival. In places like Andhra Pradesh, this Navami is celebrated during "Sankranthi."

The basic principle of this festival is based on Goddess Durga, also known as "Devi" in Malayalam. According to the Hindhu Mythology, She has been called as the "Aadi Para Shakthi" (The first greatest feminine Force which constitutes the universal power). It is believed that the divinity of the Goddess is present everywhere in all movable and immovable things. So people started to worship everything in the Universe. Thus people began to collect clay, stones, wood etc and made idols and start worshipping. In the earlier days people worshipped Banyan trees as the part of their devotion to Mother

Nature. Taking into consideration of this universal worship, the deep ecological concern of Hindu Mythology cannot be ignored. During these nine days of Navarathri festival people arrange Bomma Golu at their homes.

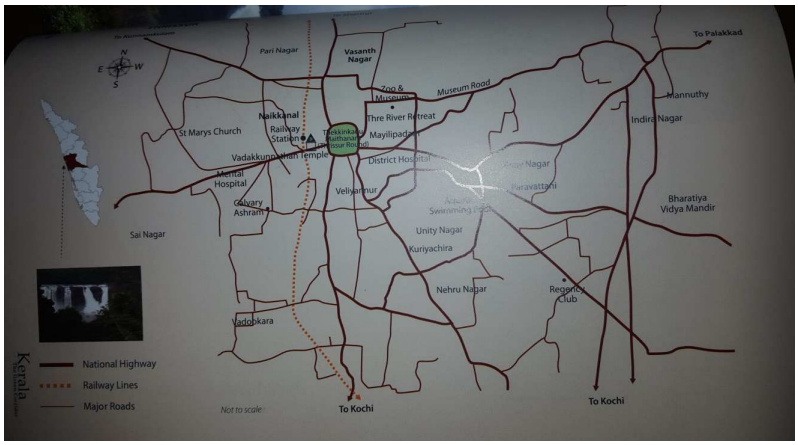
In this festival the Goddess Durga, Lakshmi and Saraswathi are being worshiped all over India. Durga is worshiped in places like Bengal, Lakshmi in places like Maharasthra and the Saraswathi Pooja is very common in Kerala. In these 9 days of the festival, first 3 days Durga is worshiped and next 3 days Lakshmi and the last 3 days Godess Saraswathi. In Kerala the 10th day is celebrated as Vijayadashami. In Kerala on this special day, the young new learners and their books will be devoted to Godess Saraswathi (the divine source of wisdom and enlightenment), who will help them in learning. Also musical instruments and other working tools will also be devoted to the Goddess on this day. As Shiva, the destroyer, Vishnu, the preserver and Brahma the creator, their female counterparts Durga, Lakshmi and Saraswathi also act as the divine forces of this Universe. This festival is celebrated in memory of Goddess Durga's victory over evil, which she fought against the Asuras for the long nine days. It is said that in each day she fought in different forms and incarnations which is very well depicted in "Aigiri Nandini Slokha". As she saved the human beings from evil forces we thank her during this festival.

Coming to the celebration part, In India it is widely celebrated in Tamil Nadu, Karnataka, and Andhra Pradesh. Bommai Kolu in Tamil means "Divine Presence." Bomma Koluvu in Telugu means "Court of Toys." And Bombe Habba means "Doll Festival" in Kannada. It commemorates with Ganapathi / Vinayaka Pooja followed by a welcoming ritual for Goddess Saraswathi performed by the elderly members of the family probably women. Then womenfolk of the family build the rack of **Odd** Numbered Shelves/ Planks/ Steps of Golu in steps like 3, 5, 7, 9 or 11etc. Later the female members of the family arrange it with a beautiful fabric in a very aesthetic manner. Then they arrange different types of dolls mainly of Gods and Goddesses in the main row. There will be also the depictions of Puranas, Weddings, Everyday Scenes, Royal Processions, Professions Kitchen Utensils, Toys, Village Folks, Birds and Animlas. There

will be Dolls from all walks of life even from the normal common man's life. Thus all dolled up on different steps in such a way that the stories move from one scene to another. Thus a show case of dolls collected and displayed according to ones taste can be really a visual treat for the eyes. In front of that there will be flowers and lilted lamps. A" Kuthuvilakku Lamp" is lit in the middle of the decorated Rangoli or Kolam, while devotional Bhajans and slokhas are chanted. The bottom layer will be arranged with sweets made by women members of the families. Along with the cultural implications of the Golu it has got a significant connection with the agricultural economy of ancient India. Many of the figurines were usually made of clay. Just before this festival the fields required dredging and de-silting for irrigation, the Golu celebration demands clay formed from such activities are really helful for the farmers and doll makers. They also sell dolls during these seasons. The below picture is taken during ast Navarathri At Punkunnam where these dolls are being sold.

This research paper is focusing on the Bomma Golu celebration of the Tamil Brahmin settlement of Kerala especially at Thrissur. The photos shown in this paper is of the Navarathri Bomma Golu celebrations of Thrissur District. This was collected during September 2017. This paper tries to analyze this festival in the context of women Empowerment and how women are getting prominence through this festival and tradition.

Thrissur District was formed on July 1st, 1949, earlier known as Thrissivaperur. It is the fifth largest city in Kerala noted for its cultural heritage and archeological wealth, is built around a 65-acre hillock called the "Thekkinkadu Miadanam" which seats the Vadakkumnathan temple. It spans around 3032 km and is home to over 10% of Kerala's Population. Thrissur was once the capital of the Kingdom of Kochi, another Tourist place noted for Muziris Biennales. Thrissur has a large number of well known temples including the Thiruvambadi Sri Krishna Temple- one of the largest Sree Krishna Temples in Kerala. Thrissur District being the cultural capital of the State Kerala (a state renowned for 100% Literacy) is well known for festivals like "Thrissur Pooram"; the main attraction of Foreign tourists, "Pulikkali", "Kummattikali, Temples and also for communal harmony and cultural fabric of the region". It is known so because of the cultural, spiritual and religious leanings throughout history. The city is widely acclaimed as the land of elephant lovers. "Aanayouttu", is the world largest elephant feeding ceremony held in Vadakkumnathan Temple in the city annually. The ceremony is conducted on the first day of the Malayalm Month of Karkidakam. Thrisur has historically been a center of Hindu Scholarship. The cultural significance of this town in the integral development of Kerala cannot be neglected.



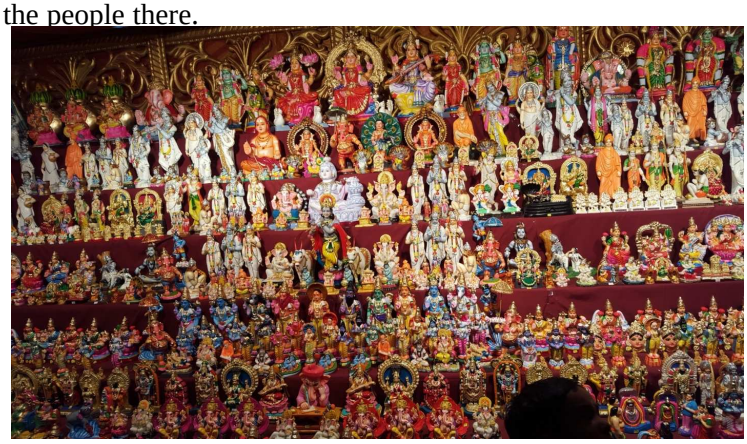
The Tamil Brahmins of Kerala were essentially temple centered. Here in Thrissur, apart from the individual home celebrations, the Brahmin community members jointly arrange Bomma Golu in some common places under the leadership of Kerala Brahmana Sabha and Samooha (means social) Madoms, because there are many Tamil Brahmin settlements in Thrissur. These community members are great scholars and well educated and they very strictly follow their old value systems and customs. They speak Tamil even though the regional language of Thrissur is Malayalam. This joint community is venue for all the Tamil Brahmins of Thrissur District for their social gatherings and prayers. Such Samooha Madoms are there at Alapuzha, Ernakulam, Kottayam, Thrissur, Guruvayoor, Angadippuram, Kozhikkode etc and they host Bomma Golu every year.

At Thrissur, under the community called Kerala Brahmana Sabha, the Tamil Brahmins of Thrissur District arrange Bomma Golu At Pushpagiri Agraharam, Punkunnam (a place in Thrissur District) and At Pandi Samooha Madom Dharmashastha temple at Pazhayanadakkavu. In Thrissur both these communities arrange a beautiful Golu for the other community members and public people. This festival at thrissur has got a wide media coverage also for the last Navarathri celebration of September 2017. This is the best place for them to have healthy social net workings, as their population is not that large. All the Tamil Brahmins of Thrissur District will assemble

at these Samooha Madoms for this festival and they will worship and do Poojas together. This is indeed a great thing to be appreciated, as they celebrate it in their community centers and it caters to the societal aspect of the festival. In this current world of Nuclear Families and social media driven relationships, these kind of Social gathering opportunities are very relevant to continue their relationship with other members of the society. Children also take part in these kinds of arrangements as happy helpers which in turn instill thier tradition in them. Through these community Bomma Golus the younger generations get a very good picture and awareness about their old customs, values and traditions. Thus the new younger generation is also very actively participating in it. During the last September, the material collection and interview conducted for this research paper many elderly people have expressed their grief towards diminishing of their old "Agraharams" as they are forced to sell it for business people as they can't renovate it. So these kinds of festivals are actually trying to revive their old customs n traditions in the society.

Women and religion, also women and culture has got an inevitable relationship from time immemorial. The Festival Bomma Golu is actually the festival of ladies because they are the ones who are arranging it according to their creativity. It is also a golden opportunity for them to promote their creative expressions. During this festival they are getting a chance to come out of their homes and interact with other members of the society. The main attraction of this festival is in the **Evenings** after arranging Bomma Golu, they visit others homes dressed up very beautifully. It is a good exposure time for women.

In the evenings, Women within the neighborhood invite each other to have a look upon their Golu Displays. They exchange sweets and gifts, they visit others with hands full of “tambulams” (the young women and children are given trays containing Kunkumam, Combs, Mirror, Turmeric, Beetle leaves and other auspicious items) and all. Firstly these food items are devoted and given to deities as “Neiveidhyam” and then they distribute it to others. Also varieties of sweets like chocolates and other delicious items like “Medu vada” are being made and distributed on these days. Again the culinary skills of women are also given importance. Sweets and mouth watering desserts (made of Chana and Jaggery) are open to other community members also which foreground the harmonious communal life of the people there.



The community members also help Young girls or women in their community who is in need of Financial or any other support during this festival. All people are welcomed to view this amazing Spectacle of Golu and they very proudly exhibit theirs. Almost all the women folk of their community are good singers. During their visits, they are asked to sing hymns and chants. Songs are also an offering to the deities. Thus this festival is the best platform for them to showcase their talents.

As we all know that now a days atrocities against women are increasing in the form of rape, molestation, exploitation, binary opposition, female feticide and other gender biased actions of the male chauvinists. Such issues are prevalent even in this post modern era of Globalization. The so called norms of the Patriarchal society is still stereotyping women in the name of the assumed Gender roles and relationships. Like people worship Mother Nature, during the Bomma Golu festival Women and young girls are being worshipped at least in these nine days. This attitude highlights also the deep ecological concerns of their religion. So let's hope and pray that on every Navami or Navarathri No Durga is aborted, No Lakshmi Has to beg for money, No saraswathi is stopped from going to school, No Parvathy is raped

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AWARENESS AND USE OF SELECTED E-RESOURCES AMONG FACULTY OF LITTLE FLOWER COLLEGE, GURUVAYOOR: A CASE STUDY

Dr. Joicy A. J.

UGC Librarian, Little Flower College, Guruvayoor

Abstract

E Resources are major tools of inspiration to teaching, learning and research in Higher Educational Academic Institutions. The present study made an attempt to study the awareness and use of Social Networking Tools among faculty members of a college of excellence as a case study. The study covers randomly selected 80 faculty members of the seven departments of the college. The result reveals that more than half of the respondents are female, Associate Professors below the age 35 years. They are highly aware and use of Citation Indexes, Social networks, video Conference and slide shares. Majority of them never used Reference Management Software, Google Calendar, online surveys and micro blogging.

Key Words: Social Networking Tools, E Resources, Faculty, College of Excellence, Awareness and use.

Introduction

Now a days Internet and social network have emerged as the most powerful tools for use, access, storage and retrieving the information. The present age is called as Digital Age. In this age, there is

a vast change in almost all walks of life. Because of the electronics inventions, the education field is also greatly affected. In the final decade of the last century, there is a great increment in the use of electronic Medias in the educational field. In the past two decades, higher education has made tremendous growth, providing quality education in India. New and advanced technologies have brought significant changes in the education systems. Almost all the countries of the world have adopted the new technologies for teaching and learning process where India is not an exceptional one. Computers and related electronic resources have come to play a central role in education. Electronic information sources are becoming more and more important and useful for the academic community. University academics are a unique population and rely on recent and timely information.

The dawn of 21st century witnessed the digital revolution and gained an extraordinary significance as an indispensable tool in pursuit of knowledge and information. The Internet has remarkably come up as the most powerful medium of storage and retrieval of information needed for various purposes. In the changing scenario, the academic institutions have been adopting many novel technologies for fulfilling their commitments and needs. The concept of 'digital library' or an 'electronic library' has got sudden importance not only in the academic scenario but also in the private sectors and government organizations. In today's rapid changing world, information needs of learners and knowledge seekers are met through a plethora of sources. The digital resources available in a library play a prominent role in facilitating access to required information to the users in an easy and expeditious manner. Further, one need not go to the library to make use of print formats as the digital resource can be made use of by any user through online access via networks or authentication methods at any time by comfortably sitting at home or office.

However, it is imperative that one should be familiar with the use and exploitation of digital resources for their quicker and effective usage. Further, digital resources can also be used for efficient retrieval. Thus, digital resources in a library play a significant role in academic libraries as they are mostly tuned for the promotion of academic excellence and research. In view of all this, digital resources

like CD-ROM database, online databases, online journals, OPACs and Internet etc are slowly replacing the importance and usage of print media.

E-Resources

The electronic resources are defined as "systems in which information is stored electronically and made accessible through electronic systems and computer networks". It includes electronic articles, Online- Databases, E-journals E-books, Internet resources OPAC, CD-ROMs, etc.An electronic resource is defined as a resource which requires computer access or any electronic product that delivers a collection of data, be it text referring to full text bases, electronic journals, image collections, other multimedia products and numerical, graphical or time based, as a commercially available title that has been published with an aim to being marketed. These may be delivered on CD ROM, on tape, via internet and so on.

Electronic resources are valuable tools for study, learning and research. Electronic resources can provide many advantages over traditional print-based resources: they contain current information because they updated frequently, they offer advanced search capabilities, they offer flexibility in the storage of the results, and they enable access to information without the restrictions of time and location. There is a great need to study the use of electronic resources and investigate the level of satisfaction among academics in order to redefine the collection and services provided by academic libraries and to improve the technological platforms that make these electronic contents available to users. Understanding how to select and use the appropriate resources for specific information needs is the key to successful research. To become adept at locating and using information for research, you must know about the many different resources available to you.

Around the world social networking becomes an essential part of every day's life. Social networking is a composition of individuals or group of persons, which are attached to one or more individuals such as friend, family, neighbourhood, small communities etc. According to 2016 statistics 28.4% of the population was using internet in India and 10.3% are active on social media live ment.com says that col-

lege students (33%) are the largest demographic of archives social media users.

Social networking tools provide network analysis and connection facilities to allow people to understand the community structure and influence it over time. These tools range from Facebook and Twitter where all the information is provided by people themselves, to tools that silently collect information from a defined population by reading emails. Computer software and web-based services that enable people to interact with each other; sample tools include blogs, wikis, video conferencing, online chat, instant messaging. Small Web applications that allow users to connect and collaborate examples include Facebook, MySpace and LinkedIn.

Role of E-Resources Education and Research

The access to electronic resources in Higher Education Institutions is rapidly increasing. The growth of information in electronic format forces students to learn how to find, select and use a wide variety of resources. The multiple accesses speed, rich content, reuse, timeliness, anywhere access is some of the features of e-resources of the e-resources enhance the teaching and learning skills.Higher education must develop these skills, in order to produce qualified individuals, engaged in the lifelong pursuit of knowledge for personal and professional growth. For students in academic education in particular, the ability to effectively utilize electronic information resources is a key issue, since it may help them to enhance the quality of their teaching when they become professionals. In addition, it is expected that an educator comfortable in using electronic resources may encourage his/her students to do the same, and thus contribute to their computer and information literacy.

This study helps to find out the use of electronic resources and the pattern of organization of electronic sources in the educational and research fields.

About Little Flower College

The clarion call to educate women for the liberation of the country and of the individual was taken up with enthusiasm by all Indians who had a deep - rooted belief in the wellbeing of mankind.The institution has around 2000 students offering 17 UG programmes includ-

ing 2 vocational courses and 9 PG programmes and a community college. The digitalizing initiatives for teaching learning process a harbinger for nuanced approach for seamless integration of traditional and innovative technologies has been rolled out. The institution has grasped its potential for being a college with potential for excellence and has vocational courses and community college as well as to be ranked 49th in the nation by NIRF though by passed for the RUSA allocation. Designing new age courses to suit the needs of the locality is a challenge to be tackled vigorously.

Review Literature:-

Suja& Suresh (2022)shows that in the sphere of education, the novel coronavirus (covid-19) disease has offered unique obstacles. This quick and unanticipated transformation has compelled library personnel to migrate their services to the digital platform, as well as provide acceptable remote service to consumers. Kerala's Government Teacher Educational Institutions had to demonstrate how technology should be used for rescue operations during the covid Pandemic on a practical level.The goal of this work is to show how much information libraries can supply to faculty, researchers, and students, as well as the level of open-source information awareness.

Shivaraju&Sivasami (2019) the purpose of this study is to find out the extent to which electronic resources are utilized among the faculty and research scholars at Alliance University, Bengaluru. Questionnaire method was used to make a survey of use of electronic resources by the faculty members and research scholars. Study reveals that majority of the respondents are aware of electronic resources. Majority of the respondents are using e-journals for seeking the information and maximum number of users under study prefers e-resources for their research/project work.

Chandra et al. (2014) conducted a study on Use Pattern of E-Resources among Faculty Members in Arts and Science Colleges in Chennai concluded that most of the respondents were aware of e-resources available in their college library. They have accessed e-resources for their study and research purpose. Majority of the respondents opine that e-resources are useful.

Bhat & Mudhol (2014) presented the findings of a survey about

the awareness and use of electronic resources by medical students available in the medical institute libraries. The subjects chosen for this study were 300 faculty members and medical students of Sher-E-Kashmir Institute of Medical Science (SKIMS), Jammu and Kashmir, India.

Pauline Adeniran (2013) conducted a study on Usage of electronic resources by undergraduates at the Redeemer's University, Nigeria revealed that the use of electronic resources has tremendous impact on the academic performances of the undergraduate students of Redeemer's University; however, there is need for them to acquire more skills in the use of electronic resources.

Thanuskodi (2012) founded the use of e-resources by the post graduate students, Research scholars and faculty of arts in the Annamalai University. The study found that the majority of users are aware about the availability of e-resources. The result reveals that 47.78 % of respondents wanted to access only electronic version whereas only 32.78% users wanted to read the printed journals but 19.44% respondents wanted to use both electronic and printed version. Majority of the respondents 76.66% use e-resources for writing papers. The analysis reveals that many of the respondents search e-resources through linking facility available on the library website.

Need and Significance of the study

The need and significance of proposed study is intended to identify "Awareness and use of selected E-resources among faculty of Little Flower College, Guruvayoor" with the following objectives and hypothesis.

Objectives of the Study

1. To understand the awareness of the faculty of departments about the selected social network tools.

2. To examine the usage of social network tools among the respondents.

Hypothesis

1. There is an association between faculty user's age and their awareness of social networking tools.

2. There is a significant association between faculty user's age

and their usefulness of social networking tools.

3. There is a significant difference between gender of the faculty with regard to their awareness of social networking tools.

4. There is a significant difference between gender of the facultywith regard to their use of social networking tools.

Methodology

This paper attempts to find out the use and awareness of selected E-Resources especially Social network tools by the faculty of Little FlowerCollege, Guruvayoor. The tool used for data collection was questionnaire. One hundred questionnaires were distributed to the faculty of seven departments of Little Flower College. Eighty filled up questionnaires were collected from the respondents for the data analysis and interpretations on the basis of filled up questionnaire the data has been analysed and tabulated using SPSS version 23.

Findings

· Majority of the respondents were women (52.5%).

· A majority of 61.3 percent of them are below 35 years of age.

· A significant majority of 92.5 percent of the respondents have secured higher level of education, that is, higher than post graduate such as M.Phil, Ph.D, and NET/SET.

· A majority of the faculty are Assistant Professors.

· The highest level of awareness among the faculty of Little Flower College is found to be using Instant messaging (77.5%), videos (68.8%), general social networks (67.5%), slideshare for presentations (55.0%), video conference (51.2%), document creation, edition and sharing (48.8%).

· The highly used networking tools are found to be general social networks (58.8%), videos (55%), instant messaging (72.5%), and slideshare for presentations (43.8%).

· It was concluded that most of the faculty members are satisfied with Social Network tools.

Hypothesis 1& 2

Relationship between age of the respondents and awareness and use of social networking tools

ANOVA

		Sum of Squares	Df	Mean Square	F	Sig.	Result
q7_aw	Between Groups	340.504	6	56.751	3.139	.009	P< 0.05 - Significant
	Within Groups	1319.984	73	18.082			
	Total	1660.487	79				
q7_use	Between Groups	306.351	6	51.059	2.367	.038	P<0.05 -Significant
	Within Groups	1574.449	73	21.568			
	Total	1880.800	79				

Result of Hypothesis 1 and 2

When the above hypotheseswere tested using one way anova, it is found that there is a significant relationship between faculty age and their awareness on social network tools.

The variables use of the social networking tools and age of respondents were studied for the significance. One way anova analysis reveals that there is significant difference between faculty age and their use of social networking tools.

Inference

Hence, null hypothesis got rejected in both of the test one and two.

Hypothesis 3 and 4

Difference between male and female faculty with regard to their awareness and use of social networking tools

Independent Samples Test

		t-test for Equality of Means			Result
		t	df	Sig. (2-tailed)	
q7_aw	Equal variances assumed	-3.498	78	.001	P<0.05 - Significant
q7_use	Equal variances assumed	-3.168	78	.002	P<0.05 - Significant

Result of Hypothesis 3and 4

When the above hypothesis tested using faculty't' test, it is found that there is a significant relationship between male and female faculty users with regard to their awareness about social network tools.

When the above hypothesis tested using faculty't' test, it is found that there is a significant relationship between male and female faculty users with regard to their use about social network tools.

Inference

Hence, null hypothesis got rejected in both of the test three and four.

Conclusion

Now a day Internet and social network have emerged as the most powerful tools for use, access, storage and retrieving the information. The paper is attempted to study use and awareness of selected E-Resources by the faculty of Little Flower College Guruvayoor. The result of this study has revealed that most of the faculty are aware and use of the e-resources, especially social network and its tools. They have accessed e-resources for their study and research purposes. Majority of the respondents opine that e-resources are useful.

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THE NEW EDUCATION CRISIS; NEP 2020 AND ITS IMPLICATIONS ON HIGHER EDUCATION IN INDIA

Derry Paul T M,

Asst. Professor on Contract, Department of Political Science, LF College

Abstract

Higher education sector in India is passing through a phase of rapid changes in its principles as well as implementation. The introduction of NEP 2020 is proposed to change the entire structure of education in the country. The article analyses interpretations of NEP 2020 with respect to the impacts it creates especially on higher education sector in India. The issues regarding introduction of common entrance examinations and other centralising initiatives in higher education are critically evaluated in the article. Ideas concerning ancient Indian values like Seva, sacrifice and vocational principles are included in the postulates of NEP. This is also assessed as a part of this article. The involvement of political executive in educational sector and the political appointments in various higher education institutions are examined and role of these in the policy shift are noted. The concerns of marginalised communities regarding their exclusion in higher education sector and other concerns of students and researchers are also studied.

Keywords: NEP 2020, Marginalisation, Inclusive Education, Political Appointments.

Higher education system in India is in a phase of transition initiated by National Education Policy 2020 by the central government. Education in India whether primary or higher is a matter of great discourse from the initial days of Independence. What we had then was the remnants of colonial educational apparatus. All our universities, colleges and other institutions were bearing the load of westernized arrangements. Even after 1947 we were a bit reluctant to initiate our own attempts on a proper educational policy. But as a result of visionary engagements by leaders like Nehru, higher education sector in India gained an agile momentum. In course, India started to produce best professional brains out of our IIT's and other premier institutions. The modernization of Indian education system is a process moving along progress of the country. Educational policies were introduced and implemented in various periods. Different ministries included their contributions to the progress of educational sector.

The National Educational Policy 2020 (NEP 2020) introduced by NDA government also is an attempt labelled to civilize the so called educational system in India. But the postulates and suggestions of the policy clearly generates a factor of doubt among the academic community of our country. There is a key element of bewilderment regarding the execution of this policy. Criticism towards this policy regarding excessive glorification of ancient Indian culture, promoting privatisation, undermining the Right to Education Act and most importantly, replacing constitutional values with banal ideas such as seva, ahimsa, swacchta, sacrifice and courtesy are proven to be genuine during the attempt to channelise this policy . Idea of value education is used in an improper sense in the draft and it tries to impart primitive ideals even to the higher education infrastructure. Vocational training is given prominence replacing the ethos of quality education. The field of higher education is most effected domain in this regard. The opportunities for research are being cut off. Master of Philosophy (M.Phil) which was serving as a preparatory course for researchers is suggested to be stopped. This will create a large trouble for the research sector of the country. The research fellowships are also demanded to be reduced and especially the research in social sciences are heavily discouraged. There are confusions regarding admission procedures which are expected to be modified according to

the NEP 2020. The multiple exit options provided in the proposed under graduate course structure also is an issue that creates confusions among the academic community.

What is happening to our Campuses?

The interventions of political executive in academic spaces can be seen clearly in the recent days. The involvements allegedly begins from the admission procedure itself. As Arun Kumar writes in EPW,

"Political interference in top appointments is a crucial factor in the decline of institutions of higher learning. Often vice chancellors, directors and principals have been appointed for proximity to the powers that be and not their academic credentials. This makes them beholden to political bosses or in privately controlled institutions to the 'moneyed' and that erodes their accountability to their academic peers. No wonder civil servants and army men have been appointed even though they lack academic imagination, the rot is now deeper, since there are persistent reports of money being the consideration for appointments."

The higher education frame work is in threat of political appointments irrespective of ability and proper vision for pursuit of knowledge. Authority is becoming a tool for politicizing academic environ of the institution. There are allegations of political appointments in at least four or five higher education institutions including Central Universities and IIT''s. Political appointments make the academic spaces in to mere bureaucratic institutions. The reduction proposed in fields of research will pull back spirit of inquiry from the student community.

Another important aspect of this policy is the marginalization faced by socio-economic backward class in higher education system. Deliberate attempts can be seen to exclude them from these higher learning opportunities. One such issue is raised recently by the Jawaharlal Nehru University Students' Union (JNUSU). They blame that the admission procedure to JNU, which is an international face of higher education in India is being adulterated with an attempt of exclusion. There are students from marginalized communities who were out of the game only because they got less marks in the viva-voce. In spite of their fair performance in JNUEE which is the national level en-

trance test conducted by NTA for the admission process, they are given nominal marks in the viva-voce conducted by particular departmental committees. Students argues that these viva sessions are totally planned to remove eligible candidates from their opportunity. JNUSU president Aishe Ghosh responded furiously to media regarding the admission procedure. She commented,

The admission intake policies do not heed the social conditions in India. It dismisses the struggles of students from deprived backgrounds who do not get a fair start at education. Many first-generation learners and aspirants overcome several odds in pursuing higher education. Central universities should not be gatekeeping education, which is a right of all. The NEP 2020 betrays the very ethos of public-funded education in the country and poses the threat of widening the gap that exists between students from marginalised communities and others. What happened in JNU during the viva-voce was only another instance of a long-standing culture of bias against the disadvantages, (Times of India)

These are two significant cases of direct intervention of pressure groups in to educational system after the introduction of NEP 2020. NEP can't be blamed directly for these events but the backing given by NEP 2020 as a legal material for this attempts is much evident. The modernization agenda of NDA government points to NEP for all their actions on educational reforms. Their attempts to politicize education is having a strong legal backing now. This is a major threat posed by the proposed NEP. This includes inculcation of ideas of separatism, Islamophobia and creating the notion of otherness among students. Aim of education is to civilize mankind and provide them with proper scientific temper. But what NEP 2020 suggest is the rejuvenation of age old concepts of value education and excessive stress on ancient Indian culture.What education means is the inclusive growth of society in to a common goal of development. This inclusiveness is what missing from NEP in a proper sense. Whereas it stresses on many other factors which are to be observed through a lens of ambiguity. As Disha Nawani comments,

The underlying focus of any educational policy should be on bringing every child, particularly the marginalised, to the forefront of our con-

cern by ensuring an enabling and dignified environment, respectful of their worlds, knowledge and experiences. Our aim should not be limited to imparting children with foundational skills of literacy, numeracy and competencies but removing structural disadvantages, thus enabling them to live a meaningful life, simultaneously strengthening our society as a secular, democratic space.*(Indian Express)*

This notion is to be included within the implicational mechanism of NEP 2020. The political bias and social exclusion elements must be eliminated in order to obtain the proper visualization of what is expected from higher education sector. The issues of students are to be genuinely addressed.

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QUESTIONING THE NOTION OF FAIR SKIN : AN ANALYSIS OF HELEN OYEYEMI'S *BOY, SNOW, BIRD*

Ms Silpa T H.

Asst. Professor on Contract , Dept. of Functional English, L.F.College,

Abstract

In all its sense, Helen Oyeyem's novel *Boy, Snow, Bird* can be seen as a much awaited tale in this post-modern era, which has the power to shatter the authoritative role of Eurocentric values, reinforced by traditional fairy tales. Grimm Brothers' "Little Snow White" fairy tale upholds two stereotypical representations; first one is "voice of looking Glass", which symbolizes the patriarchal definition for gender roles and women's beauty. The second one is the racial stereotype of "the fairest of us all." It's high time for readers of these kinds of fairy tales to move away from all those typical stereotypical representations. This Research paper tries to bring a change in fairy tale readers, that is, instead of just being an observer, they should also try to become an interpreter and active reader. During the observation phase, all the readers might have imbibed the values and stereotypes presented by these Eurocentric tales but it s high time to be able to ask questions against those imbibed stereotypes and tropes.

Keywords : Eurocentrism, Re-vision, Retelling, Fairy tale, Stereotypes.

Post-modern revisions may question and remake the classic fairy tale's production of gender… [or] expose the fairy tales complicity

with the exhausted forms and ideologies of traditional western narrative, rewriting the tale of magic in order to question and re-create the rules of narrative production, especially as such rules contribute to naturalizing subjectivity and gender (Bacchilega 23).

As every work of art reflected and influenced its times, these fairy tales also had big impact on the society. Moreover, it can be viewed as tool for propagating gender and racial stereotypes in society. For example, the concept of colourism, which is defined as prejudiced treatment of same race people based on their colour. After colonialism, every colonized country had great admiration for fair skin. Western texts portrayed fair skinned people as good and dark skinned people as bad. The colonized countries got attracted towards these stereotypical representations rather than anti-stereotypical ones in their native literatures. Being a colonized country, India has a number of great texts like Rig-Veda, Mahabharata, in which dark skinned hero, Krishna and heroine, Draupadi are presented as embodiment of power and goodness. But readers gave importance to western thoughts and works of literature, which are evident in their approach towards white skin.

Even after attaining freedom, the colonized countries followed the mindset of their masters which made the colourism to take a deep root in these countries. In this contemporary era also, there are films and daily soaps, which portrays Krishna and Draupadi as white skinned characters, without sticking on to descriptions of that characters in the native cultural texts. The attribution of power and beauty to fair skinned people was introduced by Aryans. After the rule of British, the notion of light skinned ruling class and dark skinned subjects were developed all over the world. The common man started to associate white skin with beauty and power. Here is, the role of fairy tales, it had portrayed white skinned woman as more beautiful princess. As these texts satisfied Eurocentric values, it gained popularity and acted a medium to propagate stereotypical thoughts over generations. When all these thoughts got perpetuated over decades, it gave rise to fairness product industries worth billions of dollars. Fairness cream advertisements for longest time implied that being fair meant being empowered. Even though, colour based discrimination affected all genders, women became more compelled to attain fair skin and inter-

nalize Eurocentric standard of beauty. These were some impacts of imbibing western thoughts. But later on, certain theories like post structuralism, deconstruction made people to think beyond the conventional voices, which paved their way for becoming interpreters of certain western values embedded texts.

Boy, Snow, Bird is a re-visioned novel which shows the deconstructive interpretation power of Helen Oyeyemi. This novel has a number of reasons for being the most suitable text for exploring both deconstruction and re-vision of gender and racial stereotypes. First reason is that the narrative of this text is set in America of 1940s and 1950s. It was the time of Civil Rights Movement in America, when Blacks fought against racism. The period of 1940s and 1950s America had witnessed women participation in Civil Rights Movement. There was Montgomery bus boycott, which happened because of Rosa Park's denial to take a seat in the back of a bus. There were women who did their best to contribute for the Civil Rights Movement. Their involvements include contribution of editorial works to the "Black Panther" newspaper which was a forum to discuss gender issues. It was a time when women began to form organizations like National Council of Negro Women to fight for their gender and race. This was the historical context of the narrative in the novel *Boy, Snow, Bird*. Because of the influence of the times, the central character Boy is presented as a woman with agency.

The second reason, that states this novel's suitability for deconstructive and revisionist analysis is the author herself. Helen Oyeyemi is a British-Nigerian woman writer, who has used re-vision as a technique to break away the barriers constructed in society, based on gender and race. Being a black woman, she can employ her life experience to interpret the Eurocentric fairy tale in a new way. Interpretative phase of literature has to be employed in an efficient way to fight against stereotypical representations in various texts. Oyeyemi has used Alicia Ostriker's Re-visionist Mythmaking as an effective technique to correct the distorted image of women in society. Traditional fairy tales always presented women within some limitations based on gender roles. These presentations promoted certain hegemony in literature and society which include male over female, white over black etc. Here is the need to break binary oppositions

along with stereotypes. Critics like Jacques Derrida, Paul de Man tried to dismantle the binaries. This paper also employs the deconstructive method of dismantling binaries, along with re-vision to bring out anti-stereotypical representation in fairy tale inspired novel.

After post structuralism, reader's perspectives got changed and found a new direction in reading of tales. As a result of that change, a number of novels and films came up with deconstructive and post-modern elements. People began to value perspectives rather than centre. Marginalized sections of the society attained central positions in certain works. Besides the author, the characters themselves began to have narrative voices in literary importance. This was the idea, communicated by Roland Barthes in his work The Death of the Author. All these changes in literature had its impact on society too. If one takes the case of contemporary society, he/she can observe that the society has become more inclusive in the sense that now the marginalized or voiceless sections like Dalit and Trans-genders are getting a status of being the part of the social structure.

In this modern era, structures are getting deconstructed in all its sense. Certain conventional norms are getting banned or rewritten. For example, the 377 act has liberated people from the conventional notion of heterosexuality. So, in a way society began to accept marginalized ones like homosexuals bad women as part of the society itself. This is happening only because of the fact that people are thinking from multiple perspectives, in order to deconstruct certain age-old social stereotypes and prejudices.

Everything in this society was earlier shaped by more powerful ones. Even the standards of beauty were according to patriarchal and racist conventions. But now, there are some changes in those beauty standards. Even a black lady is now getting the label of Miss Universe. As the time is progressing, certain fairness product companies are also taking their initiatives to change their prejudiced mindset. For example, recently Fair & Lovely has changed its name to Glow & Lovely, because they understood that fairness is no longer a parameter for measuring the beauty. Their consumers are getting evolved, so along with that they also have to improve their standards.

Even in art and culture some types of changes are coming. But

still there are some stereotypes which are not ready to leave from the minds of certain people. Oyeyemi has published the novel *Boy, Snow, Bird* to address that section of society, who is still living with the prejudiced mind-set. She is, in a way, trying to evoke a change. This novel Boy, Snow, Bird was published in 2014. In the same year of publication of this novel, there was an incident happened in New York City which has a lot more to do with social political context of this novel. In 2014, a black man named Eric Garner was killed by the whites and this was not the first time such murders were happening in America. Before that incident, the world had seen the murder of another black man named George Floyd by US police man. So still, gender and racial prejudices and discriminations are continuing and it appears to be an unsettling issue all over the world.

On one side, world is developing in all its sense like economy, scientific advancements etc. but on the other side, there are some people, who are still sticking on to unnecessary prejudices and Eurocentric values. This research paper points out how traditional fairy tales like Grimm Brothers' "Little Snow White" can be considered as a tool for the representation of stereotypes and how re-visioned fairy tale like Helen Oyeyemi's novel *Boy, Snow, Bird* can be viewed as a tale, which questions the patriarchal and racist thoughts of the society.

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THE JOURNEY FROM CANDIDATE TO AN EMPLOYEE

Gayathri Mukundan

Faculty Incharge**,** Department of Human Resource Management, L.F. College.

Abstract

This article emphasizes on the beginning of a candidates' journey in an organization until they are placed in their job, becoming an employee. Staffing is a process in HR which initially starts with planning the manpower required till placing the right candidate on the job. A candidate goes through various stages to become an employee in an organization. Recruitment, though a commonly said word is misunderstood as selecting and placing the candidates. Once the candidate is placed in their job role and moves on with induction and orientation process, staffing process or cycle comes to an end. Once this process is complete for one candidate, it begins for another or even another set of candidates. Staffing is a crucial stage in the life of a candidate as well as HR. The measure of employee experience begins with staffing which is an important yardstick for the performance of the HR personnel.

Keywords: Staffing, Recruitment, Selection, Placement, Manpower Planning, Induction, Orientation

Introduction

Every human being wishes their first experience in an organisation to be very smooth. They reach an organisation with high hopes, dreams, and enthusiasm. It is the prime duty of the HR department to fulfil that through effective candidate experience. The main objective

of this article is to understand the various stages of staffing process and to understand the importance of the role of HR. This article is written using empirical research method and contains relevant theoretic data pertaining to the topic. Both employees' and HR's journey will be understood through this article. HR plays a major role in shaping an employee's career from the start. Staffing process includes four major steps or stages beginning with Manpower planning and ends with placement followed by induction/ orientation process. This article also covers the recent trends in staffing and the changes in the process of recruitment occurred due to various technological interventions. To better understand the process, it is important to understand the meaning of staffing or how staffing has been defined. The concept of staffing came about in 1940s during World War II as employees left for war and various positions were vacant. According to Koontz and O'Donnell "the managerial function of staffing involves manuring the organizational structure through proper and effective selection, appraisal and development of personnel to fill the roles designed into the structure."

Staffing is the process of recruiting, selecting, developing, training, promoting and compensating an employee. This article covers the initial few steps of staffing. The journey of a person from being a candidate to becoming an employee of an organisation.

The four steps of staffing:

Manpower Planning – The most important work of HR personnel is to analyse and provide the manpower or the human resource required in a company. Every department will seek the help of HR when it comes to bringing the right talent inside the organisation. An important step involved in manpower planning is ***job analysis***. A process where an HR personnel will gather, synthesize and implement the information available regarding the workforce in the organisation.

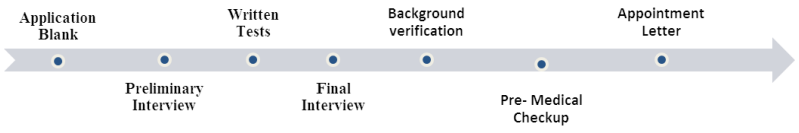
Job analysis includes two steps ***job description*** *(JD)* and***job specification*** *(JS).* JD is a factual statement of the duties and responsibilities of an employee for one particular job and JS is the qualifications and skills required for that particular job. Once JD and JS are clearly defined and understood, its time to move on to the second step of staffing as the number of people required will be explicit.

Recruitment –This is the simple act of attracting potential candidates for a position vacant in an organisation. Though simple, recruitment is the crucial function in an organisation. One wrong talent brought inside the company can hinder the working of the organisation.

Edwin Flippo has defined "Recruitment is the process of searching for potential employees and stimulating them to apply for the jobs." Once HR plans for the manpower required in the company in consultation with the stakeholders, the next step is to invite applications.

There are various sources of recruitment and they are broadly classified as internal and external source of recruitment. The ***internal sources*** include re-employment of former employees, transfers, promotions etc. This is called lateral hiring too. ***External sources*** of recruitment include advertisements, employment exchanges, campus hiring, employee referrals etc. The source of recruitment will be decided based on the needs and demand of the vacancy. If it is mass hiring then organisations prefer advertisements through various print or social medias. Candidates apply to the vacancies based on the position's requirement, they get called by the organisation if their skills and requirements match the vacant position. Once the candidate is shortlisted, then they move on to the next step.

Selection –Once the candidate gets through recruitment process, the process of selection begins. It is essential to select the right candidate from the pool of applicants. Selection becomes vital as this is the stage where find the right fit for the right job. A typical selection process begins with application blank and concludes once the appointment letter is handed over to the candidate.



Application Blank is the first step wherein the candidate fills up the application form with all the details requested by the organisation. The candidates will be scrutinised and shortlisted as per the requirements of the job. Based on this, they will be called upon for ***preliminary interviews.*** These interviews vary from one organisation to another. Few companies conduct online interviews or understand the candidate just by a phone call. This is done when there are a greater number of applicants. The candidates will be assessed on their confidence, interest, skills, attitude etc. Once they are scrutinised on all the said parameters, a ***written test*** is conducted to check the aptitude of the candidate. There are zillion ways to conduct these tests and largely depend on the size and nature of the organisation and also based on the positions that are vacant. Few positions in the higher grades do not require these tests as the candidate will be much experienced person. The skills and knowledge are mainly assessed through these tests and few organisations conduct personality tests also during this round of selection. Apart from these group discussions are also conducted to understand how that candidate will be able to manage in a group and what will be the input given by him to the group. Post written tests, the candidate will be selected on merit basis for the ***final*** round of interview. The final interview is preferably conducted face to face to find out whether the person will be right fit or not. The candidate is very close to the final selection process when he reaches this step of selection. Once the candidate is selected after the final interview, the work of HR becomes evident as there are many more hurdles to cross to bring the candidate into the organisation. A candidate must go through a ***background verification*** process which is mostly done by the security officers within the organisation in case of factories and renowned organisations. There are organisations that outsource this process to a third party. Educational, professional, and personal background is verified during this process. A check on the records of the nearby police stations of the candidate is also done. References from neighbours and relatives are also collected to better understand the conduct of the candidate. Few organisations contact the previous boss of the candidates to understand the loyalty of the employee towards work and to the organisation as well. Once a candidate is cleared with a clean chit on the back-

ground verification, he is advised to do various tests to understand the health status of the employee. A ***pre-medical check-up*** done by the organisation will vary from industry to industry. In factories, acandidate will be selected based on certain criteria of height, weight and other health parameters as given by the Factories Act. This will be different for different types of factories. Other establishments will follow Shops and Establishments act. An official ***appointment letter*** is handed over once the employees cross the final stage of health requirements.

Placement –The process of placing the right person in the right job at the right place is the best meaning given for placement. Placement is the last step of the staffing process. This is followed by induction, orientation, training, transfers, promotions and the life cycle of an employee goes on and on.***Induction*** is the process of introducing the employees and new hires to their job, position, skills that are to be used and the way of work in the organisation. This is different from the process of ***orientation*** which is to give an overall picture to an employee about the business, the organisation's products/ services, their colleagues, the workplace and the responsibilities to be handled by the employee. The employee gets oriented to the way of work and the work environment through a series of induction training. The most important training given to an employee is the initial training as he gets a hold of all the things within the organisation. The major difference between induction and orientation is that the former is a process of introducing new employees to the company and the latter is providing the introduced employee with further information about the company. Placing the right candidate as per their skills and abilities to the right position is another skill that an HR possess. This will boost the morale of the employee thereby leading to the upliftment of the organisation.

The staffing process does not end here, the employee is further taken through the path of career development and he makes a mark in the organisation. An HR personnel becomes the guide to take the employee in the ladder of heights in an organisation. HR person plays a pivotal role in the overall development of the organisation through positive employee experience.

Conclusion: An employee becomes the ambassador or the representative of the organisation they are with. The journey from a candidate to an employee is purely based on the general understanding of the staffing process. My experience as a candidate and as an HR is shortly expressed in this article. This article signifies the role of HR in making the candidate experience blissful. The journey that the candidate goes through in the initial stages of the job marks as the first impression for the employee in an organisation. Every employee will remember their first few steps in an organisation and this article emphasises on the process followed for that experience to be fruitful. Staffing is a hectic process from the point of view of an HR personnel or the organisation. One wrong move can hinder the business overall. Finding the best fit for the job is the task which every HR must master at. Human Resource Management, the term HRM itself signifies the importance of managing the human resources. Placing the right candidate in the right position is a credit that HR will very proudly hold. The different perspectives of staffing is covered in this article. How a candidate understands and goes through the various process and how an HR takes the candidate smoothly till he becomes an employeeis a journey that everyone wishes to go through peacefully. It is the prime duty of an HR personnel to ensure that every candidate gets the opportunity to have a happy and peaceful induction to the company.

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A PSYCHOLOGICAL VENTURE THROUGH THEO FABER IN *THE SILENT PATIENT* AND SHAKUNI IN *MAHABHARATA*

Drisya M.

Assistant Professor on Contract, Department of Functional English,
Little Flower College, Guruvayoor

Abstract

Psycho analysis is a form of therapy which aims to cure mental disorders by investigating the interaction of conscious and unconscious elements in the mind. Sigmund Freud, an Austrian neurologist and the founder of psychoanalysis, introduced it as a clinical method for treating psychopathology through dialogue between a patient and a psychoanalyst. Here, there is an attempt to compare Theo Faber, protagonist of the novel *The Silent Patient* by Alex Michaelides and the epic character Shakuni in the *Mahabharata* through the theory of Psychoanalysis and also to show the motive of their revenge and root cause of their psychopathology.

Theo Faber is the protagonist of the novel but his actions both around the murder of Gabriel and after the reveal show him to be more of an anti-hero or even antagonist. He was a victim of mental frustration, so he wished to cure the people, who are facing similar kinds of problems. Hence the secondary aim of his job is to help people, but at the same time the real motivation was purely selfish, because he was on a quest to help himself. Theo mentions that "We

are drawn to this particular profession because we are damaged - we study psychology to heal ourselves."(Michaelides 17)

'The development of our personality doesn't take place in isolation, but in relationship with another we are shaped and completed by unseen, unremembered forces; namely our parents.' It is exact in Theo Faber's case. He was abused by his father. That negative experience influenced him throughout his life. He does not lead a happy childhood. That unhappiness and torture made him a psycho. In most cases of mental illness, the peoplesuffered a negative experience from their dear and near ones. Hence parents have a very important role in their children's mental and emotional health. In Theo Faber's case, he grew up feeling edgy, afraid and anxious. This anxiety originated in his relationship with his father, around whom he was never safe. Youth is one of the most beautiful times in everyone's life both physically and mentally. but in Theo's case, that childhood experience and trauma haunted him regularly. Hence he was not able to enjoy his youth. Love is an important medicine to cure these kinds of trauma and mental illness. Most of the situations, mental illness is formed by lack of love or the scarcity of love from others. From that lack of love, from the people, who closely related to them made them mentally unstable. In Theo's case, lack of proper love and care from his father and his abusive nature lead Theo to a mental patient. In married life too he faced betrayal from his wife. Love that doesn't include honesty doesn't deserve to be called love. It is true in the case of Theo, because in each stage of his life he faced dishonesty in love from his dear and near ones.

Shakuni was the Prince of the Gandhara Kingdom. He is famed for being one of the pivotal negative character of the Hindu epic, the *Mahabharata*. Shakuni is usually perceived as being wicked, cunning and extremely scheming in fact, he practically masterminded the great war of Kurukshetra. His entire mission was to take revenge for several unjust events that took place in his life or the life of his near and dear ones. He wanted to avenge Gandhara's defeat at the hands of Hastinapur and the way his whole family had to suffer for it. He fumed at Bhishma's insult - when the latter insisted that his sister, Gandhari marry the blind Dhritarashtra. He also wanted to see the Kauravas reigning over the Pandavas and completely defeating

them. A person who desires revenge, and desires the harm of others can only be called Evil. This evil deed of Shakuni is due to the mental struggles and physical struggles experienced by Shakuni. So there is a root story behind these attitudes. Shakuni is also a very intelligent character of *Mahabharata* after Vasudev Krishna. Shakuni was extremely intelligent and equally devious as well. Shakuni worked tirelessly to inject poison in the minds of the Kauravas against their cousins, the Pandavas. In the novel *The Silent Patient* Theo Faber also planned several ways to take revenge on Gabriel for his relationship with Theo's wife Kathy. These kinds of deeds done by the people around Shakuni and Theo Faber negatively affected their psychological level. So the base and root cause of their revenge made them behave as Psychos. One of the important similarities between them is the effect of negative experiences from their father's side. The physical body and mental health are related to each other. Both of them faced physical harassment. That physical harassment negatively influenced their mental health. According to their perspective there are so many reasons for their evil deeds. Those particular reasons made them harm the people around them. Hence no one can blame them once one knows their past. Because they were tortured a lot in their past. That frustration eventually turned to anger directed at all the people who were the reasons for their disasters. Shakuni's sister Gandhari married Dhritarashtra, who was blind. Shakuni was against this marriage. So he decided to take revenge against Bhishma who brought the proposal of marriage. So, Shakuni vowed that he would also end the entire Kuru line. Shakuni poisoned Duryodhana against Pandavas to initiate war.

Gandhari was manglik, hence she was first married off to a goat before being married to Dhritarashtra to overcome the peril of Dhritarashtra a non - manglik. Dhritarashtra heard of this incident much after their marriage and became very angry. According to the view of Dhritarashtra, it is a kind of betrayal done by Gandhari's family to Dhritarashtra. He believed that her secret first marriage technically made him her second husband. It was an insult to Dhritarashtra. Hence as a punishment he decided to put Gandhari's family in prison including king Subala. He decided to gradually starve them to death and therefore each of them was given only one fistful

of rice to eat every day and they knew that they would not live long on this diet. Gandhari's father asked Shakuni to consume all the food given to them, so at least he would survive to avenge their death. In order to make sure that he would forever remember to take revenge, his father twisted his leg and gave him the permanent limp that typically characterises Shakuni. That limp reminds him of the cruelty of Dhritarashtra. Both Shakuni and his father Subala had planned well for the revenge. The pain of that leg injury will regularly haunt Shakuni and that will increase the depth of the revenge but in reality it was an injustice done by Subala to his son. That decision of twisting his leg made Shakuni a handicapped throughout his life. This physical deformity shows the mental deformity too. To work out his plans, Shakuni chose Kauravas as his tools. He kept a record of each and every tortures, humiliations and frustrations in his mind and with a proper plan, he waited for a long time to implement it through Kauravas against the Pandavas. He had a proper plan for revenge. But at that time too, the id is working on him. Id is based on the pleasure principle and for immediate satisfaction and gratification, because of this reason, the id is working. No one is born with an evil mind, the circumstances and the people around them made them negative characters. According to Bhagavad Gita, our own mind acts like an enemy if we do not control it. It is absolutely correct in the case of both Theo and Shakuni. Both lost the controlling power of their mind by their over involvement and dedication to revenge which eventually led them to their own disaster. That is, Theo Faber was arrested and Shakuni was killed by the youngest of Pandavas, Sahadeva. To take revenge, they choose others as their tools. For instance, Theo Faber wanted to take revenge on Gabriel Berenson, the lover of Kathy. To reach him he chose Alicia Berenson, the wife of Gabriel Berenson as his tool, because he can destroy his family life too. In Shakuni's case, his revenge was towards Bhishma and Dhritarashtra. For their disaster, Shakuni considered Kauravas as his tools.

Theo's and Shakuni's justification for these crimes were that they are nothing but justice for the maltreatment, abuses and frustrations they faced in their earlier days. According to them, they got that justice when they fulfil their revenge. But at the end, the two become over confident just like a criminal and that overconfidence

leads them to their own disaster. Id is satisfied when they did it and id is the source of all psychic energy. Theo as well as Shakuni made a proper plan but they needed immediate pleasure by the retaliation and didn't give much thought of the future and after effects of their actions. Their entire mission was to take reprisal and by that they got immediate satisfaction and gratification. Here one can see the influence of id working on them. The ego and superego present in them comes to the forefront in certain circumstances. Ego is based on Reality principle. In Theo Faber's case, he kept everything a secret. He knows that if anyone comes to know about his plan it will negatively affect him. This action is based on his knowledge about reality and society. In Theo Faber and Shakuni, true love was the weakness, that weakness is also a main cause of their recrimination. Psychoanalysis is the study of the human mind. The experiences the people face during their lifetime is reflected in their behaviour. Those experiences and the way the people took those experiences control their personality. Psychoanalytic theory focuses on the role of a person's unconscious as well as early or childhood experiences. Here both Theo Faber and Shakuni have similar kind of negative experiences and when a situation aroused they try to expose that frustrations through violence towards the enemies. Another difference between Theo Faber and Shakuni is Theo's father dislikes him, hence he mentally and physically abused him, but in the case of Shakuni, his father Subala was very fond of him, but he physically damaged him. In reality, his father has done this with a good intention, but that made Shakuni a physically damaged one throughout his life. The physical damage of Shakuni shows his mental damage. Both Shakuni and Theo Faber come to accept their destruction in the form of being arrested for Theo and death for Shakuni.

Every psycho has a base story for their revenge. Once a person become a psycho, that psychic vibration will remain in their unconscious mind for a long time. When an accurate situation arrives that psychic vibration awakens and makes them behave accordingly.

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PURL AS AN INVITATION TO TRANSFORMATION TO GENDER EQUALITY

Jinsa K. Joy

Assistant Professor, Dept. of. Multimedia,L. F. College Guruvayoor

Abstract

This study investigates the portrayal of female transformation in a Society, prominently dominated by male ambience. The study exposes male domination in society by the use of a mirror that is the film, PURL, an animation movie produced for Pixar SparkShots. In this programme pixar studio's employees were given limited budgets to produce animated short films within six months duration. These films were originally released on pixar's YouTube channel. Kristen Lester wrote the screenplay and directed it. It reflects her own experience in the male-dominated media industry on her arrival in it as the first female apprentice.

Key words: ,animation,film industry,gender,gender equality,male domination,female,social space,gender discrimination.

Introduction

Purl is an animation movie on the struggle for gender equality in the film industry, especially in the animation industry. The film industry is a male-dominated area,but nowadays many female artists find out their own space in the film industry. This animation movie depicts a clear picture of male domination.The film concept coming from

Kristen Lester ,the director of movie and a female director of the Purl Animation Movie. The Purl animation movie is a one of the strong response to the male-dominated film industry. The director's ambition is to open up the filmmaking industry to women as well as males. Kristen Lester created a lovely animated film to accomplish this purpose. 'Purl' advocates for gender equity in the workplace, particularly in the film industry. The research focuses on the stages of gender discrimination change in the BRO Company of the PURL Animation movie. Kristen Lestern, the film's director, creates a new door for female professionals in the animation film industry. The notable milestone of gender equity in the Animation Movie Industry is the fresh beginning of this danger task. Kristen Lester's initiative in the film industry is highly inspiring. The film exposes the various forms of casual sexism in the workplace. Gender discrimination is prevalent in society, particularly in workplaces where men and women cowork. The film explores the potential of this harassment, as well as the transition from gender variety to gender equality.

Kristen Lester

Kristen Lester is an American director, story artist and writer. She is a specialist in story boarding, character designing, colour scripting, environment and prop design as well as in writing stories. The film, 'Purl' was created, written and directed by Kristen Lester, who said the film is based on her own experiences working in animation. "My first job, I was like the only woman in the room, and so in order to do the thing that I loved, I sort of became one of the guys. Lester says. "This idea of shape-shifting and 'knitting new personas' was something I thought could be a cool metaphor." At her early jobs, Lester says she had to do little things, like self-edit her conversations around her male colleagues, to fit in. One example was avoiding referencing films that she feared were viewed as "too girly"(1)

PURL

Kristen Lester's short film "Purl" explores a wide range of issues in a short amount of time. Purl, a computer-animated short film directed and written by Kristen Lester, was presented in 2018. Pixar Animation Studios created the film, which was distributed by Walt Disney Studios Motion Pictures. Several issues are explored in the

film, including gender masculinity, female battle against male-dominated fields, and feminine empathy with their own gender.)"Purl, a pink ball of yarn, is the main character. She joins an all-male start-up firm called B.R.O. Capital and struggles to fit in. She's treated as an outcast because she's different and her disposition and ideas don't align with the "bros.(2) It becomes tough for her to fit in with the company. She adapts after great effort on her part. She changes and gains acceptance. When Purl arrives at work in B.R.O. Capital, she notices that her coworkers are ignoring her. A company image allows her to observe the nature of the company. She notices their clothing style, hairstyle, and the way they speak. She embraces new ways. She is soon welcomed into their company. Lacy, another yellow ball of yarn, is a new employee who is similarly alienated in the same way. Purl understands her plight. Purl soon discovers that changing one's ways is meaningless. She reverts to her previous habits. Finally, the office has a happy coexistence of balls of yarn and men.

Methodology

The researcher adopts the method of descriptive analysis of the film in this study. The film is viewed as life writing by the writer as well as a mirror reflecting her experience. A thorough analysis of the film is done in the context of female marginalization in male-dominated work places.

Purl is a Journey to Gender Equality

'Purl', Disney, and Pixar's excellent short film sends an important message about gender equality in the workplace. Purl has an essential message for us in the post-#Me-too era. The only way a woman's dignity is damaged is through sexual harassment. The unrecognized sexism adds to the alienation of women and the deprivation of opportunity to them. Purl is a resilient force that dares to dream differently and nudges every woman to do the same. The bro culture does not care to accommodate women, with their "annoying gossip, high-pitched squeals, and sad weakness," It is founded on extremely erroneous and stereotyped conceptions of masculinity and femininity. Purl overcomes these situations and she behaves like one of them. She makes resistance against the male-dominated culture with the help of imitating their mannerisms. Purl studies and develops their

professional mannerisms. She has to mould her personality to become more like her colleagues to be acceptable – something a lot of successful women do. Purl does not provide clear answers on how to create an inclusive workplace environment for women, but it does raise some crucial questions. Purl is forced to make a difficult decision when a new ball of yarn, Lacy, joins the squad. Should she open the doors for others to follow her example after successfully infiltrating the boys club? Should she continue to receive the rewards while the rest of the women suffer? The solution is obvious. Nowadays people should teach young girls that the world is theirs to conquer, yet one of their most difficult challenges is typically a group of man-children who refuse to accept them into their cliques. Purl is a tenacious force who dares to dream unconventionally and encourages others to do the same.

Purl, the Challenging Female against Male Domination

It's an attempt by Pixar, which has a reputation for being "Hollywood's boys' club," to look inward. Pixar's notoriety didn't rise to the fore until the sexual harassment charges against its now-fired CEO, John Lasseter, were revealed. In truth, the firm has a history of having a toxic work climate, with a shortage of female animators and tales featuring female characters. Kristen Lester, the film's director, has revealed that the picture was influenced by her own experiences as an animator. The dominance of bro culture at work is just one of many ways toxic masculinity expresses itself. It serves as an exclusionary mechanism, relegating women to the margins. Several contemporary workplaces provide a microcosmic illustration of how patriarchy and toxic masculinity function in the larger context. Pixar's short film Purl is a commentary on bro culture that thrives in workplaces. It is a story that most working women today know all too well, where they devise ways to be "accepted" in offices often dominated by men. (3) Casual sexism, which often goes unrecognized, adds to the separation and exploitation of women. BRO company maintained many gender discriminations. The film 'PURL' reveals this idea very strongly. she is the only female worker in the office and if she doesn't act the way her co-workers do, she won't be heard. "The Pew Research Centre came out with a study last year that found that male-dominated companies report higher rates

of female discrimination. It stated that women are less likely to be treated fairly"

Transformation of the Social Space

Purl, a pink-colored ball of yarn, arrives at B.R.O. Capital. She is dressed plainly and has simple manners. She is thrilled with her new position. Purl was greeted coldly on her first day at work. Nobody seemed to be paying attention to her. She learns about the firm's nature from an image. She is familiar with its personnel's dress, habits, and voice. Purl switches to them and is accepted into the gang. Purl turned her physical appearance and mannerisms into the BRO company status. Sometimes following Purl's makeover, a fresh joyfully enthusiastic hire named Lacy joins B.R.O. Lacy is a yellow-coloured ball of yarn that newly joined the start-up company named B.R.O. Capital. She got Purl's early situation from the BRO company. Purl understands the Yarn situation. She suffers gender discrimination from the BRO company. Purl helps her situation and she gives her support and courage to overcome these lonely circumstances. Purl's constant support is a stepping stone in the yarn's life. Purl's empathetic nature towards Yarn is a strong motivation for her professional life in the BRO company. She helps Lacy to achieve her dreams in this male-dominated field. Purl's transformed life is the witness of the BRO company and they also welcome other yarns in the company. Purl's determination succeeds.The office is filled with dozens of brightly coloured yarn balls working cheerfully alongside the now-enlightened guys in the film's happy finale. Nonetheless, there is a visible difference in the men: they are more racially diversified. That was no accident. Lester says. "I wanted to portray the world as it could be. A world where people – and yarn balls – of all different shapes and sizes could work together to make something great."(4)

Conclusion

The study brings out the fact that it is the responsibility of the women themselves to work for equality with men. They should get the awareness that they are equal to men with their own diversity. No need to imitate men to become acceptable and successful. Males and Female are created with complimentary diverse skills, abilities,

chemistry, biology, language and socio-cultural dynamics. Losing one's own identity to become acceptable is not advisable. Purl's first step was adaptation with the male counterparts, totally losing her identity. Later she realises that she is not happy with this masquerade. Then she returns to her authentic self and works for herself actualisation. Thus she becomes a source of inspiration for other marginalised especially women. Lots of balls of yawns representing women enter the B.R.O capital and a workspace of men and women happily coexists thereafter.

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