Volume 9, Issue 4(6), April 2020

International Journal of Multidisciplinary Educational Research

Published by
Sucharitha Publications
Visakhapatnam
Andhra Pradesh – India
Email: victorphilosophy@gmail.com
Website: www.ijmer.in

Editorial Board

Typeset and Printed in India
www.ijmer.in

IJMER, Journal of Multidisciplinary Educational Research, concentrates on critical and creative research in multidisciplinary traditions. This journal seeks to promote original research and cultivate a fruitful dialogue between old and new thought.

C O N T E N T S

Volume 9 **Issue 4(6)** **April 2020**

Dr. K. VICTOR BABU

M.A.,M.A.,M.Phil.,Ph.D.,PDF, (D.Lit)

Associate Professor, Institute of Education & Editor-in-Chief
International Journal of Multidisciplinary Educational Research (IJMER) & Sucharitha: A Journal of Philosophy and Religion
Mettu University, Metu, Ethiopia.

IJMER

ISSN : 2277 – 7881
Impact Factor :6.514 (2020)
Index Copernicus Value: 5.16

2277 - 7881

JISRA F

Editorial……

It is heartening to note that our journal is able to sustain the enthusiasm and covering various facets of knowledge. It is our hope that IJMER would continue to live up to its fullest expectations savoring the thoughts of the intellectuals associated with its functioning .Our progress is steady and we are in a position now to receive evaluate and publish as many articles as we can. The response from the academicians and scholars is excellent and we are proud to acknowledge this stimulating aspect.

The writers with their rich research experience in the academic fields are contributing excellently and making IJMER march to progress as envisaged. The interdisciplinary topics bring in a spirit of immense participation enabling us to understand the relations in the growing competitive world. Our endeavour will be to keep IJMER as a perfect tool in making all its participants to work to unity with their thoughts and action.

The Editor thanks one and all for their input towards the growth of the **Knowledge Based Society**. All of us together are making continues efforts to make our predictions true in making IJMER, a Journal of Repute

Dr.K.Victor Babu
Editor-in-Chief

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY EDUCATIONAL RESEARCH
ISSN:2277-7881; IMPACT FACTOR :6.514(2020); IC VALUE:5.16; ISI VALUE:2.286
Peer Reviewed:VOLUME:9, ISSUE:4(1), APRIL :2020

MORATORIUM UNDER INDIAN INSOLVENCY REGIME

Dr. Binoy J. Kattadiyil
ICSI IIP, an IPA of IBBI
New Delhi

CS Swati Agarwal
ICSI IIP, an IPA of IBBI
New Delhi

Introduction

Insolvency and Bankruptcy Code, since its inception has enumerated various concepts. One such concept enumerated is the concept of 'MORATORIUM' which is considered as the most important aspect of the Corporate Insolvency Resolution Process (CIRP).One of the goals of having an insolvency law is to ensure the suspension of debt collection actions by the creditors, and provide time for the debtors and creditors to re-negotiate their contract.[1]This requires a moratorium period. It was observed that the moratorium period was very much necessary for the corporate debtor so as to evaluate the possible option and ways for revival of the stressed entity. The Code explains that once the petition filed against a company is admitted by the Adjudicating Authority a moratorium is imposed on that company. The term 'Moratorium' is not defined in the Code, however it can actually be described as the time period where no judicial proceedings can take place against the Corporate Debtor for recovery of enforcement of security interest, sale or transfer of assets, or termination of essential contracts can be instituted or continued against the Corporate Debtor.

Purpose of Moratorium

The purpose of Moratorium is protecting the assets of the Corporate Debtor during CIRP and ensuring timely completion of the insolvency resolution procedure by continuing to keep the company as going concern. Moratorium not only puts a stay on the pending proceedings it also bars the Board of Directors of the company from the pulling out the finances available. Non declaration of the moratorium would lead to failure of the achievement of the objective of the code as creditors would resort to individual enforcement action for their debt.

Provisions under the Code[2]

Section 13(1) (a) of the Insolvency and Bankruptcy Code enables the Adjudicating Authority to impose moratorium on the Corporate Debtor. Section

[1]https://ibbi.gov.in/BLRCReportVol1_04112015.pdf
[2]https://ibbi.gov.in//uploads/legalframwork/547c9c2af074c90ac5919fa8a5c60bd4.pdf

14 of the Code lays down the purpose for declaration of the same prohibiting various actions on the Corporate Debtor.

Section 14 (1) of the Code prohibits the following on declaration of moratorium:

- The institution of suits or continuation of pending suits or proceedings against the corporate debtor including execution of any judgement, decree or order in any court of law, tribunal, arbitration panel or other authority.
- Transferring, encumbering, alienating or disposing off by the corporate debtor any of its assets or any legal right or beneficial interest therein.
- Any action to foreclose, recover or enforce any security interest created by the corporate debtor in respect of its property including any action under the Securitisation and Reconstruction of Financial Assets and Enforcement of Security Interest Act, 2002
- The recovery of any property by an owner or lessor where such property is occupied by or in the possession of the corporate debtor

Code provides an explanation w.r.t. Section 14(1) that notwithstanding anything contained in any other law for the time being in force, a licence, permit, registration, quota, concession, clearance or a similar grant or right given by the Central Government, State Government, local authority, sectoral regulator or any other authority constituted under any other law for the time being in force, shall not be suspended or terminated on the grounds of insolvency, subject to the condition that there is no default in payment of current dues arising for the use or continuation of the license or a similar grant or right during moratorium period

Section 14 (2) states that the supply of essential goods or services to the corporate debtor as may be specified shall not be terminated or suspended or interrupted during moratorium period.

As per Section 14 (2A) where IRP/RP considers the supply of goods or services critical to protect and preserve the value of the corporate debtor and manage the operations of such corporate debtor as a going concern, then the supply of such goods or services shall not be terminated, suspended or interrupted during the period of moratorium, except where such corporate debtor has not paid dues arising from such supply during the moratorium period or in such circumstances as may be specified.

Section 14 (3) provides that prohibition of actions mentioned in Section 14(1) shall not apply to:

- Such transactions, agreements or other arrangement as may be notified by the Central Government in consultation with any financial sector regulator or any other authority.
- A surety in a contract of guarantee to a corporate debtor.

The order of moratorium shall have effect from the date of admission of the Insolvency Resolution Process of the Corporate Debtor till the completion of the corporate insolvency resolution process.

Provided that where at any time during the corporate insolvency resolution process period, if the Adjudicating Authority approves the resolution plan under sub-section (1) of section 31 or passes an order for liquidation of corporate debtor under section 33, the moratorium shall cease to have effect from the date of such approval or liquidation order, as the case may be.

Punishment on breach of Moratorium

Section 74 of the Code deals with the punishment for contravention of moratorium. When a Corporate Debtor or any of its officers or be it a creditor violated the provisions of Section 14 or knowingly or wilfully committed or authorised or permitted such contravention shall be punished in the following manner:

Officials of the Corporate Debtor	Creditors
Imprisonment for a term of atleast 3 years, which can be extended to 5 years Or Fine of atleast one lakh rupees, which can extend to three lakh rupees Or With both fine and imprisonment	Imprisonment for a term of atleast 3 years, which can be extended to 5 years Or Fine of atleast one lakh rupees, which can extend to one crore rupees Or With both fine and imprisonment

Concept of Interim Moratorium

Part III of the Insolvency and Bankruptcy Code throws light on the concept of interim- moratorium. As per Section 81(1), if a debtor files an application for fresh start, an interim-moratorium shall commence on the date of filing of said application in relation to all the debts and shall cease to have effect on the date of admission or rejection of such application, as the case may be. Similarly, Section 96 provides that whenever a debtor or a creditor files for the insolvency resolution process under this part of the code, an interim-moratorium shall commence on the date of the application in relation to all the debts and shall cease to have effect on the date of admission of such application during the interim- moratorium period:

— Any pending legal action or proceeding in respect of any debt shall be deemed to have been stayed; and
— The creditors of the debtor shall not initiate any legal action or proceedings in respect of any debt.

Moratorium shall commence from the date of the admission of the application. However, Part III of the Code relating to fresh start process and the insolvency resolution process of individuals and partnership firms is yet to be notified. Interim-moratorium basically applies on the debts.

Part II of the Code under Section 14 which deals with Corporate Insolvency Resolution Process of the Corporate Debtors does not talk about interim-moratorium. There is no concept of interim-moratorium being imposed on application filed by the Operational Creditor, Financial Creditor or Corporate Debtor itself. Moratorium is imposed only on admission of the application.

Findings related to Moratorium

The Adjudicating Authority (NCLT) and the Appellate Authority (NCLAT) along with the Apex Court (Supreme Court) of India have taken a lot of decisions and passed a lot of orders discussing the application of moratorium and its impact on other laws.

The following table shows the orders passed by the decision making authorities regarding Resolution Plans since the inception of the Insolvency and Bankruptcy Code:

Date of Order	Case	Finding/Ruling
14-09-2017	Canara Bank Vs. Deccan Chronicle Holdings Limited	Moratorium will not affect any suit or case pending before the Hon'ble Supreme Court under Article 32 or where an order is passed under Article 136 or the power of the High Court under Article 226.
23-10-2017	Alchemist Asset Reconstrution Company Ltd. Vs. M/S. Hotel GaudavanPvt. Ltd. &Ors.	Hon'ble Supreme Court held that after moratorium under Sec. 14 come into effect, arbitration proceedings cannot start or continue against the Corporate Debtor.
08.02.2018	Dakshin Gujarat VIJ Company Ltd. v. M/s. ABG Shipyard Ltd. &Anr	An order of Moratorium will not apply to payment of current charges payable by the Corporate Debtor for supply of Essential Goods and/or Services.
02.05.2018	ICICI Bank Ltd. v. Vista Steel Pvt. Ltd.	An order of Moratorium is applicable to proceedings pending before any court against the CD or Guarantor, but not applicable to filing of an application for triggering CIRP against a Corporate

		Guarantor or Personal Guarantor.
24.07.2018	GAIL (India) Limited v. Rajeev Manaadiar&Ors.	"Security Interest" does not include "Performance Bank Guarantee" given by Corporate Debtor and can be invoked by the Creditor during the moratorium period.
31.07.2018	Shah Brothers IspatPvt. Ltd. v. P. Mohanraj&Ors.	An order of moratorium will not cover or apply to a criminalproceeding initiated under Section 138 of Negotiable Instruments Act, 1881.
01.05.2019	Ranjit Kapoor and Others v. Hemant Sharma and Others Yajur International Private Limited v. Hemant Sharma, Resolution Professional of White Metals Limited	Any payment to Operational Creditors by Corporate Debtor after order of moratorium & before joining of Resolution Professional is in violation of provisions of Section 14, IBC.
02.05.2019	VarrsanaIspat Limited Through the Resolution ProfessionalMr. Anil Goel v. Deputy Director, Directorate of Enforcement	Section 14, IBC cannot give protection from criminal proceeding or any penal action involving imprisonment to an individual which may include the ex-director /shareholder of Corporate Debtor, relate to different field having no overriding effect of one Act over the other including Insolvency and Bankruptcy Code.
02.05.2019	Prasad Gempex v. Star Agro Marine Exports Ltd. &Anr.	Notwithstanding an order passed under Section 31, IBC, it is openfor a person to file a suit or an application against the CD after completion of Moratorium Period, in accordance with Section 60(6), IBC.
12-02-2019	Sterling Sez Infrastructure Ltd. v. Deputy Director, Directorate Of Enforcement, Prevention of Money Laundering Act	No attachment can be ordered under the Prevention of Money Laundering Act, 2002 with respect to the assets of the Corporate Debtor undergoing insolvency process.

International Perspective of Moratorium

- US Bankruptcy Code[3]

As per Sec 362 (a) of the US Bankruptcy Code, immediately on filing of Bankruptcy petition, an automatic stay or moratorium is imposed staying all litigation and prevents the enforcement of judgements and of security without leave of the court. The stay is imposed on:

— The commencement or continuation, including the issuance or employment of process, of a judicial, administrative, or other action or proceeding against the debtor that was or could have been commenced before the commencement of the case, or to recover a claim against the debtor that arose before the commencement of the case.

— The enforcement, against the debtor or against property of the estate, of a judgment obtained before the commencement of the case.

[3]https://www.law.cornell.edu/uscode/text/11/362

— Any act to obtain possession of property of the estate or of property from the estate or to exercise control over property of the estate.
— Any act to create, perfect, or enforce any lien against property of the estate.
— Any act to create, perfect, or enforce against property of the debtor any lien to the extent that such lien secures a claim that arose before the commencement of the case under the code.
— Any act to collect, assess, or recover a claim against the debtor that arose before the commencement of the case.
— The setoff of any debt owing to the debtor that arose before the commencement of the case against any claim against the debtor; and
— He commencement or continuation of a proceeding before the United States Tax Court concerning a tax liability of a debtor that is a corporation for a taxable period the bankruptcy court may determine or concerning the tax liability of a debtor who is an individual for a taxable period ending before the date of the order for relief.

On request of a party in interest and after notice and a hearing, the court shall grant relief from the stay provided, such as by terminating, annulling, modifying, or conditioning such stay for causes mentioned in Section 362(d).
Further, the Code gives debtor under Section 1121 right to file a plan of reorganization for 120 days from the relief order granted. The period of 120 days may not be extended beyond a date that is 18 months after the date of the order for relief. In most instances the debtor company will first take actions to stabilize its operations and formulate its business plan and thereafter proceed to formulate a plan of reorganization.[4]

Conclusion

The Code provides for the creation of a calm period for creditors and debtors to negotiate the viability of the entity. In the calm period a regulated insolvency professional controls the assets under the supervision of an adjudicating authority. The motivation behind the moratorium is that it is value maximising for the entity to continue operations even as viability is being assessed during the insolvency resolution process.[5] Thus, it can be said that moratorium is that calm period under the insolvency code which might give a new life to the Corporate Debtor by protecting it against all odds.

[4]https://www.jonesday.com/files/Publication/1ec093d4-66fb-42a6-8115-be0694c59443/Presentation/PublicationAttachment/e5b46572-7aeb-4c34-ab2e-bee2f8f3d3c2/Comparison%20of%20Chapter%2011%20(A4).pdf
[5]https://ibbi.gov.in/BLRCReportVol1_04112015.pdf

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY EDUCATIONAL RESEARCH
ISSN:2277-7881; IMPACT FACTOR :6.514(2020); IC VALUE:5.16; ISI VALUE:2.286
Peer Reviewed:VOLUME:9, ISSUE:4(1), APRIL :2020

HOUSEHOLD SAVINGS IN INDIA: AN ECONOMIC ANALYSIS

Anila.C
Assistant Professor (Research Scholar)
Department of Economics
Sree Keralavarma College
Thrissur, Kerala

Dr.KM Francis
Associate Professor (Retd)
Department of Economics
St.Thomas College (Autonomous)
Thrissur

Dr Sabu PJ
Assistant Professor
Department of Economics
St.Thomas College (Autonomous), Thrissur

Abstract
Saving and investment are important drivers in fastening the growth process. In a developing country like India Gross Domestic Saving plays a vital role in accelerating the growth process and achieving higher levels of development. Savings are generated from the public sector and private sector and domestic savings play a critical role in augmenting capital accumulation. The composition and pattern of domestic savings play a key role in understanding the growth process of the economy. In Indian economy the household sector plays a dominant role by generating the major share of Gross Domestic Savings. Household savings provide a cushion of wellbeing to the individuals and at the same time provides fund for the nation's development process. Household savings are typically in the form of physical and financial assets, and there has been a major shift in the composition of household savings from financial savings to physical savings. The changes in the household sector savings have direct influence on the Gross Domestic Product and as such its momentum has to be maintained with appropriate economic policy measures.

Key Words: Economic growth, Gross Domestic Saving, Household savings, Physical Assets, Financial Assets.

Introduction
The development of a nation's productive capacity requires capital formation which can be done either by utilizing domestic resources or through external assistance. Domestic resources especially saving and investment propensities play a dominant role in achieving economic growth and development. Economic history suggests that countries that were able to accumulate high levels of domestic investment largely financed by domestic saving achieved

faster rate of economic growth. As such savings is a prerequisite in taking the economy to higher strata's of growth. Saving has been defined by CSO as "The excess of current income over current expenditure and is the balancing item on the income and outlay accounts of producing enterprise and households, government administration and other final consumers". The role of domestic saving and domestic investment in promoting economic growth has received considerable attention in India and also in many countries around the world. In India saving rate has steadily increased over time and economic planners has emphasized on saving and investment as the primary instruments of economic growth and increase in national income. The secular uptrend witnessed in domestic growth is clearly associated with the consistent trends of increases in domestic savings.

Significance of the study

In India the household sector contributes a lion's share of the total savings generated. This sector plays a vibrant role in pooling savings, generating liquidity and thereby enhancing the financial wellbeing of the economy. Household income, its distribution to expenditure and savings are very important for economic analysis as it supply the economic resources to the firm and receive payments in terms of money and this money is spent by households on goods and services produced by them. These factors have an important role in determining the nature and rate of economic growth. There is a need to pay more attention to the changing composition of savings and the role that the structure of savings plays in determining the kinds of investments that will be financed by incremental savings. An insight into the composition and pattern of household savings has a significant relevance in determining the economy's growth path.

Objectives of the study

1. To study the composition of savings in India
2. To analyse the pattern and growth of household savings in Indian economy.

Data source and Methodology

The study is descriptive and is based on secondary data collected from various sources like Reserve Bank of India publications, Economic Review, MOSPI and various websites. Simple statistical tools are used for data analysis.

Composition of Saving

For the estimation of domestic savings, the whole economy is divided into two parts - Public Saving and Private Saving. Private Saving is further divided into two parts; those are Household Saving and Corporate Saving. In India household sector occupies a position of dominance over other institutional sectors like Private corporate sector and Public sectors in terms of generating

savings. Savings by individuals are important both for personal and financial wellbeing. Household savings is defined as the difference between a household's disposable income and its consumption of goods and services. The saving of the private corporate sector constitutes the net saving of non-government, non-financial companies, private financial institutions and cooperative institutions as revealed from the profit and loss accounts placed in the balance sheet of these companies. The saving of public sector includes the net savings of both departmental and non-departmental enterprises and savings of administrative departments shown as the excess of current receipts over current expenditures of the government. While India's saving rates have steadily increased over time, their composition has undergone a considerable change.

Trend in Domestic Savings

In India domestic saving has been considered as one of the major sources of capital formation _ From the inception of economic planning , the planners have targeted to achieve a self-reliant and self-sustaining economic growth by achieving a sharp increase in the saving and investment rates. The table below shows the composition of various sectors towards Gross Domestic Saving as a percentage of GDP since 2000-01 to2017-18.

Table-1
Gross domestic saving (as per cent of GDP)

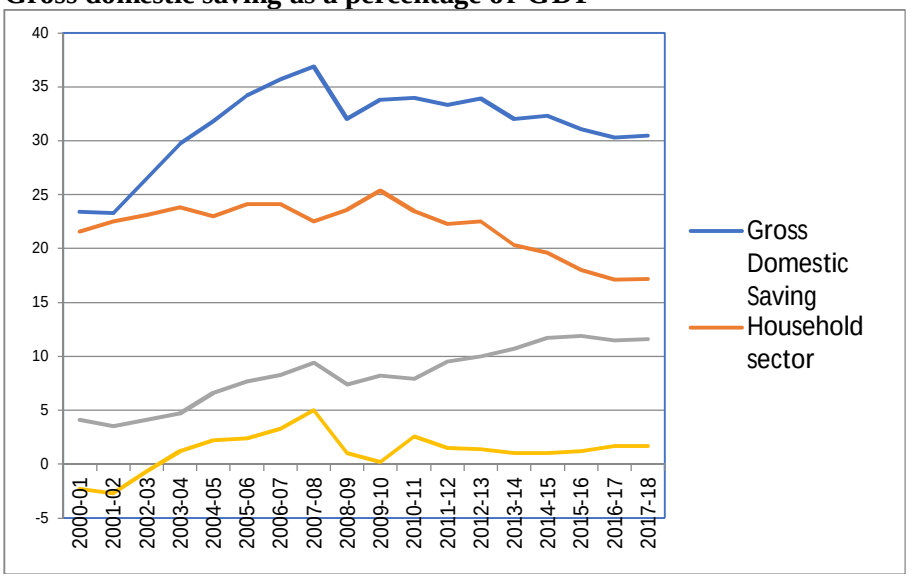
Gross Domestic Saving				
Year	Household sector	Private Corporate sector	Public sector	Total
2000-01	21.6	4.1	-2.3	23.4
2001-02	22.5	3.5	-2.7	23.3
2002-03	23.1	4.1	-0.7	26.5
2003-04	23.8	4.7	1.2	29.7
2004-05	23	6.6	2.2	31.8
2005-06	24.1	7.7	2.4	34.2
2006-07	24.1	8.3	3.3	35.7
2007-08	22.5	9.4	5	36.9
2008-09	23.6	7.4	1	32
2009-10	25.4	8.2	0.2	33.8
2010-11	23.5	7.9	2.6	34
2011-12	22.3	9.5	1.5	33.3
2012-13	22.5	10	1.4	33.9
2013-14	20.30	10.70	1.00	32
2014-15	19.60	11.7	1	32.3
2015-16	18	11.9	1.2	31.1
2016-17	17.1	11.5	1.7	30.3
2017-18	17.2	11.6	1.7	30.5

Source-RBI Bulletin

In the initial phases of planning Indian economy exhibited a very slow progress in the growth of Gross Domestic Savings. The saving rate has exhibited an upward trend with some mild intermittent escalations over the period. During

the period of 2000-01 the GDS was 23.4 and it gained momentum during the later periods and reached a high value of 36.9 in 2007-08. But in the next period it dropped about 4 per cent mainly due to the global recessionary factors that was prevalent during that time. In the latter periods the economy mildly regained and showed a slow progress but again started dipping and is only 30.5 per cent during 2017-18. The major share of Gross domestic savings is generated from the household sector and it showed a mild progress in the initial period but later a decline and reached 17.2 in 2017-18. This decline is reflected in the saving rate of the economy. The share of the private corporate sector increased from2000-01 peaked in 2007-08, declined and again exhibited a mild revival from 2011-12 onwards. In contrast to the private sector, public sector exhibited negative trend from 2000-03 after that a very slow progress is seen but contributes only a very meager share. This clearly shows the vibrant role played by the household sector and the dip in this sector has to be rectified along with significant increase to capital expenditure by government and more flow from the private corporate sector. The slowdown in the household sector needs to be addressed and measures should be taken to increase the savings especially of upper and middle class income group.

Figure-1
Gross domestic saving as a percentage of GDP



Physical and Financial savings of households

The savings of the household sector comprises of both physical assets and financial assets. Household saving in financial assets is estimated as gross financial assets net of financial liabilities, while household saving in physical assets is the net addition to physical assets by the households. Physical savings refers to that part of the income kept by the people in the form of gold, physical assets like land etc. A physical asset is an item of economic, commercial, or exchange value that has a material existence. Net addition to physical assets of the households, comprises of investment in fixed assets of construction and machinery & equipment, and change in stocks. . A financial asset is a liquid asset that gets its value from a contractual right or ownership claim. The investment in financial assets comprises of currency, net deposits, shares, debentures , net claims on government in the form of small saving, investment in government securities, life insurance funds and provident and pension funds.

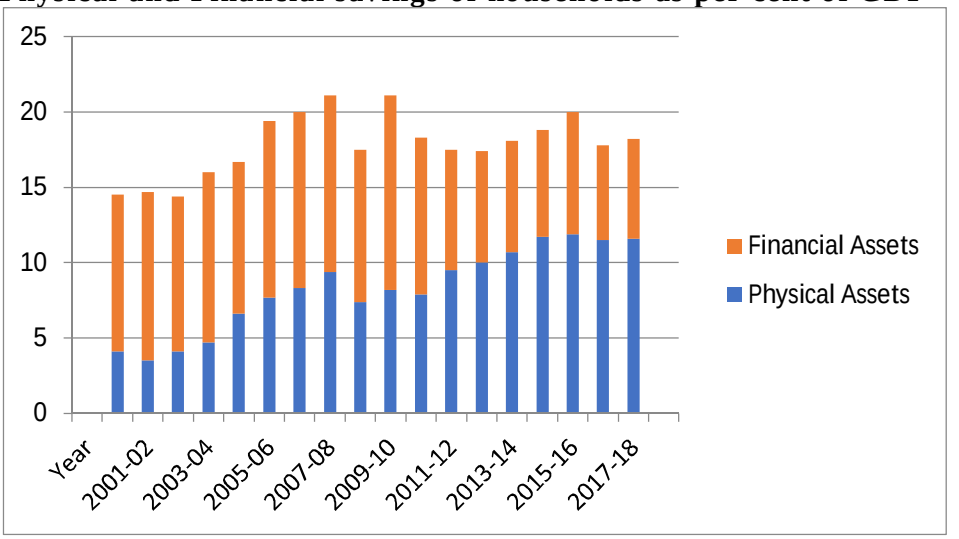
Table-2

Physical and Financial savings of households as per cent of GDP

Year	Physical Assets	Financial Assets
2000-01	4.1	10.4
2001-02	3.5	11.2
2002-03	4.1	10.3
2003-04	4.7	11.3
2004-05	6.6	10.1
2005-06	7.7	11.7
2006-07	8.3	11.7
2007-08	9.4	11.7
2008-09	7.4	10.1
2009-10	8.2	12.9
2010-11	7.9	10.4
2011-12	9.5	8
2012-13	10	7.4
2013-14	10.70	7.40
2014-15	11.7	7.1
2015-16	11.9	8.1
2016-17	11.5	6.3
2017-18	11.6	6.6

Source-RBI Bulletin

Figure-2
Physical and Financial savings of households as per cent of GDP



The composition of household saving during the period shows the variations in the preference pattern of households towards physical and financial assets. In the initial phase from 2000-04 percentage share of physical assets was considerable less when compared to that of financial assets that exhibited a higher percentage roughly about eleven per cent while physical savings was around three to four percent. Later the preference towards physical assets showed an increasing trend and its percentage share increased above the financial assets from the period of 2011-12 onwards. The dominance of physical assets are due to several reasons like lower returns on financial savings, perception of safety, risk factors, easy availability of loans etc. Higher preference for physical assets, among other things, has resulted in lower penetration of financial products. Lower financial savings by households is a reflection in their shrinking share of gross national savings. Even though Indians have a preference towards bank deposits, insurance products and gilt edged securities, still gold and real estate play an important place due to various social and cultural needs and aspirations. There is a need for more financial penetration and households should hold diversified portfolio by incorporating more financial products. The drop in financial savings reduces liquidity and reduces the flow of funds towards investment activities.

Conclusion

To lead the economy through its path of development rate of domestic savings must be enhanced. Higher domestic savings helps in the growth of the economy and also attracts foreign investment which paves way for long run development. In Indian economy household sector is the most dominant sector that contributes to Gross Domestic Savings as such saving potential of the household sector must be properly utilized. It was the result of high domestic saving rate that Indian economy stand strong during the global recession. The financial inclusion measures must penetrate more into the economy and the financial savings of the households must be accelerated so that more fund flow and liquidity will take place. Thus to achieve higher rate of growth with relative price stability, propensity to save should be enhance through proper policies and incentives.

References

- Verma R (2007) “Savings, investment and Growth in India “South Asia Economic Journal, Vol 8, No-1, pp 87-98
- Umesh HS, Neelakanta BC (2017),”Sector wise Domestic Household Savings in India: An Economic Analysis”, International Journal of Information Movement”, Vol 2, Issue 1, pp 9-15
- SEBI Report-How Households Save and Invest: Eviidence from NCAER Household Survey.
- RBI Bulletin.

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY EDUCATIONAL RESEARCH
ISSN:2277-7881; IMPACT FACTOR :6.514(2020); IC VALUE:5.16; ISI VALUE:2.286
Peer Reviewed:VOLUME:9, ISSUE:4(1), APRIL :2020

ANALYSING TECHNIQUES OF SAMUEL BECKETT IN KRAPP'S LAST TAPE

Dipesh Patel
Teaching Assistant
Department of Comparative Literature
Veer Narmad South Gujarat University, Surat, Gujarat, India &
Research Scholar
Department of English
Veer Narmad South Gujarat University, Surat, Gujarat, India

Abstract

Samuel Beckett is one of prominent literary figure of the 20th century. He inspired the whole generation of playwrights with his artistic creativity and his use of various techniques to highlight the theme of existentialism in his plays. This paper tries to examine Samuel Beckett's playwriting techniques in his play Krapp's Last Tape. The play also deals with the themes of time, existentialism, and shows the absurdity of human life similar to Beckett's other famous plays.

Keyword: Samuel Beckett, Absurd, Techniques, Existentialism, Krapp's Last Tape

The play was written in English early in 1958 for the Northern Irish actor Patrick Magee, who had delighted Beckett with his third program readings of abstracts from Molloy, Malone Dies and From an Abandoned Work. We might, then, accept that it was Magee's readings themselves that directed Beckett to use theseideas for a dramatic monologue. The manuscript's original draft is dated 20th February1958 and is titled 'Magee Monologue'. The play was first issued in Evergreen Review in summer 1958 and it was first enacted on 28th October 1958 at Royal Court Theatre, London, with Endgame.Krapp was played by Magee and was directed by DonaldMcwhinnie. These two also cooperated in a television telecast, first shown in Thirty Minute Theatre on BBC2 on 29th November 1972.

The play was primarilyacknowledged as a minor dramatic masterpiece. Writing in the December 1958 issue of Twentieth Century, Roy Walker sensed that "the soliloquy has found, for first probably the last time, a form which combines the immobile mask and the mobile face, mime and speech, monologue and

dialogue, and offers all their various resources to one performer". (McDonald 24)

Summary of the play

Krapp sits at his desk but is fronting away from it. On the desk are boxes holdingrolls of recorded tapes, a reel-to-reel tape recorder, and a microphone. Later sitting for a moment, Krapp gets up and examines his pockets for his keys. Then he looks through his desk until he discovers a banana, which he peels. Throwing the peel on the floor, he puts the banana in his mouth however does not bite or chew it. After a moment of quietness, he starts to walk while having the banana.

After nearly slipping on the castoff peel, he kicks it out of the path and carries on pacing until he has eaten the whole banana. Then he looks through the desk for a second banana. Again, he peels the banana and places it in his mouth only to staymotionless, not eating it. A thought comes, and he places the banana in his pocket. Krappgoes into the shades, a cork pops, and he comes back a moment after with a ledger. He takes a seat at his desk to read what he's written.

He reads the ledger and inspects the boxes and their insidesrepetitively, going through tapes branded "Mother at rest at last," "the dark nurse," and "memorable equinox." At last, he discovers the tape he is looking for, titled "farewell to love." He puts the tape in the recorder and listens. His voice, younger, comes from the recorder. Krappcorrects in his seat to get relaxed and by chance knocks over a box of tapes. This irritates him, and he strokes the desk clean of all but the recorder. He then reverses the tape to the start.

On the recorder, his younger self speaks about taking three bananas and having to use control to keep from eating a fourth. He then talks about a neighbor who sings every day at anexact hour and how he is listening to another tape from another year around a decade earlier, when he was living together with a woman named Bianca. The oldKrappgiggles with his younger self. The taped, younger Krapp listens to himself talk about how frequently and how much he drank and about getting less involved lovingly,as laughing at what he states to as his youth, however on this tape-within-a-tape, Krapp is merely in his twenties.

The oldKrappswitches off the recorder and sits for aninstant before leaving the stage. Tops pop one after the other. He sings for a minute and then approaches back to listen some more. He resumes the tape but halts it right away to search the word "viduity," which he has overheard on the tape. After he studies it means being a widow or widower, he starts the tape again. He catches his voice remembering a young woman who threatened to call the police if he tried to talk to her again. OldKrapphalts and resumes the tape again.

This time, his younger voice talks of playing with a dog, and a depressing year. He recalls having a dream of his life's meaning and declares that he will talk about it on the tape. The elderKrappskips this piece.Younger Krappremarks that he saw an image of a lighthouse, which reminds him of something he wants to keep itundisclosed. The agedKrappskips once more.

Next, the younger Krappcommentsabout being close with a woman, but he is approximately to end recording so the oldKrappreverses to listen to the entire story, which contains an afternoon amble through the woods followed by having sex outside. OldKrapphalts the tape and goes through his pockets for the banana, ponders it, and places it back in his pocket. He leaves his desk to get a drink and then returns to discoveradditional tape in the desk, which he plays.

He begins and halts the recording numerous times before speaking about how a year means nothing now. He talks then of the small things that he likes, for example the word "spool." He deliberatesreceiving some respect with his writing, a woman named Fanny, and then going to church as a child. He sings a song from church and then recalls about in what way he used to fall asleep throughout the service.

Younger Krappinquiries whether it is worth it to make an effort in life. OldKrapp takes the tape out and tosses it away, swapping it with an older tape, which he plays. It is the tape with the parts of his intimate experience. At the end of the tape, younger Krappponders if his best years are behind him but chooses he would not want them back. The play ends with oldKrappgazing at nothing while the tape plays the only quietness.

Analysis of the play

The Décor:

The strong contrast between light and dark – very bright in the playing area, and the rest dark – is central to the play. The contrast is most striking, pinpointing the use of only a very small part of the stage for most of the action, and it is also dramatic importance. It justifies Krapp's turning around anxiously once or twice, as if, Beckett told Martin Held, "Old Nick' were there: 'Death is standing behind him,' he explained, 'and unconsciously he's looking for it [because] it's the end … he's through with his work, with love and with religion."(Beryl S. and John Fletcher 120)

The set has remained extremely simple throughout with a plain table and chair on a bare stage. The table was bare at the beginning of the play, until Krapp went backstage into a visible, lit cubby-hole or closet to fetch in turn the ledger, the metal tins and finally, the tape recorder. The entrance to the cubby-hole was masked by an opaque, black curtain that was drawn until Krapp opened it. The cubby-hole was lit from the inside by a white light. This rather weak light,

invisible at the opening of the play, remained on after Krapp's triple journey into the cubby-hole; it was finally extinguished along with the rest of the lighting at the end.

Characters:

Although only one person is on stage, Beckett manages to have two characters, in effect, employing the recorded voice of the younger Krapp. The play, then, is only in a technical sense a monologue, in that the same actor plays both roles; but it comes over as a dialogue, conducted between an old man and the middle-aged hopeful he was in former and happier times. Indeed there is even a shadowy presence of a third Krapp mentions "these old P[ost].-M[ortem].s"(Beckett 11), which he usually indulges in, as indeed does the old Krapp also, "before embarking on a new . . . retrospect".(Beckett 11)

Krapp's purple nose is due to his drinking, of course. His shabby garb not only reveals his present poverty and neglect, but it also shows him as a clown, the white face and boots especially, and then slipping on the banana skin and thus links him to other Beckett clown figures, such as Vladimir; 'Played the clown, all alone, hour after hour, motionless . . . spell-bound, groaning'. Krapp's poor sight is something that Beckett himself is familiar with. Since he suffered from cataracts for several years and is thus making a kind of wry joke at his own expense.

Structure:

This looks complicated when the play is read in an armchair but is perfectly straightforward in performance. Old Krapp opens in his voice: the middle-aged Krapp then speaks on tape; Krapp senior stops him, croaks out a fragment of a hymn, resumes his listening, interrupts it again to consult the dictionary, listens further, switches off when a younger man announces the imminent end of the tape and winds back to the account of the 'farewell to love'. Then Krapp the elder records his comments, sings his hymn again, remembers the love story, throws away his current recording, returns for the third time to the love affair, and this time allows the old tape to be concluded and ' run on in silence'. The structure is thus one of counterpoint, with more time given to the younger man's tape and less to Krapp's last tape.

Many critics congratulate Beckett on his imaginative dramatic use of the tape recorder and several points out of this device enables him to return to something explored in his first book, Proust, the problem of the ever-changing identity of the self. Thus Kenner is led to Krappas "a last bitter parody of those vases celebrated in Proust, where the lost past is sealed away" (Beckett 19). Michael Robinson points out that Beckett has brilliantly overcome the problem of

incorporating material from the past into the play and has "fashioned a vehicle which manages to combine, not only the background which drama normally requires, but also the Proustian past of an individual in time" (Robinson 284).

Language:

Although Irish names and references creep in, there does not seem to be anything specifically Irish about Krapp's language. He is not as self-conscious about his use of language, but he does show enjoyment of words and sensitivity to them. Beckett uses this latter characteristic as a means of distinguishing between the Krapp that we see and the one that we hear on tape. The language of Krapp the younger is more learned and even precious compared with Krapp senior's; note the latter's irritation at the former's pompous, pedantic style and his stopping the tape whenever the younger Krapp begins to declaim. He fails to understand the word 'viduity' used by his former self, although Katherine Worth suggests that even young Krapp may have used a dictionary for this, wishing to make a good impression on tape. Certainly even at 69 Krapp can still revel childlike in the joys of a word like 'spool' with its sensuous plosive and its stretched vowel. But the language of the play operates on another important level, as Alec Reid has pointed out:

As we listen, we become aware of something else, of three distinct sound patterns. Gradually we distinguish an even-paced measure for narrative speech, a slower, long-drawn-out lyrical tempo, and a brisker, harsh, sardonic tone, and we notice the period of silence marking the change from one rhythm to the next. From interplay of these we gradually realize that Krapp-at- 39 is torn by two radically opposed elements in his character, and that the conflict still racks the old man sitting at the table in front of us. The sound pattern do not depend on any 'interpretation' imposed by the actor or the director. They are inevitable; deliberately constructed by Beckett through the words he has arranged them, and the pauses which he has per down to separate them. (Reid 22)

Conclusion:

The 39-year-old Krapp rejected happiness for the 'fire in him', which is, one assumes, the creative energy and insight engendered by his experience at the time of the 'memorable equinox'. The old Krapp shows only too clearly the dismal consequences of that ascetic act of renunciation – the fire is now not even a glow in the embers. On the other hand we are well aware that had Krapp opted for common happiness it would in any case by now long since have turned to ashes. The paradox is that the decision confronting him was, in fact, a non-choice: as a writer, he was not in a position to prefer ordinary happiness, which for Beckettian man is neither of this world nor the next; that is why

Krapp, like the tape, runs on finally into silence. The play has fused most successfully a moving human situation with philosophical issues that lead one directly into judgments on the nature of existence and Beckett has done it with the masterful use of the stage décor, carefully crafted character and watchful selection oflanguage which allows the audience to properly identify the difference between young and the old Krapp.

References:

- Reid, Alec. All I Can Manage, More Than I Could: An Approach to Samuel Beckett. Dublin: Dolmen Press, 1968.
- Beckett, Samuel. Krapp's Last Tape, Embers. London: Curtis Brown Ltd., 1983.
- Sontag, Susan. Against Interpretation and Other Essays. New York: Picador USA, 1966.
- McDonald, Ronan. The Cambridge Introduction to Samuel Beckett. London: Cambridge University Press, 2006.
- Text und Buhne, **"**Samuel Beckett - Krapp's Last Tape (Patrick Magee)." Youtube, 17 Nov. 2012, youtube.com/watch?v=otpEwEVFKLc.
- Tom Wolfe. The Painted Word. Toronto: Bantam Books, 1975.

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY EDUCATIONAL RESEARCH
ISSN:2277-7881; IMPACT FACTOR :6.514(2020); IC VALUE:5.16; ISI VALUE:2.286
Peer Reviewed:VOLUME:9, ISSUE:4(1), APRIL :2020

PROBLEMS OF EDUCATIONALLY BACKWARD MUSLIMMINORITY IN GOVERNMENT ELEMENTARY SCHOOL

Dr. Garuda Dhawja Barik
Associate Professor
College of Teacher Education
Bhawanipatna,Odisha

Dr. S.Jyotirani
Lecturer in Education
Dr.P.M.I.A.S.E, Institute of A.S.E
Sambalpur, Odisha

Abstract

The present study examined problems of educationally backward Muslim minorities in government elementary school. The main objective was to study problems of educationally backward minorities studying in government elementary school and also problem of long absentees belong to educationally backward minorities. The study was delimited to government elementary school of Sambalpur municipal corporation area where a sizeable number of Muslim minority students are studying. The descriptive survey method was adopted for the present study. The researcher selected 04 elementary schools following purposive random sampling where 20% or more students belongs to Muslim minority community are studying at present. In order to collect relevant information from both teachers and students the researcher used the following tools are- 1.School information blank 2.Questionnaire for teachers 3.Focused Group Discussion (FGD) for long absentees. The obtained data were analysed through descriptive statistics like simple percentage. The major findings of the study showed that as per school record no cases of dropout are recorded in any sample schools. However 65 long absentees' minority students are there in sample schools. Most of the long absentees are boys students (66.15%).The teachers teaching in schools have minority Muslim students facing language problem due to different home language of minority students. All the teachers agreed that student's absenteeism problems were discussed in parent teacher meeting. About 55% teachers agreed that long absentee's minority students belong to seasonal migrant family. Teachers cited important reasons for minority student's absenteeism like lack of interest for education (40%), parental attitude/ lack of interest (35%), seasonal migration (25%), helping in household work (30%) and attending religious festival (25%).

Keywords: Educationally Backward, Minority students, Elementary School

Introduction

India is a multicultural, multi-ethnic, multi-religious, and multilingual nation with diversity as its strength. The Government of India has made provisions for both religious and linguistic minorities. Minority Community is one of the backward Communities in our society. At present, it has notified six religious groups as minority groups viz., Muslim, Christian, Sikh, Buddhist, Zoroastrian (Parsi), and Jain. According to the census of India 2011the Muslim population is 17.22 cores (14.13%) and the literacy rate of minority community Muslim is 68.5%.Especially Muslims are behind in all aspects of life. In Education they are not so good like other forward communities. All

levels of our Education System they are still behind. As like in the Elementary level they have so many Educational Problems. Several steps have been taken by the Government for the progress and overall development of various religious minorities. One such initiative is the Prime Minister's New 15 Point Programme for the Welfare of Minorities which is an overarching programme covering various schemes and initiatives of different Ministries/ Departments. The Ministry of Human Resource Development (MHRD) has been implementing various schemes for the education of children from the minority communities. Almost fifteen per cent of the total outlay under the Sarva Shiksha Abhiyan (SSA) is targeted for the Minority Concentration Districts (MCDs) to achieve the goal of Universalization of Elementary Education (UEE), bridge infrastructural gaps for schools, classrooms, teachers, and expand access by opening new schools. The Constitution of India is committed to the principle of equality of all citizens. Further, it has directed the state to protect the rights of all minorities in matters of language, religion and culture. In fact, promotion and protection of the rights of minorities contributes to the stability, peace and development of a nation. Muslims are facing a number of problems like issue of security, educational backwardness, and dismal representation in government employment and private sector and in rural development programmes. Literacy and education are one of the essential human development parameters. Public policies are striving to make India a 100% literate society and also improve the quality and quantity of higher/scientific levels of education. Practically, all citizens wish to ensure that their children not only become educated but also get quality modern education, which yields higher rate of returns─ monetarily and in terms of non-market gains.

Review of Related Literature

The following are the review of related literature:-

Amin (2013) found that 26% of educated Muslim women had illiterate husbands. This low level creates further pressures to impose a ceiling on girls education, so as not to render them 'unmanageable' "in this shows the patriarchal attitude of the community towards the higher education of girl child, Where a highly educated girl is considered unsuitable for marriage. Here it is noticeable that in Muslim community which is economically backward, where a young male had to discontinue his education to join family business or to provide a helping hand to his parents had an indirect effect upon the education of girls.

Kotay(2013) found that Muslims face discrimination at various levels, they are at a double disadvantage with low levels of education combined with low quality of education. Even if government accepted the recommendations of SCR in toto, surprisingly, no progress has been made in overall conditions of Muslims, including education sector, since the recommendations were made. There is need of broad based policy initiatives combined with main streaming of

Muslims in regular ministries, departments and programmes of state as well as central government.

Narula (2014) found that over the years the number of institutions, enrolment, teachers, and physical facilities have increased; still educational progress of Muslims is not satisfactory in terms of literacy rates, enrolment, and retention and in completion of grades. Again gender disparity as one of the reasons of educational backwardness of the Muslim minority. The negative attitude and low aspirations of parents towards girls‟ education, early marriages and cultural preference for a domestic role for women delimits women's role in participation of formal education.

Hussain(2018) found that gender disparities in education reflect the unequal position of women in highly gender biased social order. Muslims are the lowest educated section of Indian Society and Muslim women the least one. The backwardness among Muslim women in comparison with non-Muslim women in India has become a matter of concern at present. Although Islam as a religion gives its full emphasis on attainment of women's education, yet there are several social reasons for their backwardness such as large family size, poverty, negative attitude towards girl's education, lack of link between Madrasa education and modern education, etc. The study aims to highlight the educational status of Muslim women in India, the reasons for their backwardness, the issues and challenges they face and recommendations for their integration with the mainstream society.

From the above discussion it was clear those majority minority Muslim students facing several problems due to poverty, family problem, gender disparity, adjustment problem at school which lead to poor performance in education than other students in class.

RATIONALE OF THE STUDY

Education is one of the most powerful factors for the political, social, economic and spiritual development of individuals and communities. Education holds the key to the empowerment of Indian Muslims. It is a well known fact that India cannot march on the path of development and claim to be world leader if majority of its minority community remains educationally backward. High dropout rates and absentees among Muslim students are worrisome. As with many Indians, the main reason for educational backwardness of Muslims is due to poverty ,illiteracy some family related problem, economic problem, religious problem, communication problem, linguistic problem and some personal and mental problem involve, due to which children are forced to drop out and

remain absent in classes at elementary level. It was also very much evident that most of the minority Muslim community in urban pocket live in slum area with much difficulty and mostly are small traders, daily labourers and wage earner .The children belongs this slum area are mostly studying in local government elementary school .So the researcher too keenly interested to conduct this study to know the reason behind dropout and long absenteeism of educationally backward Muslim minority students at elementary level.

OBJECTIVES OF THE STUDY

The objectives of the present study were-

1. To find out the facilities available in government elementary school.
2. To study problems of educationally backward Muslim minorities children studying in government elementary school.
3. Find out the problems of long absentees belong to educationally backward Muslim minorities.
4. To provide suggestion if any.

DELIMITATION OF THE STUDY

The present study delimited to government elementary school of Sambalpur municipal corporation area where a sizeable number of Muslim minority students are studying.

METHOD

For the present study descriptive survey method was followed by investigator.

POPULATION

All the elementary schools situated in the municipal corporation area and having minority Muslim students constitute the population of the present study.

SAMPLE

For the present study 04 elementary schools were selected following purposive random sampling method where 20% or more students belongs to Muslim minority community are studying.

TOOLS USED

For collection of required data for the present study the followings self-made tools are used-

I. School information blank
ii. Questionnaire for teachers
iii. Focused Group Discussion (FGD) for long absentees.

ANALYSIS & INTERPRETATION OF DATA

TABLE-1

AVAILABILITY OF CLASSROOM IN GOVERNMENT ELEMENTARY SCHOOL

SL.NO	NAME OF THE SCHOOL	TOTAL NUMBER OF CLASS	TOTAL NUMBER OF STUDENT	STUDENT CLASSROOM RATIO
1	VSS GOVERNMENT U.P SCHOOL,MOTIJHARAN	08	556	1:69.50
2	GOVERNMENT UPPER PRIMARY SCHOOL,SUNAPALI	08	199	1:24.87
3	GOVENMENT UPPER PRIMARY SCHOOL,BROOKSHILL	08	308	1:38.50
4	GOVENMENT PRIMARY SCHOOL,BHUTAPADA	05	72	1:14.40
	TOTAL	29	1135	1:39.13

The above table reveals about availability of classroom in relation to students strength. There was a variation so far as availability of classroom is concerned i.e. in school like VSS U.P School, Motijharan it was very high 1:69.50 and in Government Primary School, Bhutapada very low 1:14.40. However in the sample schools the overall students classroom ratio is1:39.13.

TABLE-2

STUDENT-TEACHER RATIO

SL.NO	NAME OF THE SCHOOLS	TOTAL NUMBER OF TEACHER	TOTAL NUMBER OF STUDENTS	STUDENT-TEACHER RATIO
1	VSS UP SCHOOL,MOTIJHARAN	15	556	1:37.06
2	GOVT.UP SCHOOL,SUNAPALI	06	199	1:33.16
3	GOVT. UP SCHOOL,BROOKSHILL	07	308	1:44
4	GOVT.PRIMARY SCHOOL,BHUTAPADA	02	72	1:36
	TOTAL	30	1135	1:37.83

The above table shows that the student teacher ratio in the sample schools is 1:37.83. But when comparing among the schools it was clear that the student teacher ratio is

very high i.e.1:44 in case of government U.P school, Brookshills and little bit low in case of government upper primary school, Sunapali i.e. 1:33.16.

TABLE-3
AVAIABILITY OF SAFE DRINKING WATER FACILITIES

SL.NO	NAME OF THE SCHOOL	FACILITIES AVAILABLE									
		PHD SUPPLY		TUBEWELL		OVERHEAD TANK		TAP WATER		AQUA GUARD	
		YES	NO	YES	NO	YES	NO	YES	NO	YES	NO
1	VSS GOVERNMENT U.P SCHOOL,MOTIJHARAN	YES	-	YES	-	-	NO	-	NO	YES	-
2	GOVERNMENT UPPER PRIMARY SCHOOL,SUNAPALI	YES	-	YES	-	YES	-	YES	-	-	NO
3	GOVENMENT UPPER PRIMARY SCHOOL,BROOKSHILL	YES	-	YES	-	-	NO	-	NO	YES	-
4	GOVENMENT PRIMARY SCHOOL,BHUTAPADA	-	NO	YES	-	-	NO	-	NO	-	NO
	TOTAL	03	01	04	00	01	03	01	03	02	02

The above table indicates about the availability of safe drinking water facilities in the government schools. It was clear that the major sources of safe drinking water facilities are PHD water supply in 75% schools and availability of tube wells in all the schools. Again availability of overhead tanks in schools is concerned only in 01(25%) schools overhead tanks are there for water storage and supply through tap. Similarly in 02(50%) schools water filters are also available to provide safe drinking water.

TABLE-4

AVAIABILITY OF MID-DAY MEAL RELATED FACILITIES

SL. NO	NAME OF THE SCHOOL	FACILITIES AVAILABLE								
		KITCHEN SHED		DINING HALL		COOKING UTENCILS		TRAY STANDING		COOK & HELPER
		YES	NO	YES	NO	YES	NO	YES	NO	
1	VSS GOVERNMENT U.P SCHOOL	YES	-	YES	-	YES	-	-	NO	08
2	GOVERNMENT UPPER PRIMARY SCHOOL,SUNAPALI	YES	-	-	NO	YES	-	-	NO	04
3	GOVENMENT UPPER PRIMARY SCHOOL,BROOKIS HILL	YES	-	-	NO	YES	-	-	NO	04
4	GOVENMENT PRIMARY SCHOOL,BHUTAPADA	YES	-	-	NO	YES	-	-	NO	02
	TOTAL	04	00	01	03	04	00	00	04	18

The above table reveals that in all the schools facilities like kitchen shed and cook and helper for cooking mid-day-meal and serving to students are available. Again only in 01(25%) school dinning hall are there and all schools adequate cooking utensils are available at present to prepare mid-day-meal.

TABLE-5

AVABILITY OF TOILETS IN SCHOOL

SL.NO	NAME OF THE SCHOOL	SEPARATE URINAL FOR STUDENTS			
		BOYS		GIRLS	
		YES	NO	YES	NO
1	VSS GOVERNMENT U.P SCHOOL,MOTIJHARAN	YES	-	YES	-
2	GOVERNMENT UPPER PRIMARY SCHOOL,SUNAPALI	YES	-	YES	-
3	GOVENMENT UPPER PRIMARY SCHOOL,BROOKIS HILL	YES	-	YES	-
4	GOVENMENT PRIMARY SCHOOL,BHUTAPADA	YES	-	YES	-
	TOTAL	04	00	04	00

The above table shows that in all school latrine and urinals are available for students. Again separate toilets are available for both boys and girls in all sample schools.

TABLE-06
STUDENT STRENGTH

SL.NO	NAME OF THE SCHOOL	BOYS	GIRLS	TOTAL	MINORITY STUDENTS MUSLIM		TOTAL	DROPOUT STUDENTS MINORITY		TOTAL	LONG ABSENTEES STUDENTS (MINORITY)		TOTAL
					BOYS	GIRLS		BOYS	GIRLS		BOYS	GIRLS	
1	V S S Government Upper Primary School,MOTIJHARAN	213	343	556	94	201	295	-	-	-	22	19	31
2	GOVERMENT UPPER PRIMARY SCHOOL, SUNAPALI	93	106	199	63	70	133	-	-	-	10	07	17
3	GOVERNMENT UPPER PRIMARY SCHOOL, BROOKIS HIL	150	158	308	35	29	64	-	-	-	06	03	09
4	GOVERNMENT PRIMARY SCHOOL, BHUTAPADA	41	31	72	19	17	36	-	-	-	05	03	08
	TOTAL	497	638	1135	211	317	528				43	22	65

The above table reveals that out of out of 1135 students studying in government upper primary schools 528 students (46.51%) students belongs to minority category. Again out of 528 minority students 311(58.90%) are girls students. Regarding the dropout students as per school record no such cases were recorded. Similarly long absentees is concerned there are 65 students who are irregularly attending the schools. Most of the long absentees are boys 43(66.15%) and 22 (33.85%) are girls students.

TABLE-7
PROBLEMS FACED BY EDUCATIONALY BACKWARD CHILDREN IN GOVERNMENT ELEMENTARY SCHOOL

SL.NO	STATEMENT	NUMBER & PERCENTAGE
		YES
1	Do you have Muslim minority students in your school?	20 (100%)
2	Do they face any difficulty during teaching?	20(100%)
3	If majority of students will remain absent in school then YOU meet their parents	20 (100%)
4	Whether problems of students are discussed in Parent Teacher meeting or not?	20 (100%)
5	Do your class have long absentees students?	11(55%)
6	Do they have language problem?	20 (100%)
7	Do they understand odia language?	12 (60%)

The above table indicates that all the teachers facing problems due to minority students studying in their class. The teachers opined that language is a major problem for them because the students home language is different from school language. Again all the teachers agreed that they were discussed students absenteeism in parent teacher meetings. Similarly 11(55%) teachers agreed that students were remain absent for a long period of time due to seasonal migration of parents. Again 12(60%)students understand Odia language.

Table- 08
PROBLEM FACED BY TEACHERS DURING TEACHING

SL.NO	PROBLEMS	NUMBER and PERCENTAGES
1	Language Problem	20(100%)
2	Absenteeism	11(55%)
3	Indiscipline	8(40%)
4	Lack of interest in study	9(45%)
5	Dropout	0(0%)

The above table reveals that the teachers are viewed that educationally backward minorities students facing problems in classroom like language problem(100%), absenteeism (55%),indiscipline(40%) and lack of interest in study (15%).

TABLE-9

OPINION OF TEACHERS TOWARDS STUDENTS ABSENTEESM

SL.NO	Reasons of Absenteeism	NUMBER AND PERCENTAGE
1	Parental Attitude/Lack of Awareness	07(35%)
2	Lack of interest in study	08(40%)
3	Health Problem	03(15%)
4	Family Problem	06(30%)
5	Household Work	03(15%)
6	Migration	07(35%)
7	Religious Festival	05(25%)
8	Adjustment problem due to indiscipline in the classroom	01(5%)

The above table shows that teachers cited different reasons for students absentees from school. The main reason as cited by teachers are lack of interest for education(40%),parental attitude' lack of awareness(35%),helping in household work(30%),and attending religious festivals(25%) and adjustment problem due to indiscipline in school(05%).

TABLE-10

PROBLEMS OF ABSENTEES STUDENTS

S.NO	PROBLEMS OF STUDENTS	NUMBER & PERCENTAGE
1	Lack of interest	51(78.46%)
2	Household work	40(61.53%)
3	Working part time	25(38.46 %)
4	Health issue	28(43.07%)
5	Going to village for celebration of festival	54(83.07 %)
6	Seasonal migration of parents	58(89.23 %)
7	Family Disturbance	20(30.76 %)
8	Taking care of siblings	27(41.53 %)
9	Home Environment	24(36.92 %)
10	Poverty of Parents	45(69.23%)
11	Religious duties like performing Namaz	60(92.30%)

The above table reveals that 78.46% absentees agreed that due to lack of interest they remain absent from school. Similarly 61.53% cited helping in household work,89.23% viewed seasonal migration of their parents and 83.07% cited visiting their village for celebration religious festival are the main reasons of absent from school.

TABLE-11

PROBLEMS OF ABSENTEES AT SCHOOL

Sl.No	PROBLEMS	NUMBER AND PERCENTAGE
1	Problem in school subject like English, Mathematics	55(84.61%)
2	Lack of infrastructure facilities at school	58(89.23%)
3	Difficulty in medium of instruction	57(87.69%)
4	Lack of adequate teachers	35(53.84%)
5	Misbehaviour of outsider to students	20(30.76%)
6	Feeling of insecurity being a minority	18(27.69%)
7	Negative attitude of teachers towards minority students	04(6.15%)
8	Ill treatments by teachers	06(9.23%)
9	Ill treatments by classmates	12(18.46%)
10	Lack of adequate support by school authority	05(07.69%)

The above table indicates that 84.61% students face difficulty in English and Mathematics subject,87.69% face language problem,89.23% students cited inadequate facilities in school and 53.84% students cited lack of adequate teachers as main school related problems.

TABLE-12

OTHER PROBLEMS RELATED TO ABSENTEES STUDENTS

SL.NO	PROBLEMS	NUMBER AND PERCENTAGE
1	Parents are very particular that children must attend school regularly	45(69.23%)
2	Parents always motivated to attend school	50 (76.92%)
3	Friends are always supportive	61(93.84%)
4	Understand school language properly	45(69.23%)
5	Government should provide more facilities to minority children's	55(84.61%)
6	Distance of school is longer and tiresome	11(16.92%)
7	Due to rush traffic children are very much frightened	10(15.38%)
8	Books and other support not available in time	09(13.84%)

The above table shows that the absentees have positive views regarding their parental support and motivation and friend cooperation. However 84.61% agreed that government should provide more facilities to minority children and 15.38% cited rush traffic very frightening and 13.84% viewed that books and other support not reached them in time.

MAJOR FINDINGS-

The followings are the major findings of the present study:-

- The student's classroom ratio of sample schools is 1:39.13.
- Similarly the student teacher ratio in sample schools is 1:37.83.
- The main source of safe drinking water in schools are tube well and PHD water supply.
- Only in 25% schools overhead tank with tap water facilities available at present.
- Again in 50% schools water filter facilities available to provide safe drinking water.
- In all sample schools separate toilet for boys and girls are available.
- About 46.51% of minority Muslim category students are studying in sample schools.
- Again out of them 58.90% are girls students.
- As per school record no cases of dropout are recorded in any sample schools.
- However 65 long absentees' minority students are there in sample schools.
- Most of the long absentees are boy's students (66.15%).
- The teachers teaching in schools have minority Muslim students facing language problem due to different home language of minority students.
- All the teachers agreed that student's absenteeism problems were discussed in parent teacher meeting.
- About 55% teachers agreed that long absentee's minority students belongs to seasonal migrant family.
- Again all the teachers facing language problem during teaching.
- Teachers cited important reasons for minority students absenteeism like lack of interest for education(40%) , parental attitude/ lack of interest (35%), seasonal migration(25%), helping in household work (30%) and attending religious festival (25%).
- About78.46% absentees agreed that due to lack of interest they remain absent from school. Similarly 61.53% cited helping in household work,89.23% viewed seasonal migration of their parents and 83.07% cited visiting their village for celebration religious festival are the main reasons of absent from school.
- Similarly 61.53% cited helping in household work,89.23% viewed seasonal migration of their parents and 83.07% cited visiting their village for celebration religious festival are the main reasons of absent from school.
- About 84.61% students face difficulty in English and Mathematics subject and87.69% face language problem,89.23% students cited inadequate facilities in school and 53.84% students cited lack of adequate teachers as main school related problems.
- Again 89.23% students cited inadequate facilities in school and 53.84% students cited lack of adequate teachers as main school related problems.
- Majority of the absentees have positive views regarding their parental support and motivation and friend cooperation. However 84.61% agreed that government should provide more facilities to minority children and 15.38% cited rush traffic very

frightening and 13.84% viewed that books and other support not reached them in time.

- About 84.61% absentees agreed that government should provide more facilities to minority children. And 15.38% cited rush traffic very frightening and 13.84% viewed that books and other support not reached them in time.
- About15.38% absentees cited rush traffic very frightening and 13.84% viewed that books and other support not reached them in time.

CONCLUSION

In India, Minority Community especially Muslim is one of the important Communities. But, we know that this Community has lots of Problems in all contexts. Particularly educational backwardness leading to all other problems remain a major factors of backwardness for Muslim communities in India. Literacy and education are one of the essential human development parameters. Public policies are striving to make India a 100% literate society and also improve the quality and quantity of higher/scientific levels of education. Practically, all citizens wish to ensure that their children not only become educated but also get quality modern education, which yields higher rate of returns─ monetarily and in terms of non-market gains .Thus elementary education is a basic and fundamental rights for every Indian to empower for a better future and standard life. All the communities including Muslim minority must access to quality education for their upliftment is need of the hour.

REFERENCES

- Ahmad, I.(1981) Muslim educational backwardness: An inferential analysis.*"* *Economic and Political Weekly,* 16 (36), 1457-1465.
- Vijapur, A. P. (2007)Education among Indian Muslim: Problems and Prospects." In Minorities of India: problems & prospects. *Indian Council of Social Science Research,*42 (10): 832-836.
- Rong, M. (2009) The development of minority education and the practice of bilingual education in Xinjiang Uyghur Autonomous Region. *Higher Education Press and Springer-Verlag ,* 4(2),188–251.
- Agirdag,A.& Houtte,M.V .(2012) Determinants of attitudes toward Muslim students among Flemish teachers: *A research note. Journal for the Scientific study of Religion,* 51(2),368-376.
- Kotay,F.A.(2013) Educational Exclusion of Indian Muslim: Issues & problems. *European Academic Research,*1(9),2843-2866.
- Nasreen, P. (2013) Education of Muslim Women- A journey from past to present. *International Journal of Management and Social Sciences,* 2(1), 88-95.
- Narula, M. (2014) Educational development of Muslim Minority: With Special reference to Muslim concentrated States of India". *Journal of Education and Research,* 4 (1),93-108.
- Noor,A.F (2016) Minority Education- A Study of Indian Muslim *Socrates,*4(1),52-60.

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY EDUCATIONAL RESEARCH
ISSN:2277-7881; IMPACT FACTOR :6.514(2020); IC VALUE:5.16; ISI VALUE:2.286
Peer Reviewed:VOLUME:9, ISSUE:4(1), APRIL :2020

CRITICAL READING OF 'THE FLOOD' BY THAKAZHI SIVASANKARA PILLAI

Dr. Peena Thanky
Lecturer in English
R C Technical Institute, Ahmedabad

Abstract:
This paper focuses on plotting the story world of in 'The flood' by Thakazhi Sivasankara Pillai. The plot of in the flood is about a dog dying in floods because it is not recued or we can say that a dog dies because human beings refused to rescue it. So these are the possible interpretations of the plot of in the flood. Both story and the plot involve events, however plot talks about the creation of connection or the suppression of connections of events and when we talk about suppression of connection there is this associated idea of suspense involved in it. The paper is an effort to interpret the story at different levels.

Key Words: Suppression, aspirations, Desire, Refusal, Defeat

Introduction:
Before talking about on plotting the story world of in 'The flood' by Thakazhi Sivasankara Pillai I would like to begin by offering a very brief introduction about the author Thakazhi Sivasankara Pillai.He was born in Thakazhi Kuttanad, Kerala and he is firmly known as Thakazhi after the place of his birth. He wrote about 40 novels and more than 600 short stories in the Malayalam language, some of his most famous fiction are Thottiyude Makan Chmmeen and Kayat.The major concern in most of Thakazhi's writing is for the poor the lower cast members and the downtrodden in society at large, he is in fact known as the friend of the oppressed.

Before I dwell deeper into the story of in the flood I would like to explore initially about what exactly is a story and what exactly is a plot.A story is a set of events.According to Manfred John, a story is a sequence of events and actions involving characters, so for him events generally include both natural and unnatural happening like flood or car accidents and actions more specifically refers to willful acts by characters, willful here refers to deliberateactions.So keeping this in mind, the story in 'The Flood' is about a dog that is trapped in a flood and it dies, so this is the story.

Plot Construction:

Now, what exactly is a plot. A plot is a sense making operation. If we take Peter Brook's definition of a plot, he says in his book Reading for the Plot, plot is about making sense of a text and thereby making sense of life itself. Plot refers to the sequence of events with its causes and effect emphasized. E.M. Forster tells us that for example if the king died and the queen died it is just to story, it just talks about the sequence of events, the king dying and the queen dying, however if we read something like if the king died and then the queen died of grief then that is a plot because causation is referred to there.Therefore, in other words for E. M Forster plotting consists in the creation and also the suppression - suspenseful suppression of causal connection between individual events. Therefore, if we understand these meanings of plot and apply them in'The flood' what exactly is a plot there.

We could say the plot of in the flood is about a dog dying in a floods because it is not recued or we can say that a dog dies because human beings refused to rescue it. So these are the possible interpretations of the plot of in the flood. Now let us look at story and the plot together.Both story and the plot involve events, however plot talks about the creation of connection or the suppression of connections of events and when we talk about suppression of connection there is this associated idea of suspense involved in it too. Now I would like to takea look at another view of Claude Bremond on plotting.

He talks about alternative and possibilities and interesting idea in terms of mapping the plot of a story on narrative. So Claude Bremond talks about virtual courses of events which may be desired or striven for by characters but which may never actually occur in the storyworld.So the characters in the story hope for certain courses of events which may not be realized in the actual narrative, so he talks about a network at three-phased triadic branching model where there is an initial situation a starting point of premise.

And then we have both actualization and realization or the known actualization of the next stage in the narrative. So we have an initial state of affairs and then we have a desired outcome and then we have an outcome that is desired but not realized. Now if we want make sense this plotting it can be done in 3 ways, one it is about making sense that is it is about making meaning. The other is about causality in the events, so causality as I said is a bad connection and suppression of connections among the events and the final things that we need to think about in terms of plotting is possibility. So what are the possibilities that the character aspires for and which of them are realize and which of them are not realized. Now we look at the story of in the flood let us see what

happens.

Chennan and his family are trapped in a flood and then the escape in a boat but his dog is left behind and then he dies. So this in short, is the story. So how exactly is this story set up in the narrative.The narrative says Chennan the pariah had been standing in water an entire night and a day, it has been raining for 3 days, it has been 3 days since its master had escaped to safety. So this is the initial premise of the story and how exactly does he survive in the flood. He does not own a row boat, so what he does is inside his hut he had built an elevated platform out of coconut fronds and twigs that jutted above the level of the floodwaters. So he builds a raised platform and he stays there on it in order to avoid the waters. In the story, we see the Chennan has these dependents- a pregnant wife, 4 kids, a cat and a dog. So these arethe characters in the story at the beginning and what exactly is the crisis in thestory.

The crisis is that within the next 12 hours the water would have listened about the roof. How Chennan avoided this crisis is mentioned in the narrative. He removes a portion of the thatch from inside his hut.And he scrambled onto the roof and he looks around, he sees a big boat moving not he cries and then they hear him and they began to row towards his hut and they rescue him and his dependence. So this situation of Chennan. Being on a platform above the flood waters is a precarious situation and if we apply Bremond's possibilities to this situation what we get is this.

Chennan desires escape and he is granted that, so he gets over right to safety with his family. So the possibility the alternator is realised or actualized for Chennan in the flood.I would call this as the first story written in the flood.

The first story is Chennan's story and it has a Happy Ending, Chennan escapes and his dependents too, at least most of the dependents too. Now there are 2 incidents from the first story which are kind of left behind for the second story to pick up and move forward.

So let us look at the 2 things that are left behind and these 2 things have ramifications for the sequence of the second story written in the flood – they are the dog and property which are left behind by Chennan. So if we go back to first story Chennan does not immediately leave his hut as soon as the what is begin to rise because if they left the hut the 5 banana trees that were heavy with fruit and his hayrick would be stolen.Hayrick means hay dark, so he stays behind to look after his property and the second aspect that is very interesting for us to kind of think about deeply is this. - No one took notice of the dog who was still sniffing around in the western end of the hut. The dog is at the western end of the roof top of the hut while Chennan and his family escape via a boat.

Now thinking about the second story, it is the dog’s story.And this also has a beginning of crisis and a desire for resolution and the big question is his desire result or realized. The second story begins when the dog eventually returned to

the spot on the roof from which the family had made it escape the boat was for away, the animal begins to run around frantically on the roof, sniffing here and there, whining all the while. So the dog does not realize that the family is making its scared away and when it comes back to that spot from which they have left it kind of runs around almost panicking and it starts to cry or whelm.

If you look at this phrase begin to run around frantically it somehow resembles tenant's attitude when he removes the touch from inside his hut and then he gets on to the top of the roof to know rescue. At one point in the story, Chennan was doing the same thing. So this action scene to mirror of parallel one another something that has very symbolic meaning. The dog is on arooftop.And we need to think about the sequence of events that is set up for this particular story, who or what appears in Chennan's dog's story, what do they do and what is the significance or role in this story. Now these are the characters that appear in Chennan's dog's story.

Symbolism:

The first character that appears is a set of frogs, so when the dog tries to sniff around a long the rooftop it disturbs on some frog and one of them before it jumps or leaps into the water urinate on the face of the dog and this as symbolic significance which we will come back to again later in evaluation of the story. The other actor that follows the frog is a huge crocodile that floats past the house gently brushing the half submerge roof.At the word gently or the ideal gently is also very interesting in the context of a crocodile that is a very insidious creature and we are also constantly reminded that the dog is inprecarious situation and the phrase half submerge roof is an indication of that. Now the other very interesting detail that follow these set of characters is the reference to the Ramayana.

And in this atmosphere when there is rain when does flood water that is affecting the entire village we have someone reciting verses from the Ramayana and the dog listens to this recitation. The narrator says that the dog pricked up its ears when heard a man reciting the Ramayana. It remains silent for a while almost as if it was listening to the chanting of the world and then began working again as loudly as it could manage.So the dog listens to the recitation and it barks again and implication could be that is kind of seeking help perhaps to this person who is chanting the word.

Now in the next set of events, we have a fish popping up out of the water and a we have a crow eating from hackers which Chennan's dog notices or observe and he vines at that action because we can understand the dog is terribly hungry and it wants to have its share of the characters too but and it that something that it does not have at this particular point of time and then we have

frogs again leaping into the water, we have a green bird twittering in this environment and then we have references to fleas on the dog's body that bite him and later we have a colony of ants that also bite him when this dog disturbs their nest and finally we have another very interesting event where a snake kind of sneaks into the roof of Chennan's huts, these instance also very very symbolic which we need to unpack to drive their largest significance.Now what exactly are the meanings are embedded in these set of events. Some of the meanings are that life itself is indifferent and life goes on despite it being a tragedy or a crisis too many others for dog this is a crisis situation but for the green bird that twitter this is nothing but as little bit may be different, but it is not affected by it and life is hard. See for example we have a dead body floating on the water. That carcass again comes as food for the crow and life is about survival. Life is about sustaining in one way or the other despite being threatened by factors from the environment. Now we need to look closely at details that are constantly repeated.And one of the details that is repeated is the idea of carcasses are floating in the water, the narrator says that the carcasses of drowned animals floated past the hut, the dog looked longingly at them and barked once or twice and we need to again remember that the dog is starving and wants to eat from carcasses something that it eventually does towards the finale of the story with fatalconsequences.

In this part of the story we have a boat appearing in the morning. It is a very interesting event because of the first time the dog is getting excited about the possibility of getting away from the flood waters. So, we have a small boat that appeared in the distance and steadily drew closer, it moored under a coconut tree close to the hut. The dog wagged its tail, stretched, yawned, growled under its breath. And it is very interesting that while the dog is highly excited the man in the boat he does something totally contrary to the dog’s expectations, he climbs a coconut tree, slices off a coconut and then drinks the coconut water and disappears. So, very nice contrast the builds on the pathos in the situation while the man is blissfully unaware about the anticipation of the dog, the dog is kind of waiting for the man to respond to the crisis the it isin.If we look at the scene through Bremond's theory of actualization or non-actualization, we have a possibility on alternative in the appearance of the boat and it does not give the dog an escape. So there is a non-actualization of the possibility which results in a failed dream for the dog. However, if we contrast this seen with Chennan's situation at the beginning of the story we can clearly see that his desire isrealized. His desire is actualized which does not happen in the case of the dog, there is a non-actualization of the next stage in the narrative and therefore the narrative just floats along hoping for other events to kind of intervene and bring it to its end. Now again another boat appears in the story, it happens in the afternoon, a small row boat drifted by with two men in it.

The dog began barking, joyfully jumping up and down in its happiness. Its demeanor, the way it was trying to express itself, seemed almost human it went down to the water's edge ready to jump into the boat. So there is almost and mirror of the previous boat scene and we can see the dog is again very joyous it barks excitedly, it jumps up and down and happiness and even its cries its whining and its barking seems almost human according to the narrator of the story.

And it is it goes down to the waters' edge, on the rooftop and is ready to jump on to the rescue boat or what it thing is a rescue boat, there are two occupants in that boat and one of them is slightly sympathetic towards the dog while the other one is not and this is the conversation that happens in relation to thatscene.

One of the men said 'look at dog'and the dog began to whimper in a peculiar key, it was almost as though it was responding to the compassion in the man's voice, 'let it be' said second man.The dog tried twice to jump on the boat and it was rebuffed both times the dog howled, it was heart rending. In the scene we can clearly see through the words that the narrator wants us to realise how pathetic the dog in this situationis.

If we look at the words howling,heart rending, a whimper, all these words clearly indicate the emotional distress that the dog is suffering and this emotional distress is nicely contrasted with the man, who do not want to take this dog on boat. And this particular scene is especially pathetic because of the clear refusal that the dogsuffers at the hands of the man who can rescue this dog ,who have the power to rescue this dog and that increases the pathos in this particular moment in the story. Again, if we look at this particular moment through Bremond's theory we see another close possibility for the dog to be rescued from theflood.

But again this is non actualized or non realised, so this rebuttal this refusal that he gets from the 2 men again makes his dream to escape from the flood a failure clear failure and the crisis for the dog continues and the narrative floats along so to speak. Now we have another boat coming in, so 3 times boats appear very interestingly in the story and the last time it appears is at night.So this boat kind of highlights the vulnerability that the dog is foreseeing its end, and its desire for escape, escape so close on with the boat so close but it again out of reach because the men refused to save this creature and the narrative plods along until something else comes to intervene in the critical situation and rescues the dog or fails to rescue it.

So, third boat that we see at midnight is heavily loaded with coconuts and bunches of bananas and that in itself is an indication that this is no ordinary boat and this boat stops beside a banana tree close to the hut and there is very

clear indication that this is a boat that has a lot of stuff stolen goods on it. So the dog leapt at the thief trying to steal Chennan's bananas, the man tumbled down into the water the dog with him. The thief's companion pulled him onto the boat while the dog swam back to its rooftop, it clambered back on and shook the water off its coat, barking furiously all the while. The thieves lopped all the bananas of the trees, and load them on to the boat. So the dog tries to prevent this robbery from happening pretty violently, pretty vigorously and it attacks the man and one of the thieves who tries to steal the stuff falls on to the falls into the water and he gets back onto the boat while the dog climbs back on the rooftop.

Then one of the men caught on to the roof in advanced threateningly towards the dog, this is the second part of the attack or the fight scene that happens at in the story. It attacked him immediately and sank its teeth into his leg, howling in agony, the man jumped back into the boat while his companion took hold of an oar and brought it crashing down on the dog's head, the animal yelped and retreated.

So we can clearly see that victory is not with the dog but with the thieves who attacked the animal and the animal retreats as if it is retreating from battle unable to bear the violence that is inflicted on him by the 2 men, by the 2 thieves. What is interesting about this incident is at first that the dog realises that this is not a rescue boat, it is not excited to see the men on the boat here it is not wagging its tail, it is not mistaken, it is furious and it becomes while in pretty soon on seeing that the men are trying to rob his master's property.

And you can characterise this a struggle as a kind of an epic battle between this animal, this guardian of the house and the man who come to attack the home and steal it off its property and I would call this one of the high points of the story the climax almost of the story. So we can clearly see that the purpose of the boat on the scene is not only to rob, but it attacks the protector of the home. And protected does offer fierce resistance and they become angered by this righteous resistance offered by the dog and they try to repay the dog in kind by attacking it, so this scene not only offers a sort of realisation of a possibility of an escape but it offers more cruel act of non actualization. This is very cruel because the humans are the only ones who have the capacity to save the dog from this vulnerablesituation. But they are the ones who inflict the maximum agony on this creature. So to wrap up this incident the boats failed to give the dog its desire that the boats do not offer any kind of sucker or salvation instead something else tries to offer that which is the carcass the dead body of a creature floating in the flood waters. The carcass of is the promise of salvation. This salvation is about the appeasing the dog'shunger.

We got to remember that this dog is stranded on the rooftop for hours together

and it is apparently hungry. So when it sees the carcass floating in the waters what it tries to do is tries to eat it and this incident becomes a catalyst which moves the narrative towards the conclusion , its end point. So this is the moment the very interesting moment one moment of salvation almost metaphorically speaking an enormous bloated carcass of a cow drifted up to the house. Again the idea of drifting up,gently moving towards the house, if you recall one of the earlier incidents in connection with the crocodile, the crocodile also gently moves alongside the rooftop. So this drifting of gently moving are very interesting words that kind of convey a particular idea on the mind of the reader when its impact is totally otherwise, the other side of it.So the carcass drifts up onto the hut drifts up on to the house and is snagged on the roof, it is energized into activity, the dog's tail wagging, granting, the dog rush down the roof to where the carcass was still within reach and began carrying at the flesh sating its terrible hunger. So the dog eats greedily as you can see from its hurried eating of the meat from the carcass just then with the loud cracking noise the entire carcass was dislodged from the roof.So, there is some imbalance in the rooftop and that probably brought on by this jarring a movement of eating that the dog does of the carcass and this whole set of movements dislodges the carcass as well as the dog from the roof and the dog which was eating from it went with it went with the roof, the carcass rolled over in the current and the dog disappeared fromview.

Now, one could only hear the sound of the gushing wind cacophony of the frogs the confused noise of the frogs and the sibilant silky whisper of the wave, there was no other sound, the carcass takes the dog with it and everything disappears into the water. So we can see at a very simple level the flood itself offers a resolution but it is a cruel resolution.Because the resolution does not mean happily ever after. For the dog that means death, a tragic death by drowning death by being eaten by the crocodiles. So the carcass in the flood attempts the dog to its death. So the carcass in the flood waters becomes this large of catalyst and that kind of resolves the flood, it very interesting that the story does not end here, it does not stop here.

If it had there would have been like two stories floating by in this narrative in this text called in the flood one will be the story of Chennan and the other will be the story of Chennan's dog. So, what the narrator, what the writer does is he brings Chennan back into the story at the very end. So, once the rains have stopped, once the flood waters have receded Chennan returns to the place where his hut oncestood.

And this is what he sees, and one of the coconut trees, he saw the corpse of a dog gently rocking in the eddies of the shallow water, Chennan turned it over with his foot to check if it was his dog, he thought it might be. one of the animal’s ears was missing, you could not even tell what colour the dog was, for

skin had rotted and sloughed away. So Chennan comes back finds his dog dead and gently being rocked in the waters.

So the two stories merged here the kind of entwine at this point in the narrative and is clear the Chennan has escaped because he is there physically watching his dead dog in the waters, in the shallow waters while his dog is not that lucky. It suffers a tragic end and so the alternate possibility the possibility of getting away is awarded to Chennan while it is not realized for his dog, there is no possibility but that for thatcreature.

So Chennan's returning to the story envelopes inner story. Chennan apparently looks impassively at his dead dog we do not know what hethinks.There is no mention of what is passing through Chennan's mind right here. So which is very interesting in itself and but Chennan is standing by looking at his dead dog. Is the tragic tone minimized is a question that we need to ponder on or is it intensified that also another very interesting question to dwell on or to seek answersto.

The last lines are again very interesting because the death of the dog is portrayed in a very gentle manner with a dog being rocked as if it is rocked by a cradle or by the arms of a mother as if it is being put to sleep and its almost as if the dog has almost willingly quit its life, shed its trappings its skin and its ear and things like that and it is almost waiting for its next birth death in all its gory aspect is kind of toned down is smoothed away to give a very peaceful veil to this dog. But it seems to be apparently sleeping and at the end the writer makes the flood as the most obvious villain in the story because the flood offers the carcass and the dog becomes tempted by the carcass it starts to eat it and it falls into the waters and is eaten consequently by the crocodiles as well. So the flood becomes the monster easy monster there while there are other monsters lurking you know behind the flood.

By making the flood the easy villain, the easy monster, the apparent evil one the writer makes it seem as if it is nobody's fault as if the death of the dog is nobody's fault that seems to be one very easy interpretation to take away from this story.

References:

- ThakazhiSivasankaraPillaiThe best of Thakazhi Sivasankara Pillai New Delhi : Lotus Collection, 1999. Print
- Brooks, Peter Reading for the Plot Harvard University Press, 1984 Print
- Claude, Bremond The Logic of Narrative Possibilities The Johns Hopkins University Press, Source:New Literary History,Vol. 11, No. 3, On Narrative and Narratives: II (Spring, 1980), pp. 387-411
- https://nptel.ac.in

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY EDUCATIONAL RESEARCH
ISSN:2277-7881; IMPACT FACTOR :6.514(2020); IC VALUE:5.16; ISI VALUE:2.286
Peer Reviewed:VOLUME:9, ISSUE:4(1), APRIL :2020

STATUS OF WOMEN ENTREPRENEURSHIP IN INDIA

Dr.P.M.Sharmila
Assistant professor
Govt. First Grade College
Vijayanagar, Banagalore

Abstract
In today's world, women entrepreneurs are playing very vital role and they have become important part of the global business environment and it's really important for the sustained economic development and social progress. In India, though women are playing key role in the society, but still their entrepreneurial ability has not been properly tapped due to the lower status of women in the society. The main purpose of this paper is to find out the status of women entrepreneurs in India. This paper includes rationale grounds behind the women entrepreneurship. Another main purpose of this paper is to analyze policies of Indian government for women and also to analyze that are those policies adequate for the growth of women entrepreneurship. Main reasons for women to become an entrepreneur, the institutions that are serving the women to put their views into action are also included in this study. On the basis of this study some suggestions are given to encourage spirit of women entrepreneurship to become a successful entrepreneur. This paper focuses on the problems, issues, challenges faced by women entrepreneurs, how to overcome them and to analyze policies .

Key words : Women Entrepreneurship, Business, Society, Status challenges, Role of Govt & suggestions

1. Introduction

Entrepreneurship refers to the act of setting up a new business or reviving an existing business so as to take advantages from new opportunities. An Entrepreneur is a person who starts an enterprise. They searches for Change and responds to it. A number of definitions have been given of an Entrepreneur- The economists view him as a fourth factor of production along with land labor and capital. The sociologists feel that certain communities and cultures promote entrepreneurship like for example in India we say that Gujaratis and Sindhis are very enterprising. Still others feel that entrepreneurs are innovators who come up with new ideas for products, markets or techniques. Thus, entrepreneurs shape the Economy by creating new wealth and new jobs and by inventing new Products and services. However, an insight study reveals that it is not About making money, having the greatest

ideas, knowing the best sales pitch, applying the best marketing strategy. It is in reality an attitude to create something new and an activity which creates value in the entire social eco-system. It isthe psyche makeup of a person. It is a state of mind, which develops naturally, based on his/ her surrounding and experiences, which makes him/ her think about life and career in a given way. Entrepreneurship has been a male-dominated phenomenon from the very early age, but time has changed the situation and brought women as today's most memorable and inspirational entrepreneurs. It is estimated that women entrepreneurs presently comprise about 10% of the total number of entrepreneurs in India, with the percentage growing every year. If the prevailing trends continue, it is likely that in another five years, women will comprise 20% of the entrepreneurial force (Saidapur et.al, 2012). The Tenth Five-Year Plan (2002-07) aims at empowering women through translating the recently adopted National Policy for Empowerment of Women (2001) into action and ensuring Survival, Protection and Development of women and children through rights based approach

2. Status of women entrepreneurs in India

Entrepreneurship is considered as one of the most important factors contributing to the development of society. India has been ranked among the worst performing countries in the area of women entrepreneurship in gender-focused global entrepreneurship survey, released in July 2013 by PC maker Dell and Washington based consulting firm Global Entrepreneurship and Development Institute (GEDI). Of the 17 countries surveyed India ranks 16th, just above Uganda. Countries like Turkey, Morocco and Egypt has outperformed India. Status of higher education in women in India came out to be lower than most countries in the world. At present, women's entrepreneurial role is limited in the large scale industries and technology based businesses. But even in small scale industries, the women's participation is very low. As per the third all-India census of Small Scale Industries, only 10.11% of the micro and small enterprises were owned by women, and only 9.46% of them were managed by women. While the number of women operating their own business is increasing globally, women continue to face huge obstacles that stunt the growth of their businesses, such as lack of capital, strict social constraints, and limited time and skill.

3. Reasons for Women Becoming Entrepreneurs

Self-esteem, recognition, Self-determination, and career goal are the key drivers for choosing to entrepreneurship by women .Sometimes, women choose such career path for proving their potential, caliber in order to achieve self-satisfaction. However, dismal economic conditions of the women arising out of unemployment in the family and divorce can compel women into

entrepreneurial activities. The days have gone when women always passed her whole life within the boundaries of house now women are found indulged in every line of business. The entry of women into business in India is an extension of their normal home activities. But with the spread of education and passage of time women started shifting from doing work at home or kitchen to the business venture. Skill, knowledge and adaptability in business are the main reasons for women to emerge into business ventures. Women Entrepreneur is a person who accepts challenging role to meet her personal needs and become economically independent. A strong desire to do something positive is an inbuilt quality of entrepreneurial women, who is capable of contributing values in both family and social life. With the advent of media, women are aware of their own traits, rights and also the work situations. The challenges and opportunities provided to the women of digital era are growing rapidly that the job seekers are turning into job creators. Many women start a business due to some traumatic event, such as divorce, discrimination due to pregnancy or the corporate glass ceiling, the health of a family member, or economic reasons such as a layoff. But a new talent pool of women entrepreneurs is forming today, as more women opt to leave corporate world to chart their own destinies. They are growing as designers, interior decorators, exporters, publishers, garment manufacturers and still exploring new avenues of economic participation.

4. Challenges faced by women Entrepreneurs:¬ Conflicts between Work and Domestic Commitments-Women's Family obligations also bar them from becoming successful Entrepreneurs in both developed and developing nations. "Having primary responsibility for children, home and older dependent family members, few women can devote all their time and energies to their business" (Starchier, 1996)

¬Gender gaps in education- While women are making major strides in Educational attainment at primary and secondary levels, they often lack the Combination of education, vocational and development of highly productive businesses.

¬Lack of finance - Access to finance is one of the most common challenges that entrepreneurs face and this is especially true for women who are further Women Entrepreneurship in India .

¬Legal constraints in family law- The institutional and legal environment is critical to the growth of female-owned enterprises. Laws regulating the private sphere specifically those regarding marriage, inheritance and land can

hinder women's access to assets that can be used as collateral when securing a loan.

¬Heavy household responsibilities leave a demand on women especially those in rural areas who have more children. They are required to perform their traditional role as housewives and therefore, they have fewer hours of free time than men, both during the weekend and on weekdays. An ILO report on women entrepreneurship identifies the following problems faced by women entrepreneurs.
¬Lack of family support- Sometimes the family may make the women feel guilty of neglecting household duties in her pursuit of business obligations. Cultural traditions may hold back a woman from venturing into her own business.

¬Lack of capital-traditional sources of finance like banks are reluctant to lend to women entrepreneurs especially if they do not have any male or family backing. This is especially true of lower income females. Women do not have adequate finance or legal knowledge to start an enterprise.
Short Of Self-Confidence – In India women have lack of self-confidence in their strength and ability. The family members and the society are unwilling to stand beside their organizational growth. To a certain degree, this situation is changing with Indian women and yet to face an incredible amend to boost the rate of growth in entrepreneurship.
Social-Cultural Barriers –family and personal obligations sometimes works as a great barrier for succeeding in business career of women entrepreneurship. Only few women are capable of managing both home and business efficiently, giving sufficient time to perform all their responsibilities in priority.

5. Role of Government to Develop Women Entrepreneurs in India:
Development of women has been a policy objective of the government since independence. Until the 70s the concept of women‘s development was mainly welfare oriented. In 1970s, there was a shift from welfare approach to development approach that recognized the mutually reinforcing nature of the process of development. The 80s adopted a multi-disciplinary approach with an emphasis on three core areas of health, education and employment. Women were given priorities in all the sectors including SSI sector. Government and non-government bodies have paid increasing attention to women‘s economic contribution through self-employment and industrial ventures.

The First Five-Year Plan (1951-56) envisaged a number of welfare measures for women. Establishment of the Central Social Welfare Board, organization of Mahila Mandal's and the Community Development Programs were a few steps in this direction.
In the second Five-Year Plan (1956-61), the empowerment of women was closely linked with the overall approach of intensive agricultural development programs. The Third and Fourth Five-Year Plans (1961-66 and 1969-74) supported female education as a major welfare measure.

The Fifth Five-Year Plan (1974-79) emphasized training of women, who werein need of income and protection. This plan coincided with International Women's Decade and the submission of Report of the Committee on the Status of Women in India. In1976, Women's welfare and Development Bureau was set up under the Ministry of Social Welfare.

The Sixth Five-Year Plan (1980-85) saw a definite shift from welfare to development. It recognized women's lack of access to resources as a critical factor impending their growth.

The Seventh Five-Year Plan (1985-90) emphasized the need for gender equality and empowerment. For the first time, emphasis was placed upon qualitative aspects such as inculcation of confidence, generation of awareness with regards to rights and training in skills for better employment.

The Eighth Five-Year Plan (1992-97) focused on empowering women, especially at the Gross Roots Level, through Panchayati Raj Institutions. The Ninth Five-Year Plan (1997-2002) adopted a strategy of Women's Component Plan, under which not less than 30 percent of funds/ benefits were earmarked for women related sectors.

The Tenth Five-Year Plan (2002-07) aims at empowering women through translating the recently adopted National Policy for Empowerment of Women (2001) into action and ensuring Survival, Protection and Development of women and children through rights based approach.
At present, the Government of India has over 27 schemes for women operated by different departments and ministries. Some of these are:

1.Assistance to Rural Women in Non-Farm Development (ARWIND) schemes
2.Entrepreneurial Development program (EDPs)
3. Indira Mahila Yojana
4.Indira Mahila Kendra
5. Integrated Rural Development Program (IRDP)
6. Khadi And Village Industries Commission (KVIC)

7. Management Development program
8. Women's Development Corporations (WDCs)
9. Marketing of Non-Farm Products of Rural Women (MAHIMA)
10. Mahila Vikas Nidhi
11. Mahila Samiti Yojana 299
12. Mahila Vikas Nidhi
13. Micro Credit Scheme
14 Micro & Small Enterprises Cluster Development Programmes (MSE-CDP).
15. NGO's Credit Schemes
16. NABARD- KfW-SEWA Bank project
17. National Banks for Agriculture and Rural Development's Schemes
18. Priyadarshini Project- A programme for Rural Women Empowerment and Livelihood in Mid Gangetic Plains'
19. Prime Minister's Rojgar Yojana (PMRY)
21.Rashtriya Mahila Kosh
22.Rajiv Gandhi Mahila Vikas Pariyojana (RGMVP)
23.SIDBI's Mahila Udyam Nidhi
24. SBI's Stree Shakti Scheme
25.Trade Related Entrepreneurship Assistance and Development (TREAD)
26. Working Women's Forum
27. Training of Rural Youth for Self-Employment (TRYSEM)

6. Suggestions to increase Women entrepreneurship in India.

The elimination of obstacles for women entrepreneurship requires a major change in traditional attitudes and mindsets of people in society rather than being limited to only creation of opportunities for women. Hence, it is imperative to design programs that will address to attitudinal changes, training, supportive services. The basic requirement in development of women entrepreneurship is to make aware the women regarding her existence, her unique identity and her contribution towards the economic growth and development of country. The basic instinct of entrepreneurship should be tried to be reaped into the minds of the women from their childhood. This could be achieved by carefully designing the curriculum that will impart the basic knowledge along with its practical implication regarding management (financial, legal etc.) of an enterprise.

Women Entrepreneurship in India

For any developing country, Women entrepreneurs play the vital role particularly in terms of their contribution to the economic development. Women entrepreneurship has been recognized as an important source of economic growth. By establishing their new venture women entrepreneurs generate new jobs for themselves and others and also provide society with different solutions to management, organization and business problems. However, they still represent minority as women entrepreneurs, especially in India. Women entrepreneurs often face gender-based barriers to starting and growing their

businesses, like discriminatory property, matrimonial and inheritance laws and/or cultural practices; lack of access to formal finance mechanisms limited mobility and access to information and networks, etc. Women's entrepreneurship can make a particularly strong contribution to the economic well-being of the family and communities, poverty reduction and women's empowerment. Thus, governments across the world as well as various developmental organizations are actively assisting and promoting women entrepreneurs through various schemes, incentives and promotional measures. Over the past few decades women are coming out of the boundaries of houses and proving their ability and competencies in the business world.The role of modern women is much wider than, what it was previously. A woman has to play multiple roles, besides playing the role of housewife/mother/daughter, she has to play different roles in community in the social settings simultaneously. Because of Indian culture traditional customs women, even after 72 years of independence, are facing bias. This has adversely affected the status of Indian business women.¬Infrastructure – Infrastructure set up plays a vital role for any

7. Conclusion

It can be said that today we are in a better position wherein women participation in the field of entrepreneurship is increasing at a considerable rate. Efforts are being taken at the economy as brought promise of equality of opportunity in all spheres to the Indian women and laws guaranteed equal rights of participation in political process and equal opportunities and rights in education and employment were enacted. But unfortunately, the government sponsored development activities have benefited only a small section of women i.e. The urban middle class women. Women sector occupies nearly 45% of the Indian population. At this juncture, effective steps are needed to provide entrepreneurial awareness, orientation and skill development programs to women. The role of Women entrepreneur in economic development is also being recognized and steps are being taken to promote women entrepreneurship. Resurgence of entrepreneurship is the need of the hour emphasizing on educating women strata of population, spreading awareness and consciousness amongst women to outshine in the enterprise field, making them realize their strengths, and important position in the society and the great contribution they can make for their industry as well as the entire economy. Women entrepreneurship must be molded properly with entrepreneurial traits and skills to meet the changes in trends, challenges global markets and also be competent enough to sustain and strive for excellence in the entrepreneurial arena. If every citizen works with such an attitude towards respecting the important position occupied by women in society and

understanding their vital role in the modern business field too, then very soon we can pre-estimate our chances of out beating our own conservative and rigid thought process which is the biggest barrier in our country‘s development process. We always viewed that a smart woman can pick up a job any day, but if she becomes an entrepreneur she can provide a livelihood to 10 more women at least..!! Highly educated, technically sound and professionally qualified women should be encouraged for managing their own business, rather than dependent on wage employment outlets. The unexplored talents of myoung women can be identified, trained and used for various types of industries to increase the productivity in the industrial sector.

References

1. Saidapur, S et.al, ‘Women candle entrepreneurs in Gulbarga district – A micro analysis’, Spectrum: A Journal of Multidisciplinary Research’, vol.4, 2012, pp. 7-17.
2. Dhameja S K (2002), Women Entrepreneurs: Opportunities, Performance and Problems, DeepPublisher (P) Ltd., New Delhi.
3. MahantySangramKeshari – Fundamentals of Entrepreneurship – Prentice Hall of India Raheem A (2006), "Role of SHGs", Yojana, Vol.
50, No. 12.Renuka V. (2001) Opportunities and challenges for women in business, India Together, Online Report, Civil Society Information Exchange Pvt. Ltd.
4. MahantySangramKeshari – Fundamentals of Entrepreneurship – Prentice Hall of India Raheem A(2006), "Role of SHGs", Yojana, Vol.
50, No. 12.Renuka V. (2001) Opportunities and challenges for women in business, India Together, Online Report, Civil Society Information Exchange Pvt. Ltd.
5. Global Entrepreneurship Monitor (2012) GEM 2011 Global Report. Publishedonline,http://www.gemconsortium.org
6. Arora, R.;andSood, S.K.(2005), ―Fundamentals ofEnterpre neur ship and Small Business
7. Baporikar, N. (2007) Entrepreneurship Development & Project Management- HimalayaPublication House.
8. Brush, C. (1997). Taori,Dr. Kamal - Entrepreneurship in the Decentralised Sector Women-Owned Businesses: Obstacles and Opportunities, Journal of Developmental Entrepreneurship

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY EDUCATIONAL RESEARCH
ISSN:2277-7881; IMPACT FACTOR :6.514(2020); IC VALUE:5.16; ISI VALUE:2.286
Peer Reviewed:VOLUME:9, ISSUE:4(1), APRIL :2020

LAND USE PATTERN IN CLIMATIC PHYSIOLOGICAL ZONES OF KERALA

Shijitha M
Assistant Professor(Research Scholar)
Department of Economics
Sree Keralavarma College, Thrissur

Dr K.M.Francis
Associate Professor(Retd)
Department of Economics
St.Thomas College(Autonomous)
Thrissur

Dr Sabu P J
Assistant Professor
Department of Economics
St.Thomas College (Autonomous)
Thrissur

Abstract

The Paper examines the regional variations in Land Use Pattern of Kerala, by categorizing the state into three Climatic Physiological Zones on the basis of topography. The study analysed the variations in utilisation of land in the selected districts of Kerala-Alappuzha, Malappuram and Palakkad with secondary sources and concenterated upon how the regional differences in altitude and climate create variations in land use and cropping pattern in the selected districts. The study concludes by observing that regional variations exists in the agricultural area and a certain proportion of the area is still unutilized in the midst of emergencies and the voluntary as well as involuntary implementation of Government Schemes is necessary for the State to utilise the fallow lands and cultivable wastelands which is represented as unutilized agricultural area in order to make the State Self-Sufficient to attain Food Security. Among the 17 Sustainable Development Goals for the Planet adopted by all UN Member states , the goals such as No Poverty, Zero Hunger, Good Health and well being, Climate Action, a happy life on Land can be achieved with the proper and maximum utilisation of the fallow lands which are kept as unutilized and through that the state can create a balanced ecological environment which will be a path for sustainable development.

Index Terms – Climate, Physiological Zones, Land Use Pattern, Utilised Agricultural Area, Sustainable Development Goals.

1.1 Introduction

Kerala, being the 'Spice Garden of India' gives priority to the agricultural products whose productivity depends on the physiological features. Physiologically, the terrain has three natural regions namely, lowlands,

midlands and highlands and the regions directly or indirectly influence the Land Use Pattern of Kerala and the terrain is protected by the Western Ghats, the mountain ranges which naturally provides a protection to all the economic activities, especially the agriculture related activities of Kerala.

The Total Geographical area of the State is divided into three climatically distinct and parallel physiographic zones which include

i) Eastern Highlands(Rugged and cool mountainous terrain)
ii) The Central Midlands(Rolling Hills)
iii) Western Lowlands(also called as Coastal Area)

The Eastern Highlands include the steeply sloping areas of Western Ghats and are mainly under the forest coverage, the Midland plains of Central Region consist of wide valleys and Rolling Hills, hillocks with laterite capping, mountains which are not so steep. The coastal lowlands which are the wetlands include the alluvial plains, sandy stretches and lagoons in which paddy fields and thick groves of coconut trees are interconnected with canals and rivers. The wetlands are the water precipitation systems which acts as an active tool to prevent flood and acts as the reservoirs of bio- diversity.

1.2 Significance and objective of the study:

The proper utilisation of land which is fixed in supply requires a well defined, efficient and scientific land use planning which may be varying according to the topography and climate in different regions in the economy and will help to create an ecological balance through sustainable development. The study examines the land use pattern, Cropping Pattern and its variations across the climatic physiological regions in the selected districts of Kerala and focuses on the proportion of utilised and unutilized agricultural area in the selected districts.

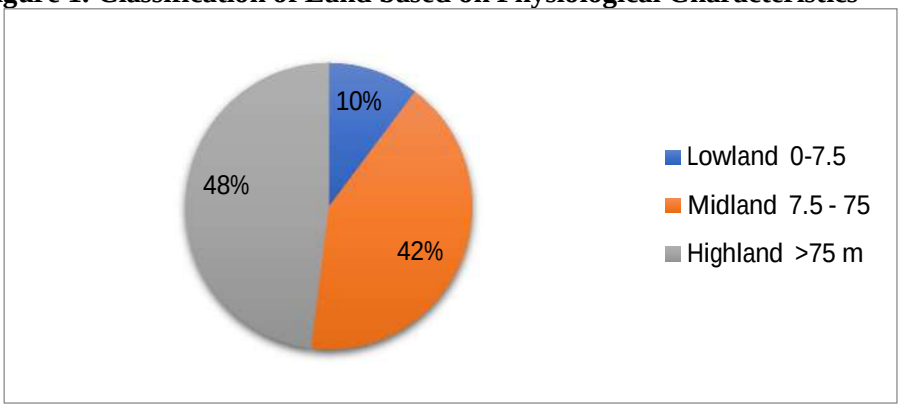
1.3 Data Base and Research Methodology

The study is purely based on secondary data related to Land Use Pattern in Kerala and the selected districts which is collected and compiled from sources such as reports of Department of Economics and Statistics, Kerala Economic Reviews and District Agricultural Statistics. Based on the three physiological regions identified in Kerala, viz Lowland, Midland and Highland, three districts are selected for the study. Alappuzha, Malappuram and Idukki are selected as study area as these are the districts of Kerala that have the largest proportion of area in the three different physiological regions.

1.4. Land Use Pattern in Kerala- A Comparative Analysis

The physiological zones along with the altitudes and the proportion of areas of land under each zone in Kerala is represented in Figure 1.

Figure 1. Classification of Land based on Physiological Characteristics



Kerala, the God's own country, though small in size, is protected with Nature itself with a balanced ecological environment occupies 48 percent Highland, 42 percent Midland and 10 percent Lowland respectively which interprets that Kerala is protected from the wide climate variations by the natural stream of Mountain Ranges, the Western Ghats. The Land classification based on Physiological characteristics in selected districts of Kerala is represented in the Table 1.

Table 1 . Land Classification based on Physiological Characteristics in selected Districts

Physiological Zones	Alappuzha		Malappuram		Idukki	
Unit	Area(sq.km)	Area(%)	Area(sq.km)	Area(%)	Area(sq.km)	Area(%)
Lowland	1128.09	80	656.86	18.48	0	0
Midland	282.02	20	1597.02	44.93	130.90	3
Highland	0.00	0	1300.58	36.59	4232.38	97
Grand Total	1410.11	100	3554.46	100	4363.28	100

Source : Kerala Economic Review

Alappuzha with no forestland and highland occupies 80 percent of Lowland or wetland and 20 percent of Midland in which lowlands or the wetland is saturated with water either permanently or temporarily. The lowlands can be converted to paddy cultivating lands and can be utilised as protective tool for flood control and water management. The land use in the lowland is dependent upon the water level, the types of plants that can be cultivated and especially the acquatic plants like lotus and fish that can be cultivated when the water level is high. Malappuram with Midlands creates variations in cropping pattern by preferring crop diversification. Idukki with the absence of lowlands reflects the production of plantation crops such as tea, coffee, cardamom, including rubber.

1.5 Regional variations in Utilised and Unutilised agricultural area:

The Land Utilisation Pattern refers to the surface utilisation of land for different purposes such as agricultural and non- agricultural which inludes residential as well as forest lands. Total Agriculture area represented as the summation of Area under Miscellaneous Tree crops (M_t), Current Fallows(C_f), Fallows other than current fallows(FO_{cf}), Cultivable Waste land (C_w) and Net Area Sown(NA_S). The summation can be split as Utilised Agricultural Area(U_A) which comprises of the Net Area Sown(NA_S) and Area under Miscellaneous Tree crops (M_t) while Unutilized Agricultural Area (UN_A) consists of Current Fallows(C_f), Fallows other than current fallows(FO_{cf}) and Cultivable Waste land (C_w).

$U_A = NA_S + M_t$ and $UN_A = C_f + FO_{cf} + C_w$

The study intents to analyse how much area is kept as unutilized in Kerala and how it can be further utilised in the future by knowing that existing land is perfectly inelastic in supply. The limited availability of land makes it more worthy to utilise even the cultivable waste and fallow lands and make it a provision for increased per capita food availability for the fast growing population.

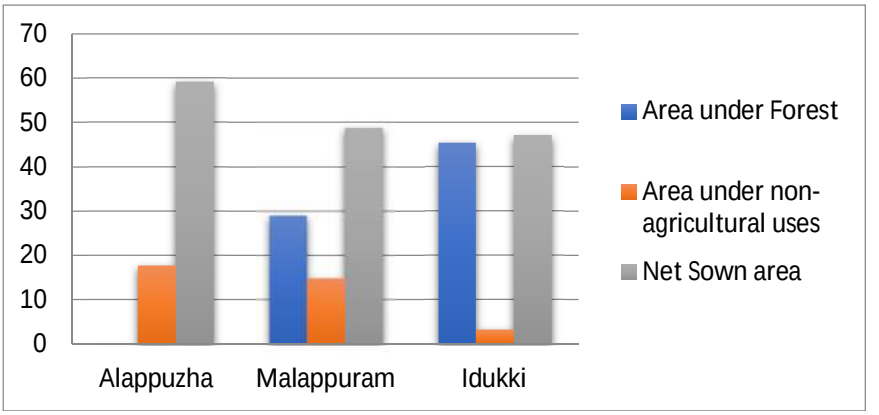
Table 2 . Land Use Pattern of Kerala and the selected Districts in 2017-18.

Sl. No	Land Use Categories	Kerala(%)	Alappuzha(%)	Malappuram(%)	Idukki(%)
1	Total geographical area	100	100	100	100
2	Area under Forest	27.83	0	29.09	45.47
3	Area under non- agricultural uses	11.40	17.84	14.88	3.29
4	Barren and Uncultivated land	0.28	0.01	0.24	0.32
5	Permanent Pastures and other grazing land	0	0	0	0
6	Land under miscellaneous tree crops, groves	0.06	0.07	0.05	0.04
7	Cultivable waste	2.48	10.58	1.62	0.49
8	Fallow lands other than current fallows	1.27	1.74	1.66	0.26
9	Current Fallow	1.48	1.29	1.77	0.38
10	Net Sown area	52.50	59.38	48.89	47.09
11	Still Water	2.54	8.83	1.74	2.40
12	Water Logged Area	0.08	0.24	0.02	0.00
13	Social Forestry	0.07	0.03	0.05	0.26
14	**Unutilised Agricultural Area**	**5.24**	**13.61**	**5.05**	**1.12**
15	**Utilised Agricultural Area**	**52.56**	**59.45**	**48.93**	**47.13**

Source: Kerala Economic Review

The Net Area Sown refers to the area which is used for cultivation in the current year which is obtained by deducting the Area Sown More Than Once from the Gross Cropped Area. The Area suitable for cultivation is kept as unutilized in Kerala and the districts and if it is utilised, the problem of food scarcity can be solved and the dependency of the state on the neighbouring states can be restricted. If the Gross Cropped Area is greater than the Net Area Sown, it is an indicator of intensive cultivation and the three districts have a high Gross Cropped Area which reflects Intensive Cultivation. The repeated cultivation in the same land with the excess use of fertilisers is also reflected in all the states which is a key indicator of over- exploitation of the existing land resources (Saka, 2011).

Figure 2. Land Utilisation pattern in selected districts of Kerala(percentage)



The usual land use patterns in the selected districts are mainly three- Area under Forest, under non- agricultural uses and Net Sown Area. The Net Area Sown in Alappuzha reveals the suitability of land for agricultural purposes especially with Paddy Cultivation while a Idukki reveals only Lower proportion of Net Area Sown which may be due to existence of deep forests and rocks which creates difficulties to access such areas by human beings. Since the cultivation in wetlands create risky situations for the farmer in the Rainy season, they prefer the Summer cultivations for which lesser quantities of water and fertlisers is needed. The percentage proportion of area of crops that are cultivated in the selected districts and the Climatic Pyhysiological zones in the selected districts is represented in Table 3.

Table 3. Area-wise Percentage Distribution of Crops cultivated in 2017-18

Crops	Alappuzha	Malappuram	Idukki
Autumn(Paddy)	8.35	0.11	0.06
Winter(Paddy)	4.94	1.65	0.30
Summer(Paddy)	19.69	0.81	0.03
Wet Paddy	32.98	2.57	0.39
Dry Paddy	3.69	0.02	0.01
Total Cereals	**36.67**	**2.59**	**0.40**
Pulses	0.02	0.00	0.03
Total Foodgrains	**36.69**	**2.59**	**0.43**
Sugar crops	0.04	0.08	0.51
Spices	2.71	27.84	10.91
Fresh Fruits	10.97	10.79	16.48
Cashew(Dry Fruit)	1.51	0.64	0.49
Total Fruits	**12.47**	**11.43**	**16.97**
Tapioca	2.26	1.80	3.24
Tubers	1.41	0.51	0.72
Vegetables	2.38	1.62	3.16
Oilseeds	**29.74**	**34.65**	**7.51**
Non- Food crops	0.03	0.04	0.05
Plantation Crops	**4.16**	**14.38**	**40.18**

Source: Kerala Economic Review

The variations in the cropping pattern is reflected in the Table which shows that in Alappuzha Wetlands, Summer Paddy and Coconut is the main cultivation , while in Malappuram Midlands, only 2.59 percent of the total agricultural land is used for producing foodgrains and 34.65 percent is used for coconut cultivation. In Idukki, 40.18 percent of the total agricultural area is used for plantation crops like rubber, tea, cocoa and coffee and 16.97 percent of the area is used for production of fruits. With the high altitude, Idukki is a true model for sustainable development with 46 percent of forest area which all the other states can follow by the Forest Regulation Act that either a natural or man-made forest is mandatory for every district in order to attain the Sustainable Goals.

In Lowlands, summer paddy cultivation in the rabi season is preferred which is sown in the months of November to February and harvested in March to June. The lowlands or wetlands are not preferable for cultivation during the autumn and winter. In the ribbon valleys of laterite terrain, Rice is the dominant crop, while the adjoining hilltops have plantations of rubber, fruit trees and other cash crops like pepper, arecanut and tapioca. The existence of evergreen forests and cold climate in the top altitude is suitable for the production of fruits and plantation crops. The regional differences are reflected in the selection of crops suitable for cultivation. The unutilized land in Highlands is low due to the existence of Red Loam Soils and humid climates which nature creates by its own

to the living inhabitants and it is cost- effective as less quantities of fertilisers are required for cultivation.

1.6 Conclusion:

The land, fixed in supply, have to be utilised in the proper manner with maximum allocation of all the resources and initiatives must be taken by Government to promote agriculture, to promote attainment of better living along with self- reliant economy, by procurement of agricultural commodities, by providing awareness to the younger generation, by producing the food crops from within the economy itself, thus finding a solution to the agricultural crisis existing in Kerala. The proper utilisation of land according to physiological characteristics will help to attain the Sustainable Development Goals with an ecological balance in the ecosystem along with the protection of our environment.

References:

- Bhardan D and Tewari S K (2010),An investigation into Land Use Dynamics in India and Land under utilisation,Indian Journal of Agricultural Economics, Vol 65, No:4, Oct- Dec.
- Dr Premkumara and Seema (2013), Land Use Pattern in India and Karnataka : A comparative Analysis, International Journal of Scientific Research, Vol 2, Issue 10, Oct 2013.
- Genene Tsegaye and Wagayehu Bekele(2010), Farmer's perception of land degradation and determinants of food security at Bilate Watershed, Southern Ethiopia, EJASTI 1 (1), 49-62
- Harilal K N and Joseph K J(2003), Stagnation and Revival of Kerala Economy: An open Economy Perspective, Economic and Poilitical Weekly, 38(23):2286-2294
- Jelili Olaide Saka(2011), The structure and determinants of Land-Use intensity among food crop farmers in South Western Nigeria, Journal of Agricultural Science, Vol 3, No 1, 194-205
- Laishram Priscilla, Arsha Balakrishnan, Lalrinsangpuii and A.K.Chauhan(2017), A study on the performance of Agricultural sector in India, Indian Journal of Agricultural Research, Vol 51, Issue 3, pages 282-286
- Prakash B A (2017), Agricultural Development of Kerala from 1800 AD to 1980 AD: A survey of studies, Reprint of Working Paper No:220 of Centre

for Development Studies, Trivandrum, June 1987, republished by Economic Studies Society, Aug 2017.

- Sanzidur Rahman(2016), Impacts of Climate Change, agro-ecology and socio- economic factors on agricultural land use diversity in Bangladesh, Land Use Policy, 50, pages 169-178
- Zachariah and Irudaya Rajan(2007), Migration, Remittances and Employment:Short term trends and long term implications, Working Pr No:395, Centre for Development Studies,TVM
- Web based land information system, Kerala Economic reviews, Agricultural Statistics Reports, Directorate of Economics and Statistics.

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY EDUCATIONAL RESEARCH
ISSN:2277-7881; IMPACT FACTOR :6.514(2020); IC VALUE:5.16; ISI VALUE:2.286
Peer Reviewed:VOLUME:9, ISSUE:4(1), APRIL :2020

FINANCIAL INSTITUTIONS AND ITS ROLE IN DEVELOPING MSME'S IN INDIA IN PRESENT CONTEXT

Shrikanth Ganapati Naik
Assistant Professor
Department of Commerce
Government First Grade College
Kumta, Karnataka State

Jayadatta S
Assistant Professor
KLE's IMSR, BVB Campus
Vidyanagar, Hubli, Karnataka State

Abstract:
Today MSME sector is playing a significant and vital role in the development of Indian economy. A catalyst for socio-economic transformation of the country, the sector is critical in meeting the national objectives of generating employment, reducing poverty, and discouraging rural-urban migration. These enterprises help to build a thriving entrepreneurial eco-system, in addition to promoting the use of indigenous technologies. The sector has also exhibited consistent growth over the last few years, but it has done so in a constrained environment often resulting in inefficient resource utilization. Of the many challenges impeding the growth and development of MSMEs, inadequate access to financial resources is one of the key bottlenecks that make these enterprises vulnerable, particularly in periods of economic downturn. In the overall value chain of different industries various firms are placed in critical positions. It is thus very much imperative to focus on those issues which impact the creation, growth and survival of the firms of the sector. Today in considering the development of MSME sector, role played by credit lending institutions is quite remarkable. Indian financial institutions and government has a crucial contribution in development as well as promotion of MSME sector. The present paper closely analyses the growth and development initiatives of Indian MSME's from opening of the economy in the last few years or so. The other part of the paper looks into the present scenario role of various financial institutions in overall development of MSME's across the nation. Research paper also aims to evaluate possible opportunities and challenges in the sector for raising funds through various financial institutions which should be considered by policy makers for better sustained results ahead.

Keywords: Financial Institutions, MSME's, resource utilization, entrepreneurial ecosystem, economic downturn, development initiatives

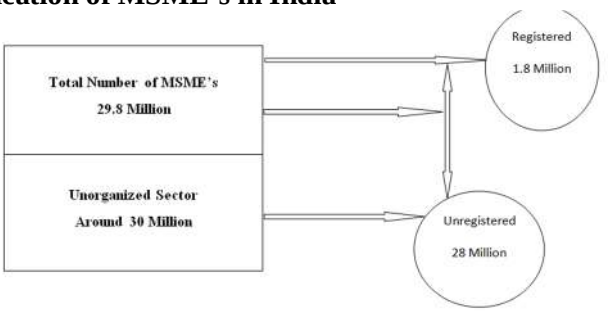
Introduction:

MSME (Micro, Small and Medium Enterprises) sector is very much crucial to India's economy. There are around 29.8 million enterprises in various industries

employing around 69 million people. MSME sector accounts for 45 percent of Indian industrial output and 40 percent of overall exports. Although 94 percent of MSME's are unregistered the contribution of sector to India's GDP has been growing consistently at around 11.5 percent a year which is higher than the overall GDP growth of 8 percent.

The Micro, Small and Medium Enterprises sector has emerged as a highly vibrant and dynamic sector of the Indian economy over the last five decades. MSMEs not only play significant role in providing employment opportunities at comparatively lower cost of capital than large scale industries but also help in establishment of industrialization of rural and backward areas, which leads to reduce regional imbalances and assure equitable distribution of national income and wealth. MSMEs are complementary to large industries as ancillary units and contribute enormously to the socio-economic development of the country. MSMEs of India have to face many challenges and utilize the opportunities in the fast changing global markets. Now, MSMEs are required to make use of consultancy services to upgrade their competencies in various fields like marketing, finance, business development operations, technology etc. MSMEs are having significant contribution in the country's industrial output, employment, exports and consistent growth in employment followed by agriculture. The MSME sector not only providing employment but also helped rural development which was the biggest challenge in front of the Government as in initial phase of industrialization which has attracted rural population towards urban region. It has provided balanced regional development of the country and proved as a key success factor for rural development. The growth of this sector also contributes significantly in the development of entrepreneurial skills among the people, decentralization of ownership, elimination of monopoly power in the market, avoidance of concentration of wealth and power and to ensure the balanced economic and social development of the country.

Broad Classification of MSME's in India



Source: MSME Census, NCEUS

Some of the Major highlights of the MSME sector are as follows:

- Number of MSME units: Around more than 45 million units in various sectors
- Production: 45% of Industrial manufacturing output
- Exports: 40% of India's total overall export
- Employment: Providing employment to almost more than 100 million people creating
  Approximately 2 million job opportunities every year
- Products: More than 8000 products

Major objectives of the study:

The major objectives of the present study are as follows:

1. To know and analyse the contribution of MSME's in Indian Economy
2. To examine the growth and performance of MSME's
3. To analyse the role of financial institutions in development of Indian MSME's
4. To analyse various challenges and opportunities available for Indian MSME's
5. To study growth and performance, present policy framework, employment opportunities, FDI Policies, de-reservation schemes in MSME's

Research Methodology adopted in the study:

The data required for the present study has been collected from secondary sources. The data collected for the study includes i). Annual reports of MSME's ii). SIDBI's reports on MSME reports iii). Ministry of MSME releases iv). RBI Annual reports v). Various websites relevant to topics

MSME- Considered as backbone of Indian economy:

MSMEs in India are continuously gaining importance due to their significant contribution towards key factors of Indian economy. MSME units contribute more than 90% of total industrial units in India. To promote national economy Government is taking several steps to boost manufacturing sector. Government's intention towards industrialization can be analysed through formation of various institutions for policy designing and allocation of funds through Five Year Plans. Formation of National Manufacturing Competitiveness Council by Government suggests ways to enhance competitiveness in the manufacturing sector to make sector globally competitive. Government has announced National Manufacturing Policy for raising the share of manufacturing to 25% of GDP by 2022. Make in India announced in September 2014 by New Government aims at to make India a Global Manufacturing hub.

SOURCES OF FINANCING FOR MSMES:

The MSMEs in India largely depend on self-finance. As per the fourth census of MSME sector 87.23% of all enterprises were found in the category of taking "self-finance/No finance". This high percentage of units depending on "self-finance/No finance" can be a result of high proportions of units falling in "Micro enterprises" category. Micro enterprises comprise 94.94% of all the MSME units in India, whereas the share of small enterprises is 4.89% and that of medium enterprises is only 0.17%.

Without much adequate financing opportunities MSME's face the problem of receivables management through factoring services. The delayed payment by the purchasers from larger enterprises has always been an issue of great concern for the MSMEs. Financial Institutions in India have to be more proactive in providing finance against the receivables factored. Globally, factoring is a preferred route of accessing working capital for SMEs. The enactment of Factoring Regulation Act in 2011 in India is expected to give boost to factoring services. Factoring offers benefits like open account facility which means credit limit increases as sales grow, provided the firm has a satisfactory record of payments.

Concerns involved in providing finance to MSMEs:

The growth in providing finance to MSMEs cannot be achieved without addressing the concerns of formal financial institutions like banks in lending to this sector. MSMEs are considered as high risk borrowers due to factors such as insufficient assets and low capitalization. The firms being highly vulnerable to economic and marketing fluctuations have high mortality rates. According to Reserve Bank of India (RBI) data, the number of sick units in MSME sector has increased by 16% to 90,141 units in March 2011 from 77,723 units in March 2010. As per current definition, a unit is considered sick when any of the borrower account of the unit remains substandard for 6 months or there is erosion in the net worth due to accumulated cash losses to the extent of 50% of its net worth during the previous accounting year and the unit has been in commercial production for at least two years. For the financial year 2011-12, the share of Micro and Small Enterprises in banking system credit was 9.8% whereas the share of these firms in banking system Non Performing Assets (NPA) was as high as 17.9%. Large number of MSMEs turning sick units and the rising trend of NPA pose a significant risk for the banks. The information asymmetry that exists in lending to MSMEs act as an obstacle in ensuring credit flow to the sector. The credit information about small enterprises is not easily available and it is not cost effective for the banks to collect information on large number of small enterprises. This often results into lending rates being loaded with the cost of information asymmetry. Information asymmetry makes it

difficult for the lenders to distinguish between bankable projects and doubtful projects. As per the 4th census of MSME sector 90.08% of the enterprises are of proprietary in nature. Such a large proportion being dependent on the proprietors and without having succession planning in most cases make the sector unattractive for the lenders. The inability of smaller firms to hire appropriate manpower means that they rely on the proprietors too heavily. In the absence of adequate collateral offered by the most MSMEs, financial institutions depend on the technical, managerial and marketing skills of borrowers to service the loan which increases the risk profile of these firms. The other problems that lenders find in dealing with MSMEs are lack of transparency and reliability of data, lack of financial discipline and inability to provide sound financial track record.

Contribution of MSMEs in Production and GDP:

More than 45 million units accounting for more than 90% of industrial units are playing key role in boosting economic growth of the country. MSMEs production has consistently grown over the period of last few years and stood at Rs. 671910 Crore i.e. 37.52% of total industrial output at the end of FY12. MSME has also proved them as engine of employment creation and total number of employment at the end of FY12 stood at 1011.8 Lakhs generating approximately 1.5 million employment opportunities every year.

MSME's financing strategy:

Finance is believes as the lifeblood of business. Majority of Indian MSMEs are falling in unorganized sector and hence struggling for regular credit flow. For start-ups, entrepreneurs are managing finance through informal sources as they used to struggle for seed funding. MSMEs require timely and adequate capital infusion through term loans and working capital loans basically in the early and growth stages. Majority of Indian MSMEs have relied on following sources for their financing need:

- Personal savings, ancestral capital, loan from relatives and also loan from unregulated markets
- Retained earnings, fundings through sale of major assets
- Institutional financing from schedules commercial banks
- Venture capital funds/ seed funds

In respect of MSME contribution, there are so many organizations that which have set up by the central governments, state governments and also banks to support development of MSME's. Some of the major list of institutions set up for MSME development is as follows:

A. Central government
    1. Central board for Micro, Small and Medium enterprises

2. Small industries development organization
3. National Institute for MSME's
4. National small industries corporation Ltd
5. Entrepreneurship development institute of India Ltd

B. State Government:
1. District Industry centres
2. Khadi and village industries commission (KVIC)
3. State Financial corporations
4. State small industries development corporation
5. State industries development corporations/State Industrial investment corporation

C. Banks:
1. Major Commercial Banks
2. Regional rural banks
3. Small Industries development corporations of India (SIDBI)
4. Co-Operative banks
5. National Bank for agriculture and Rural development (NABARD)

Apart from the above stated major forces there are also other sources of finance which MSME's choose as an easy viable source. These sources are own funds, funds from relatives or funds, credit obtained from suppliers and other such informal sources.

Major Role of Financial Institutions and development of MSME's in India:
Indian MSMEs have proved themselves as key factor for overall economic development. Considering the role of MSMEs government has taken time to time initiatives for development and promotion of the sector. After analysis it is found that Government has made huge investments through five year plans for product, skill and competitive development of MSME sector. In the county like India where economy is in its developing phase has to give due consideration for key success factor. The same happened to Indian MSMEs which has attracted the attention of policy makers and researchers.

Analysis of Bank credit against MSME's fixed investments and production:
Indian MSMEs performance is showing excellent growth in production over the period of time. Production contributing towards 45% of industrial output and 40% in export has attracted the attention of policy makers and financial institutions. Various initiatives jointly by Government of India and Small Industrial Development. Bank of India (SIDBI) led to financial inclusion and growth of MSME sector in recent years. The growth percentage of bank credit against fixed asset investment and production of MSME is increasing at 33% and 22% respectively. The increase in credit flow is indication of policy makers

concern towards growth of MSME sector for economic development of the nation.

Increase in credit flow from formal sector to MSME is due to GOI and SIDBI initiatives which include:

- Inclusion of Micro and Small Enterprises in Priority Sector Lending
- Funding support to Credit Guarantee Fund Scheme to enhance unsecured financing
- Financial support to increase penetration of credit rating
- Promotion of Cluster Development
- The Nair Committee Recommendations
- Priority Sector Lending Norms
- Prime Ministers Task Force on MSMEs recommendations
- Policies to facilitate multi prolonged support to-Skill Development, market linkages, technology adaptation and infrastructure

Product and service portfolio through which financial institutions offering credit to MSME sector are as follows:

Banks offering loans to MSME sector can be categorized are as follows:

- Fund based products and
- Non fund based products like Letter of Credit

Bank Guarantee, Current Account, Saving Account and Remittance. The overall support from government and competitive legal and regulatory environment has given boost to credit supply to MSMEs from financial institutions. The increased credit supply will certainly make MSME sector stronger and enhance their competitiveness in global market. Technology up-gradation, tool room facilities, incubators and entrepreneurial training facilities will surly enhance the capabilities of MSME to increase contribution in GDP and to achieve the goal of government by 2022 of 25% manufacturing contribution in GDP.

Some of the major challenges faced by MSME sector:

Irrespective of the efforts taken by government of India and Reserve bank of India in credit supply to MSME sector there is a huge gap between credit supply and demand by the sector. Not only the credit but there are others things too which are hindering the growth of the sector. Some of these challenges are as follows:

A. **Financial exclusion**:

Access to adequate and timely credit at a reasonable cost is the most critical problem faced by MSMEs. The statistics compiled in the fourth census of MSME sector revealed that only 5.18% of the units had availed finance through institutional sources, 2.05% through non-institutional sources and 92.77% of MSME units dependent on self-finance of informal sources. This problems needs to be address to make MSME sector globally competitive

and achieve GDP targets or expectations from the sector. Government needs to play a catalytic role to cater the needs of this sector.

B. **Infrastructure**:
India is aiming at best in class infrastructural facilities for MSME's. Infrastructural problems restrict private initiatives in this sector. Therefore creation of better infrastructural facilities for MSME's must receive priority

C. Marketing:
After the revolution in IT sector, assumed market for MSME products is no more in existence. To enhance MSME competitiveness due consideration should be given to various application of IT based products for use for the purpose of marketing should be promoted.

D. **Technology**:
Due to high initial cost of technology up-gradation, MSMEs are lagging behind in adaptation of technology and unable to be cost efficient. Sustainable Business Model approach should promoted with various attractive packages to MSMEs.

E. **Need for Skilled Labour:**
The major constraint of MSME sector is availability of skilled labour force. For this government should develop integrated model for integration of educational institutes with industries. This practice will enhance the ability of students to get practical knowledge and skill set required by industry along with theory.

Contribution of MSME's Towards Employment Generation:

The contribution of the Micro, Small and medium enterprises to the economic growth of a nation is well recognized. In developing countries, as some authors argue the contribution of MSME's towards employment generation is significant because they:

- ✓ Tend to use more labor intensive production processes than large enterprises, boosting employment and leading to more equitable income distribution
- ✓ Provide livelihood opportunities through simple, value adding processing activities in agriculturally based economies
- ✓ Nurture entrepreneurship and Support the building up of systemic productive capacities and the creation of resilient economic systems, through linkages between small and large enterprises

SSI Sector in India creates largest employment opportunities for the Indian populace, next only to Agriculture. It has been estimated that a lakh rupees of investment in fixed assets in the small scale sector generates employment for four persons. MSMEs not only play crucial role in providing large employment opportunities at comparatively lower capital cost than large industries but also help in industrialization of rural & backward areas, thereby, reducing regional

imbalances, assuring more equitable distribution of national income and wealth. MSMEs are complementary to large industries as ancillary units and this sector contributes enormously to the socio-economic development of the country. The sector contributes significantly to manufacturing output, employment and exports of the country. In terms of value, the sector accounts for about 45 per cent of the manufacturing output and 40 per cent of total exports of the country. It is estimated to employ about 60 million persons in over 26 million units throughout the country. There are over 6000 products ranging from traditional to high-tech items, which are being manufactured by 35 the MSMEs in India. It is well known that the MSME sector provides maximum opportunities for both self-employment and wage-employment, outside agriculture sector. MSME sector contributes not only to higher rate of economic growth but also in building an inclusive and sustainable society in innumerable ways through creation of non-farm livelihood at low cost, balanced regional development, gender & social balance, environmentally sustainable development and to top it all, recession proofing of economic growth, which the sector has proven time and again.

Foreign Direct Investment (FDI) Policy:

With the promulgation of the MSMED Act, 2006, the restrictive 24% ceiling prescribed for equity holding by industrial undertakings, whether domestic or foreign, in the MSEs has been done away with and MSEs are defined solely on the basis of investment in plant and machinery (manufacturing enterprises) and equipment (service enterprises). Thus, the present policy on FDI in MSE permit FDI subject only to the sectoral equity caps entry routes and other relevant sectoral regulations.

De-reservation

The issue of de-reservation has been a subject of animated debate within government for the last twenty years. The Approach to the Eleventh Five Year Plan notes the adverse implications of reservation of products for exclusive manufacture by the MSEs and recommends the policy of progressive reservation. To facilitate further investments for technological up gradation and higher productivity in the micro and small enterprises, 654 items have been taken off the list of items reserved for exclusive manufacture by the manufacturing micro and small enterprises in the last few years – reducing it to 21 at present. This has helped the sector in enlarging the scale of operations and also paved the way for entry of larger enterprises in the manufacture of these products in keeping with the global standards.

Testing Laboratories

Presently, there are many testing laboratories in the country which are providing testing facilities to the industrial sector including micro units. Specialized testing facilities for certain high end products specially leather items are not available in the country. The exporting MSME units are availing these facilities from the overseas testing labs. As such, there is need for creation of additional testing facilities in the country. It was recommended that setting up of at least 100 nos. quality testing laboratories for MSMEs in cluster/industry concentration, district/major industrial area. This activity can be undertaken under Public Private Partnership mode. There is also need for upgradation of existing Test Laboratories under the Ministry.

Competitive Technology

In today's fast paced global business scenario, technology has become more vital than ever before. With a view to foster the growth of MSME sector in the country, Government has set up ten state-of-the-art Tool Rooms and Training Centres. These Tool Rooms provide invaluable service to the Indian industry by way of precision tooling and providing well trained craftsmen in the area of tool and die making. These Tool Room are highly proficient in mould and die making technology and promote precision and quality in the development and manufacture of sophisticated moulds, dies and tools. The Tool Rooms are not only equipped with the best technology but are also abreast with the latest advancements like CAD/CAM, CNC machining for tooling, Vacuum Heat Treatment, Rapid Prototyping, etc. The Tool Room & Training Centres also offer various training programmes to meet the wide spectrum of technical manpower required in the manufacturing sector. The training programmes are designed with optimum blend of theory and practice giving the trainees exposure on actual jobs and hands on working experience wherein the tool Rooms have also developed

Export Promotion

Export promotion from the MSE sector has been accorded a high priority. To help MSEs in exporting their products, the following facilities/incentives are provided: (i) Products of MSE exporters are displayed in international exhibitions and the expenditure incurred is reimbursed by the Government; (ii) To acquaint MSE exporters with latest packaging standards, techniques, etc., training programme on packaging for exporters are organised in various parts of the country in association with the Indian Institute of Packaging; (iii) Under the MSE Marketing Development Assistance (MDA) Scheme, assistance is provided to individuals for participation in overseas fairs/ exhibitions, overseas study tours, or tours of individuals as member of a trade delegation going abroad. The Scheme also offers assistance for (a) sector specific market study

by MSE Associations/Export Promotion Councils/Federation of Indian Export Organisation; (b) Initiating/contesting anti-dumping cases by MSE Associations; and (c) reimbursement of 75 per cent of the onetime registration fee and annual fee (recurring for first three years) charged by GSI India (formerly EAN India) for adoption of Bar Coding.

Entrepreneurship Service Cell

The bank provides consultancy services to persons who graduate from colleges and institutions of engineering technology, and unemployed engineers, diploma holders and other graduates or business executives. The consultancy service right from identification of a project to its implementation and marketing is provided through the personnel of the bank and panels of expert specialists. For this is purpose, the cell after preliminary discussion with a prospective entrepreneur arranges a meeting with the right panel member. The cell and the panel member then assist the entrepreneur. This service was inaugurated on 3rd October, 1973 and is available at Chennai and a few other selected Centres.

Infrastructure Development

For setting up of industrial estates and to develop infrastructure facilities like power distribution network, water, telecommunication, drainage and pollution control facilities, roads, banks, raw materials, storage and marketing outlets, common service facilities and technological back up services, etc., for MSMEs, the Integrated Infrastructural Development (IID) Scheme was launched in 1994. The scheme covers rural as well as urban areas with a provision of 50 percent reservation for rural areas and 50 per cent industrial plots are to be reserved for the micro enterprises. The Scheme al so provides for upgradation/strengthening of the infrastructural facilities in the existing industrial estates. The estimated cost (excluding cost of land) to set up an IID Centre is Rs.5 crore ($1.25 million). Central Government provides 40 per cent in case of general States and upto 80% for North East Region (including Sikkim), J&K, H.P. and Uttarakhand, as grant and remaining amount could be loan from SIDBI/Banks/Financial Institutions or the State Funds. The IID Scheme has been subsumed under the Micro and Small Enterprise Cluster Development Programme (MSECDP). All the features of the IID Scheme have been retained and will be covered as “New Clusters” under MSECDP.

Conclusion:

Micro, Small and Medium Enterprises (MSMEs) have emerged as an engine of growth in several developed and developing economies of the world. In India also, they have emerged as a vibrant and dynamic component of the economy by virtue of their significant contribution to GDP, industrial production and exports. However, the most important contribution of this sector is towards

employment generation which is second only to agriculture. The experience of recent years shows that while employment in agriculture sector has been declining, large industries are also experiencing jobless growth. In such a situation, the main responsibility for job creation rests with unorganized sector including small and medium enterprises and the service sector. Considering its potential and ability, the MSMEs sector has been assigned a target of 12 per cent annual growth and additional employment of 4.4 million persons. So policy makers should give due consideration for designing good policies for the sector and equally for policy implementation. So far Financial Institutions have played an important role in support and development of MSMEs, focus should be given for more financial inclusion of MSMEs. Government should act on the recommendations of various committee reports appointed for MSME sector analysis.

There are few challenges which are hindering the growth of the sector. By addressing these challenges government can achieve best of its expectation from MSMEs performance in industrial output, export and most important GDP. MSMEs are best vehicle for inclusive growth to create local demand and consumption. The contribution of these firms demands that the bottlenecks in getting credit be removed. It is true that a large number of enterprises becoming sick units increases risk perception of the lenders. The NPA of banks resulting from lending to this sector is also very high. The setting up of Credit Information Bureau of India Limited (CIBIL) can strengthen the credit information infrastructure. This can enhance the confidence of the lending institutions in extending the credit to the MSMEs. It is important to increase the level of awareness about MSMEs about the policy measures and institutional measures aimed to facilitate credit flow to the sector. The MSME sector can evolve to be more competitive and contribute more significantly towards India's goal of sustainable and inclusive growth with the greater access to finance. The MSMEs of today will be large corporates and MNCs of tomorrow and hence will be giving strength to economy. So banks and other agencies should take pride while serving MSMEs as they are playing key role formation of such corporate and MNCs of Indian future of global industrial manufacturing hub in days to come. Export promotion within the MSME sector. We have also analyzed the opportunities given in the Indian economy for betterment of MSMEs. The factors like export promotion, reservation policy, tooling& technology, manpower training, technology and managerial skills gave enormous opportunities for growth and better performance in the economy. The core working area of the 12th five year plan also discussed in the paper. It is concluded that MSMEs in the Indian Economy have shown tremendous growth and excellent performance with the contribution of policy framework and

efficient steps which had been taken by the Government time to time for the growth and development of the MSMEs.

References:

1. Ravindra Gowda K, Shivakanth Shetty A (2010) SME's Contribution to Inclusive
2. Growth and Employment Opportunities in India. Southern Economist 1: 9-12.
3. Annual Report 2008 - 2009 (2009) Government of India Ministry of SSIs.
4. MSMEs Annual Report 2009-2010 (2010).
5. Pandiyan S (2008) Rural Industrial under Liberalization.
6. Radha J, Markkandeyan (2009) the Role of DICs in Promotion and Development of SSIs in Dindigul District. Unpublished PhD Thesis of Madurai Kamaraj University.
7. Laghu Udyog Samachar (2003) Government of India.
8. Annual Report on Development Banking in India (IDBI) (1999) 1: 17-18.
9. Annual Report on Development Banking in India (IDBI) (1999) 1: 32-33.
10. Datt R, Sundaram KPM (2006) Indian Economy. S. Chand & Company Ltd, New Delhi 53: 892.
11. Tamil Nadu-An Economic Appraisal (1997) Evaluation and Applied Research Department, Government of Tamil Nadu.
12. Report of Prime Minister's task force on Micro, Small and Medium Enterprises, Govt. of India, January, 2010.
13. Vision 2020: Implications for MSMEs (2011), Grant Thornton, FICCI.
14. Chakraborty K.C. (June, 2010). Bank Credit to MSMEs: Present status and way forward, RBI monthly Bulletin.
15. Annual Report, (2010-11). Ministry of Micro, Small and Medium Enterprise, Government of India. Badulescu Daniel. SMEs Financing: The extent of Need and the Responses of Different Credit Structures.
16. Final Report (Edition: April, 2011) 4th All India Census of MSME, 2006-07: Registered Sector. Risk Capital and MSMEs in India (A SIDBI Publication).
17. RBI Report on 'Empowering MSMEs for Financial Inclusion and Growth-Role of Banks and Industry Associations.
18. MSME Finance in India, 'A Research Study on Needs, Gaps and Way Forward, International Finance Corporations, November'12
19. Annual Reports, Ministry of Small Scale Industries, Government of India
20. "Micro, Small and Medium Enterprises Development Act – Background Paper", Jessica Wade, Small Enterprise Finance Centre, IFMR.
21. "Ministry of Micro, Small & Medium Enterprises, 2007: Micro, Small and Medium Enterprises in India: An Overview", Ministry of Micro Small and Medium Enterprise, Government of India
22. MSME Development Act 2006, Ministry of MSME, Government of India
23. "Final Results: Third All India Census of Small Scale Industries 2001-2002", August 2004 Edition, Ministry of Small Scale Industries, Government of India.
24. Nandagopal R, K, Arul Rajan and N, Vivek (2007) Research Methods in Business, New Delhi, Excel Books.
25. Kandasamy P, K, Thilagavathi and K, Gunavathi (2006), Probability Statistics and Queueing Theory, S. Chand and Company Ltd., New Delhi.

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY EDUCATIONAL RESEARCH
ISSN:2277-7881; IMPACT FACTOR :6.514(2020); IC VALUE:5.16; ISI VALUE:2.286
Peer Reviewed:VOLUME:9, ISSUE:4(1), APRIL :2020

SERVICE QUALITY AND PATIENT SATISFACTION – A EMPIRICAL STUDY ON PRIVATE HEALTHCARE INDUSTRY IN TAMILNADU

K. Suresh
Assistant Professor
Dept. of Management Studies
SRM Valliammai Engineering College
Chennai

Abstract:
The purpose of the study is to investigate the level of patient satisfaction with specific reference to private healthcare industry TamilNadu. This research investigates the factors that affect the level of patient satisfaction and the different factors influencing them. Simple random sampling under the probability sampling method was adopted for the study. Primary data collection was done by the researcher from 343respondents through a structured questionnaire. The data was analyzed using SPSS (Ver 20.0) The research findings help to understand the major factors that influence the patient satisfaction in healthcare industry in TamilNadu. The results indicate that among the various dimensions of SERVQUAL Assurance and Tangibles reflect the most significance to Patient Satisfaction and Responsiveness is the most important factors if not dealt with will lead to patient dissatisfaction.The research provides a pragmatic view on the level of satisfaction among patients in private healthcare industry in TamilNadu.

Keywords: SERVQUAL, Patient Satisfaction, Healthcare

Introduction:

There has been an incrementing interest in the global community towards the quality of healthcare services that are being provided across nations. The increased standard of living of people is a very important factor towards the increase in expectation towards quality standards in the quality of health care services. The Indian healthcare industry comprises of both public and private healthcare delivery system, and is continuing to bee one of the largest sectors in the country in terms of revenue and employment. The Government, i.e. public healthcare system comprises limited secondary and tertiary care institutions in key cities and focuses on providing basic healthcare facilities in the form of primary healthcare centres (PHCs) in rural areas. The private sector provides majority of secondary, tertiary and quaternary care institutions with a major concentration in metros, tier I and tier II cities.Healthcare comprises hospitals, medical devices, clinical trials, outsourcing, telemedicine, medical tourism, health insurance and medical equipment. The Indian healthcare sector is

growing at a brisk pace due to its strengthening coverage, services and increasing expenditure by public as well private players.

Market Size:

The healthcare market can increase three-fold to Rs 8.6 trillion (US$ 133.44 billion) by 2022.Indian medical tourism market is growing at the rate of 18 per cent year on year and is expected to reach US$ 9 billion by 2020. There is a significant scope for enhancing healthcare services considering that healthcare spending as a percentage of Gross Domestic Product (GDP) is rising. The government's expenditure on the health sector has grown to 1.4 per cent in FY18E from 1.2 per cent in FY14. The Government of India is planning to increase public health spending to 2.5 per cent of the country's GDP by 2025.Health insurance is gaining momentum in India. Gross direct premium income underwritten by health insurance grew 18.2 per cent y-o-y to Rs 24,864.01 crore (US$ 3.56 billion) in FY20 (up to September 2019).

In such a highly competitive industry it is very important to understand the quality of services that are being offered and the level of satisfaction of the customers with regard to the services that are being offered. Hence the study has been undertaken to understand the dimensions of service quality and its impact on the level of satisfaction among the patients in private healthcare industry. Service Quality is defined as the difference between the customer perception and their expectations. If the customers expectations of performance standards are met, it is considered to be of quality service.Satisfied customers show long term relationship with their service provider which result in higherlevel of compliance that leads to better health outcomes. Customer satisfaction is an important aspect for serviceorganizations and is highly related to service quality

Review of Literature:

Research over the years has established an increased considerable attention towards patient satisfaction and has become the concern of the healthcare providers. Various researchers in the past have explored the factors that influence the patient satisfaction. A careful review of the past literature has been carried out to understand the previous research in the areas of patient satisfaction as it would be of great help in framing the research objectives.

(Popa D, Druguș D, 2017)Daniela attempted to assess the psychometric properties of a new research instrument and the level of dissatisfaction of the patients with the professionalism of Romanian Healthcare Staff. Three latent factors corresponding to three dimensions of dissatisfaction emerged from the data: medical staff's ability to communicate, medical staff's hygiene, as well as sanitary and privacy conditions within the hospital. The first factor explained 43.47% of the variance in patient dissatisfaction, the second factor explained

10.24%, and the third factor explained 7.59%; overall, the three factors explained 61.30% of the total variance.

(Wen J, Schulman KA, 2014)This paper reports a systematic review of the relationship between team-based care and patient satisfaction. The research evidence showed that team-based care is better than usual care in improving patient satisfaction. However, considering the pooling result of continuous data, along with the suboptimal quality of included trials, further large-scale and high-quality randomized controlled trials comparing team-based care and usual care are needed.

(Zarei E, Daneshkohan A, 2014)The purpose of this study was to investigate the impact of the service quality on the overall satisfaction of patients in private hospitals of Tehran, Iran. This study found a strong relationship between service quality and patient satisfaction. About 45% of the variance in overall satisfaction was explained by four dimensions of perceived service quality. The cost of services, the quality of the process and the quality of interaction had the greatest effects on the overall satisfaction of patients, but not found a significant effect on the quality of the physical environment on patient satisfaction.

(Ashraf Direkvand-Moghadam, A. 2014)The aim of the present study was to investigate the effective factors on Patients' satisfaction with emergency medical services.Exploratory factor analysis showed that the Patients' satisfaction is composed of six factors, including: satisfaction of physicians, nursing staff, the presence of students, the method of reception and discharge, deciding to cure and knowing the position of the therapist. Base on the results of the factorial analysis, the most important aspect of satisfaction was the satisfaction of physicians.Physicians and nurses' actions and decision making are the major affecting factors satisfaction in emergency patients. Thus, improving the quality of these factors will improve the quality of emergency services for patients.

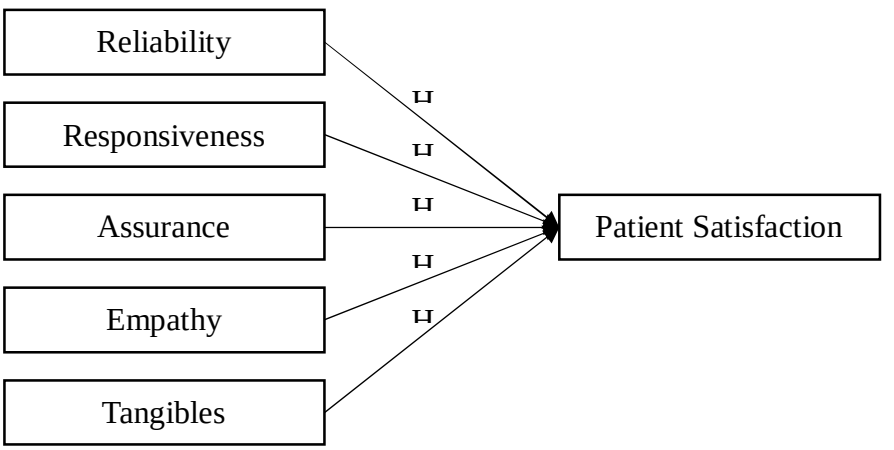
(Tetiana Stepurko, 2016)This paper analyzes the satisfaction of health care users with the quality of and access to health care services. The study focuses on six Central and Eastern European countries.The study also analyses the association of users' satisfaction with factors such as making informal payments, inability to pay and relative importance of service attributes stated by the service users.The results indicate that about 10-14 % of the service users are not satisfied with the quality of, or access to health care services they used in the preceding year.Although the average rates of satisfactions per country are relatively high, the results suggest that there is ample room for improvements.

(Pouragha, 2016)The main purpose of this study was to explore the effect of outpatient service quality on patient satisfaction in teaching hospitals in Iran. According to the findings of this study, the majority of patients had a positive experience in the outpatient departments of the teaching hospitals and thus

evaluated the services as good. Perceived service costs, physician consultation, physical environment, and information to patient were found to be the most important determinants of outpatient satisfaction. The results suggest that improving the quality of consultation, providing information to the patients during examination and consultation, creating value for patients by reducing costs or improving service quality, and enhancing the physical environment quality of the clinic can be regarded as effective strategies for the management of teaching hospitals toward increasing outpatient satisfaction.

Conceptual Framework

The conceptual framework of the study is explained in the below diagram. In line with the research objectives and the hypothesis the researcher has set the below conceptual framework. The researcher intends to investigate the level of patient satisfaction in the private healthcare industry. The study has been framed based on the following factors which would determine the level of patient satisfaction namely, reliability, responsiveness, assurance, empathy and tangibles. The research framework has been depicted in the below diagram.



Dimensions of Service Quality:

For the purpose of the current research based on the literature review and brainstorming the level of patient satisfaction is studied based on the SERVQUAL dimensions. Service quality is defined as 'a global judgment or attitude, relating to theoverall superiority of the service' (Parasuraman, Zeithaml and Berry, 1988).The SERVQUAL proposes a gap-based conceptualization of service qualitywhere the gap indicates the extent to which the service obtained confirms toexpectations.

Reliability	1	Maintains error free records
	2	A sincere interest in solving problems
	3	Providing services as promised
Responsiveness	4	Responding quickly
	5	Willing to help patients
	6	Offering prompt services to patients
Assurance	7	Ability to instill confidence in the patient
	8	Having the knowledge to answer patients' questions
	9	Ability to handle patients' problems
Empathy	10	Given individual attention
	11	Convenient consultation hours
	12	Understand the specific needs of patient
Tangibles	13	Neat appearance of employees
	14	Visual appealing facilities
	15	Neat appearance of polyclinic service
	16	Professional appearance of employees
	17	Modern equipment's
Patient Satisfaction	18	Say positive things about the hospital to other people
	19	Encourage friends and relatives to use the services of this hospital
	20	Intend to continue using the services of this hospital
	21	Have strong preference in this hospital.

Objectives of the Study:

The research has been carried out with the below objectives:

1. To study the level of patient satisfaction in Private healthcare industry in TamilNadu.
2. To examine the relationship between the various factors and the level of patient satisfaction.
3.

Research Design:

Descriptive research design was used for the study. Primary data was collected using a well-structured questionnaire having 17 items with a five-point Likert's Scale (1-Stronlgy Agree to 5-Stronlgy Disagree) was used to collect information regarding the patient level of agreement towards the various dimensions of service quality. The level of patient satisfaction has been measured through 4 items in a 5-point Likert Scale (1-Highly Satisfied to 1-Highly Dissatisfied)for the purposed of the study. Samples were collected on the basis of simple random sampling method. A total of 343 usable and complete questionnaires were collected. The information collected was tabulated and analyzed using SPSS 20.0.

Results and Discussions

Table 1: Demographic Profile of the Respondents

Demographic Profile	Category	Frequency	Percent	Valid Percent	Cumulative Percent
Age	below 25	39	11.4	11.4	11.4
	26-35	50	14.6	14.6	25.9
	36-45	80	23.3	23.3	49.3
	46-55	96	28.0	28.0	77.3
	Above55	78	22.7	22.7	100.0
Gender	male	230	67.1	67.1	67.1
	female	113	32.9	32.9	100.0
Marital Status	married	265	77.3	77.3	77.3
	bachelor	78	22.7	22.7	100.0
Occupation	Private	137	39.9	39.9	39.9
	Government	131	38.2	38.2	78.1
	Self-employed	75	21.9	21.9	100.0
Average Monthly Income	upto30000	108	31.5	31.5	31.5
	30001-40000	113	32.9	32.9	64.4
	40001-50000	66	19.2	19.2	83.7
	50001-60000	56	16.3	16.3	100.0
Education Qualification	SSLC and Below	93	27.1	27.1	27.1
	Diploma	57	16.6	16.6	43.7
	HSLC	82	23.9	23.9	67.6
	under Graduation	111	32.4	32.4	100.0

The demographic profile of the respondents is mentioned in the above table (Table 1). From the table it's inferred that majority of the respondents 96(28.0%) are in the age category 46 - 55 years, 39 (11.4%) of the respondents are in the age category of below 25 years, 50 (14.6%) of the respondents are in the age category 26-35 years, 80 (23.3%) of the respondents are in the age category 36 – 45 years, 78 (22.7%) of the respondents are in category of above 55 years of age.

As far as the monthly income is concerned, its inferred that majority of the respondents 113 (32.9%) of the respondents are in the average monthly income category of Rs. 30001 – Rs.40000, 108 (31.5%) of the respondents are in the income category of below Rs. 30000, 66 (19.2%) of the respondents are in the

category of Rs. 40001- Rs. 50000 and 56 (16.3%) of the respondents are in the income category of Rs 50001 – Rs.60000 in the monthly income category.
In regards to the marital status of the respondents, majority of the respondents 265 (77.3%) are married; 58 (25.6%) of the respondents are single. In terms of the gender of the respondents, majority of the respondents 230 (67.1%) are male, 113 (32.9%) of the respondents are single. As far as the occupation of the respondents, majority of the respondents 137 (39.9%) are working in private establishments, 131 (38.2%) of the respondents are working in government sector, 75 (21.9%) of the respondents are self-employed.
In terms of educational qualification majority of the respondents 111(32.4%) have completed under graduation, 90 (27.1%) of the respondents have their education lesser than secondary schooling, 57 (16.6%) of the respondents have completed their diploma, 82 (23.9%) have completed their higher secondary schooling.
The items used in the questionnaire were anlaysed through factor analysis to recover out the relevant factors that specify the degree of patient satisfaction. (Table2) Kaiser-Meyer-Oklin (KMO)and Bartlett's test of sphericity was carried out. KMO measure of sampling adequacy value was estimated to be 0.808 for the overall sample. The Bartlett's test of sphericity shows that the correlation among the variables is statistically significant (p=0.000). The KMO and Barlett's test results revealed the data to be fit for factor analysis.
Principal Component Analysis and Varimax rotation method was used and from the study. Table 3 shows the communalities of the loaded items and the amount of variance accounted by each of the items in the study which is between 43.3 and 72.3. The Principal Component Analysis (Table 4) showed that the 6 factors extracted account for 60.029 percent variation in the overall sample.

Table 2: KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.808
Bartlett's Test of Sphericity	Approx. Chi-Square	2126.629
	df	210
	Sig.	.000

Additionally, the test of reliability was conducted to test the reliability of the factors extracted. The Cronbach's Alpha coefficient (Table 5) for internal consistency was calculated to test the reliability. The Alpha coefficient achieved was 0.858 thus concluding that the factors were highly reliable in predicting the level of customer satisfaction. The reliability coefficient values of the factors are represented in the table 5.

Table 3: Communalities

	Initial	Extraction
RELIABILITYQ1	1.000	.713
RELIABILITYQ2	1.000	.689
RELIABILITYQ3	1.000	.598
RESPONSIVENSSQ1	1.000	.459
RESPONSIVENSSQ2	1.000	.562
RESPONSIVENSSQ3	1.000	.637
ASSURANCEQ1	1.000	.650
ASSURANCEQ2	1.000	.666
ASSURANCEQ3	1.000	.669
EMPATHYQ1	1.000	.613
EMPATHYQ2	1.000	.522
EMPATHYQ3	1.000	.621
TANGIBLESQ1	1.000	.649
TANGIBLESQ2	1.000	.723
TANGIBLESQ3	1.000	.631
TANGIBLESQ4	1.000	.653
TANGIBLESQ5	1.000	.545
PATIENTSATISFACTIONQ1	1.000	.514
PATIENTSATISFACTIONQ2	1.000	.613
PATIENTSATISFACTIONQ3	1.000	.447
PATIENTSATISFACTIONQ4	1.000	.433

Extraction Method: Principal Component Analysis.

Table 4: Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.594	26.640	26.640	5.594	26.640	26.640	2.665	12.689	12.689
2	1.724	8.210	34.850	1.724	8.210	34.850	2.285	10.882	23.570
3	1.564	7.446	42.296	1.564	7.446	42.296	2.276	10.840	34.410
4	1.381	6.575	48.871	1.381	6.575	48.871	1.830	8.714	43.124
5	1.229	5.851	54.722	1.229	5.851	54.722	1.794	8.541	51.666
6	1.114	5.307	60.029	1.114	5.307	60.029	1.756	8.363	60.029
7	.996	4.741	64.769						
8	.849	4.041	68.810						
9	.773	3.680	72.490						
10	.753	3.584	76.074						
11	.646	3.077	79.151						
12	.600	2.859	82.010						
13	.559	2.661	84.671						
14	.518	2.466	87.136						
15	.486	2.313	89.450						
16	.460	2.191	91.640						
17	.434	2.069	93.709						
18	.399	1.899	95.608						
19	.363	1.730	97.338						
20	.296	1.408	98.745						
21	.263	1.255	100.000						

Extraction Method: Principal Component Analysis.

Table 5: Reliability Statistics

Cronbach's Alpha	N of Items
.858	21

The Kolmogorov – Smirnov Test (Table 6) is carried out test the hypothesis that the data is normally distributed. The significance value is less than 0.05 which indicates that the distribution of data is normal.

Table 6: One-Sample Kolmogorov-Smirnov Test

	N	Normal Parameters[a,b]		Most Extreme Differences			Kolmogorov-Smirnov Z	Asymp. Sig. (2-tailed)
		Mean	Std. Deviation	Absolute	Positive	Negative		
RELIABILITYQ1	343	4.10	1.195	.312	.227	-.312	5.787	.000
RELIABILITYQ2	343	4.10	.973	.294	.176	-.294	5.453	.000
RELIABILITYQ3	343	3.92	1.148	.279	.172	-.279	5.160	.000
RESPONSIVENSSQ1	343	4.04	.977	.266	.162	-.266	4.924	.000
RESPONSIVENSSQ2	343	3.87	1.058	.249	.143	-.249	4.612	.000
RESPONSIVENSSQ3	343	3.55	1.413	.231	.153	-.231	4.280	.000
ASSURANCEQ1	343	4.03	1.323	.307	.232	-.307	5.689	.000
ASSURANCEQ2	343	4.17	1.123	.273	.229	-.273	5.047	.000
ASSURANCEQ3	343	3.93	1.078	.274	.161	-.274	5.076	.000
EMPATHYQ1	343	3.96	1.125	.257	.178	-.257	4.758	.000
EMPATHYQ2	343	3.87	1.242	.287	.182	-.287	5.307	.000
EMPATHYQ3	343	3.76	1.204	.277	.152	-.277	5.138	.000
TANGIBLESQ1	343	3.92	1.336	.274	.210	-.274	5.069	.000
TANGIBLESQ2	343	4.03	1.011	.299	.169	-.299	5.537	.000
TANGIBLESQ3	343	4.02	.991	.278	.162	-.278	5.145	.000
TANGIBLESQ4	343	3.61	1.136	.241	.138	-.241	4.462	.000
TANGIBLESQ5	343	4.13	1.214	.318	.236	-.318	5.880	.000
PATIENTSATISFACTIONQ1	343	3.82	1.242	.302	.170	-.302	5.597	.000
PATIENTSATISFACTIONQ2	343	4.03	1.098	.331	.189	-.331	6.129	.000
PATIENTSATISFACTIONQ3	343	3.92	1.175	.260	.180	-.260	4.823	.000
PATIENTSATISFACTIONQ4	343	3.90	1.057	.277	.149	-.277	5.133	.000

a. Test distribution is Normal
b. Calculated from data

Implications / Limitations:

Based on the research analysis it was found that the highest mean value of 4.17 accounts for assurance which reveals that majority of the respondents are of the view that the medical professionals have enough knowledge to answer the patient questions, which is considered to be a very important factor as the patient should have complete understanding of the medical procedures that are to be carried out or that has already been carried out in the process of delivering the service. followed by 4.13 being that the respondents agree the availability

of modern equipment's is considered as an important factor in determining their satisfaction. This make us conclude that the availability of modern equipment's is an essential in diagnosing and administering proper treatment to the patients. The least mean value 3.55 is for the statement 'offering prompt services to the patients' which implies that majority of the respondents are of the opinion that they are not getting the prompt services and that would lead to dissatisfaction among patients. Hence it is suggested that organisations should increase their focus towards increasing the knowledge of the medical professionals involved in delivering patient care as the patient are expecting their healthcare providers to be very knowledgeable in terms of medical skills and patient care. It is also to be noted that prompt services are to be offered for patients as this would be a very important factor if not properly take care would amount to patient dissatisfaction.

Conclusion:

The research was carried out with the purpose of determining thelevel of SERVQUAL factors in determining the patient satisfaction in private healthcare industry in TamilNadu. Based on the review of literature and in consultation with academic experts in the field it was decided to conduct the study based on the dimensions like assurance, empathy, responsiveness, reliability, tangibles were included as the independent variables and patientsatisfaction was considered as the dependent variable. From the research study its concluded that these factors have a considerable influence in determining the level of satisfaction among patients. It is to be noted that there is a very significant relationship to confirm that organisations should take effective measures to improve the knowledge of healthcare professionals and continuous training is to be arranged to ensure prompt services are provided to the patients and that would help in improving the level of patient satisfaction.

Reference:

1. Popa D, Druguș D, Leașu F, Azoicăi D, Repanovici A, Rogozea LM. Patients' perceptions of healthcare professionalism-a Romanian experience. BMC Health Serv Res. 2017;17(1):463. Published 2017 Jul 6. doi:10.1186/s12913-017-2412.
2. Wen J, Schulman KA. Can team-based care improve patient satisfaction? A systematic review of randomized controlled trials. PLoS One. 2014;9(7):e100603. Published 2014 Jul 11. doi: 10.1371/journal.pone.0100603
3. Zarei E, Daneshkohan A, Pouragha B, Marzban S, Arab M. An empirical study of the impact of service quality on patient satisfaction in private

hospitals, Iran. Glob J Health Sci. 2014;7(1):1–9. Published 2014 Jul 29. doi:10.5539/gjhs.v7n1p1

4. A, D. M., A, H., A, D., F, S., & K, S. (2014). Effective Factors on Patients' Satisfaction with Emergency Care Services using Factor Analysis: A Cross Sectional Study. Journal of clinical and diagnostic research: JCDR, 8(11), XC01–XC04.
5. Stepurko, T., Pavlova, M., & Groot, W. (2016). Overall satisfaction of health care users with the quality of and access to health care services: a cross-sectional study in six Central and Eastern European countries. BMC health services research, 16(a), 342.https://doi.org/10.1186/s12913-016-1585-1
6. Pouragha, B., &Zarei, E. (2016). The Effect of Outpatient Service Quality on Patient Satisfaction in Teaching Hospitals in Iran. Materia socio-medica, 28(1), 21–25. https://doi.org/10.5455/msm.2016.28.21-25

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY EDUCATIONAL RESEARCH
ISSN:2277-7881; IMPACT FACTOR :6.514(2020); IC VALUE:5.16; ISI VALUE:2.286
Peer Reviewed:VOLUME:9, ISSUE:4(1), APRIL :2020

तलाक के परिणामस्वरूप शिशु मन की समस्याओं का चित्रण
('आपका बंटी' उपन्यास केविशेष सन्दर्भ में)

तृष्णा दत्त (नेट, स्लेट)
प्राक्तन छात्रा, तेजपुर विश्वविद्यालय, असम |

सारांश :
'आपका बंटी' उपन्यास एक ऐसे रचना संसार की यात्रा कराते है जहाँ अलगाव, विच्छेद, पीड़ा, घुटन-टूटन, तनाव, अवसाद आदि उपस्थित हैं | यहाँ ममी-पापा के तलाक के परिणामस्वरूप बंटी के शिशुमन में उत्पन्न होनेवाले अनेक समस्याएँ कहानी प्रवाह के साथ-साथ बहुत ही मर्मस्पर्शी रूप से दिखाने का प्रयास किया गया है | उनके ममी-पापा तो एक दूसरे से अलग होकर पुनः अपने-अपने जीवन के नवीन आयामों में जोड़ जाते हैं | लेकिन, इसके बीच केवल बंटी को ही भोगना पड़ता है | बंटी के ममी और पापा के नवीन जीवन में जोड़ न पाने की त्रासदी बंटी के शिशुमन को आंदोलित कर जाती है | कभी-कभी तो वह उम्र से ज्यादा परिपक्क बनने का असफल प्रयास भी करता है, पर इन सबके बीच सबसे मर्मस्पर्शी स्थिति तब उत्पन्न होती है, जब बंटी केवल छुप, मौन ही रह जाता है | जहाँ बंटी के मानसिक पीड़ा और ममी-पापा को सम्पूर्णता में प्राप्त न कर पाने की असफलता उभर आते है |

बीज शब्द :
तलाक, मर्मस्पर्शी, पीड़ा, शिशुमन

प्रस्तावना:
आपका बंटी मन्नू भंडारी जी का एक बहुत ही लोकप्रिय उपन्यास है | कहना मुश्किल है कि यह उपन्यास स्त्री-विमर्श पर आधारित या शिशु मनोविज्ञान पर लिखित है | मूलतः त्रासदी से भरी इस इस उपन्यास मेंमाँ-बाप के विवाह-विच्छेद के कारणस्वरुप संतानों के शिशु मन पड़े मानसिक समस्याएँ मर्मस्पर्शी रूप से निखरी हैं | अपनी सृजन-प्रतिभा से धनी साहित्यकार मन्नू भण्डारी की लोकप्रियता का अन्य एक प्रमुख कारण उनकी मौलिक लेखन प्रतिभा ही है | उनकी रचनाओं में उनके व्यक्तित्व, उनकी सृजन चेतना स्पष्ट रूप से दिखाई देती है | उनकी रचनाएँ हिंदी साहित्य साहित्य की अमूल्य निधिस्वरूप है | प्रमुख रूप से उन्होंने नाटक, कहानी, उपन्यास, आत्मकथा आदि विधा में अपनी जादुई कलम चलाकर विकसित करने का प्रयास किया है | उनकी जन समादृत लेखनी का प्रमाण इस बात से भी मिलता है कि उनकी रचनाएँ कई भाषाओं में अनुदित भी हुई है | 'आपका बंटी' उनकी लोकप्रिय उपन्यासों में एक प्रमुख उपन्यास है | इस उपन्यास में जीवन के वास्तव परिस्थिति, जीवन के जटिल समस्याओं का यथार्थ चित्रण और मनोवैज्ञानिक गहराई का आलोकपात लेखिका ने अपनी अनोखी और मौलिक लेखन कुशलता से किया है | प्रस्तुत प्रबंध में 'आपका बंटी' नामक उपन्यास में माँ-बाप के विवाह-विच्छेद के फलस्वरूप उनके बच्चों के शिशु मन में किस तरह की समस्याएँ उत्पन्न होती हैं, उन्हें क्या-क्या, कैसी-कैसी

परिस्थितियों और समस्याओं से गुजरना पड़ता हैं आदि के बारे में विस्तार से विचार करने क प्रयास किया गया है |

अध्ययन का उद्देश्य :

इस अध्ययन का मूल उद्देश्य हिंदी साहित्य के एक चर्चित उपन्यास 'आपका बंटी' के सम्यक विवेचन के साथ-साथ पाठकों को तलाक के परिणाम से अवगत कराना हैं |

अध्ययन की शैली :

यहाँ विश्लेषणात्मक और विवारात्मक शैली का प्रयोग किया गया है|

'आपका बंटी' नामक उपन्यास की मूल कथाओं पर आलोकपात :

प्रस्तुत उपन्यास की मूल समस्याओं के बारे में विस्तार से आलोचना करने के लिए सबसे पहले इस उपन्यास की मूल कथाओं पर विचार करना अत्यावश्यक है | इसलिए यहाँ मूल कथाओं को सारांश के रूप में प्रस्तुत किया गया है, जो इस प्रकार है- 'आपका बंटी' मुलतः बाल मनोवैज्ञानिक धरातल पर लिखित, स्त्री-विमर्श पर आधारित, यथार्थवादी उपन्यास है | पति-पत्नी और उनके संतान संतान के बीच परिस्थिति के तूफ़ान से आयी अलगाव, विच्छेद आदि को स्पष्ट करना इस उपन्यास की मूल संवेदना है | इसमें प्रमुख पात्र हैं- बंटी, शकुन (बंटी की माँ), अजय (बंटी का पिता), वकील चाचा, टीटू (बंटी का दोस्त), मीरा (बंटी के पापा की दूसरी पत्नी), डॉ जोशी (बंटी की माँ का दूसरा पति), प्रमिला (डॉ जोशी की मृत पत्नी), अमि और जोत (डॉ जोशी के बच्चें) आदि | सन १९७१ में प्रकाशित कुल सोलह भागों में विभक्त इस उपन्यास में मूल रूप से यह दिखाया गया है कि- नौ वर्षीय बालक 'बंटी' को अपने माँ-बाप के आपसी अनबन, विवाह-विच्छेद तथा पारिवारिक विसंगति के कारण किस तरह मानसिक प्रतिकूल अंतद्वंदों के शिकार होना पड़ा |शकुन और बंटी के अत्यंत भावात्मक वर्णन के साथ उपन्यास का प्रारम्भ किया गया है | बंटी के माता-पिता के बीच आपसी सामंजस्य स्थापित हो नहीं पाता है | इसलिए दोनों के बीच मतभेद इतना बढ़ जाते हैं कि एक दूसरे से तलाक लेकर अपनी संबंध को समाप्त कर लेते है | लेकिन बंटी को ये ये सब बातें समझ में नहीं आ रहे थे | उसे यह भी समझ में नहीं आ रहा था कि वकील चाचा उनके घर क्यों आते थे | वह सोचता था कि वकील चाचा उसके माँ और पापा के बीच कुछ पेपर को लाने और ले जाने का काम करते है | लेकिन बंटी को एक बात की एहसास होता था कि- जब वकील चाचा उनके घर आते थे, उनके आने पर बंटी की माँ शकुन परेशान हो जाती थी | इसी कारण बंटी को वकील चाचा अच्छे नहीं लगते थे | बंटी को अपना दोस्त टीटू से पता चलते है कि उनके माँ-पापा के बीच तलाक हो जाने के कारण दिनों एक साथ नहीं रहते | समस्त उपन्यास में माँ-बाप के विवाह-विच्छेद से 'बंटी' कही-न-कहीं उलझा हुआ रहते है | वह माँ-पापा दोनों से बहुत ज्यादा प्यार करते थे | लेकिन दोनों के बीच सात साल से तलाक का केस चल रहा था इसलिए अलग-अलग रह रहे थे | बंटी माँ के साथ रहा करते थे, लेकिन वह अपने पिता अजय का हमेशा इंतजार करता रहता था, यह बंटी का एक मासूम सा स्वप्ना था कि- कभी उनके पिता उसके पास आये, उसके लिए खिलौना लाये, उसके साथ घुमे-फिरे, उससे बातें करे, और हमेशा उनके साथ रहे | बंटी की माँ शकुन एक स्कूल की प्रिंसिपल थी, स्कूल में वह काफ़ी स्ट्रिक रहती थी |

लेकिन, वह अपने बेटे बंटी से बहुत प्यार करती थी | फिर भी कभी-कभी अपनी जिन्दगी में वह बहुत अकेली महसूस करती थी | उनके पति अजय मीरा नाम का एक लड़की से शादी करके अपनी जिन्दगी में आगे बढ़ गये थे, इसी बात ने शकुन को बहुत आघात किया था,क्योंकि मीरा से अजय का शादी का संबंध बनाना शकुन को कहीं-न-कहीं आहत करती थी | क्योंकि तलाक होते हुए भी पति-पत्नी के बीच का पूरा संबंध ख़त्म नहीं हो जाता है | तलाक सिर्फ कानूनन ही एक को को दूसरे से अलग कर सकते है, अजय का मीरा से शादी हो जाने तक शकुन के ह्रदय में उनके प्रति कहीं-न-कहीं, भीतर-ही-भीतर, थोड़ी ही सही, लेकिन कुछ अपनापन भी बसी थी | अपनी जिन्दगी को लेकर वह बहुत चिंतित होती थी | वह सोच नहीं पा रही थी कि उसे क्या फैसला लेना चाहिए, वह सोचती रहती थी कि वह क्या करें! सबसे ज्यादा बंटी के लिए वह चिंतित होती थी | लेकिन, शकुन एक महात्वाकांक्षी स्त्री थी, वह भी जीवन को फिर से आगे बढ़ाना चाहती थी | उनके जीवन में भी डॉ.जोशी नाम का एक व्यक्ति का आगमन होता है, जो उसे पसंद करते थे और और उसे अपने साथ रहने का भी प्रस्ताव रखे थे | क्योंकि उनकी पत्नी की मृत्यु हो गई थी और उनके दो बच्चें भी थे | इसलिए वह शकुन को अपने घर में लाकर अपनी जीवन को सम्पूर्ण करना चाहते थे | वह शकुन का बेटा बंटी को भी अपनाना चाहते थे | शकुनने भी इस रिश्ते से मना नहीं किया और दोनों की शादी भी हो गई | बंटी को भी शकुन अपने साथ डॉ. जोशी के घर ले आयी | किन्तु, बंटी को अपनी माँ के साथ डॉ. जोशी की नजदीकिया बिल्कुल पसंद नहीं था, क्योंकि वह डॉ. जोशी को अपने पिता के रूप में कभी स्वीकारना ही नहीं चाहता था | डॉ. जोशी से अपनी माँ की शादी से बंटी के शिशु मन को बहुत चोट लगी थी, जिसे शकुन समझकर भी समझना नहीं चाहती थी, क्योंकि वह बंटी के कारण अपना दूसरा रिश्ता खोना नहीं चाहती थी | वह कहीं-न-कहीं अजय से भी गुस्से थे, उस गुस्से का बदला लेना भी चाहती थी | डॉ. जोशी के घर जाकर बंटी को कुछ अजीब सी महसूस होने लगी थी, वह डॉ. जोशी के बेटा-बेटी अमि और जोत को भी अपना भाई-बहन के रूप में स्वीकार नहीं कर पाता था | हमेशा वह खुद को अनचाहा महसूस करते थे, इसलिए उसने एक दिन अपने पापा अजय को एक ख़त लिखकर उसे यहाँ से ले जाने के लिए कहा | अजय कलकत्ता से बंटी को ले जाने के लिए आते है और उसे ले भी जाते है | उस वक्त बंटी के मन में बहुत ही अजीब और मर्मस्पर्शी भाव, अनुभूति उत्पन्न हुई थी | वह अपनी माँ को छोड़ना भी नहीं चाहता था | और, वह अपनी माँ से उम्मीद भी कर रहा था कि वह उसे रोक लें, एक तरफ वह माँ से गुस्सा भी था क्योंकि डॉ. जोशी के साथ अपनी माँ की शादी को स्वीकार कर लेना उसके लिए इतना सहज नहीं था |अपने पिता के साथ कलकत्ता चले जाने के बाद भी बंटी अपने पापा की दूसरी पत्नी को माँ के रूप में स्वीकार नहीं कर पाता था | उसे अपने पापा कोई और व्यक्ति लगने लगे थे | मीरा के विरोध करने के बाद भी अजय ने बंटी को हॉस्टल भेजने का फैसला कर लिया था, इस बात से भी बंटी बहुत परेशान हुए थे, उसे बहुत दुःख महसूस हो रहा था, फिर भी जब वह अपने पिता से अलग होकर हॉस्टल जाने के लिए तैयार हो गया था तब भी वह बार-बार सोचता रहता था कि पापा उसे प्यार करके कुछ कहेंगे, पर ऐसा भी नहीं हुआ | इस बात ने भी उसके कोमल मन को बहुत दर्द दिया, उसकी आँखे और मन दोनों ही वेदना में

डूब गया था | उसे पता चल जाता है कि माँ-पापा से अलग होकर रहने की पीड़ा को अब उसे भोगना ही पड़ेगा | इसी तरह बहुत ही मार्मिक रूप से उपन्यास का समाप्त हो जाता है |

तालक के फलस्वरूप शिशु मन की समस्याओं का चित्रण :

मन्नु भण्डारी जी ने इस उपन्यास में पति-पत्नी के संबंध विच्छेद की समस्याओं के फलस्वरूप उनके छोटे बच्चों पर पड़नेवाला असर, उनके शिशु मन में उत्पन्न होनेवाली यातना, दुःख, दर्द, विद्रोह, अंतद्वंद आदि को स्पष्ट रूप से बहुत ही सरल भाषा शैली में अभिव्यक्ति देने का प्रयास किया है | आधुनिक समाज में तलाक हो जाना बहुत बड़ी बात नहीं रही है | कई छोटी-बड़ी कारणों से पति-पत्नी के बीच तलाक की मामला होने लगी है | इस उपन्यास में भी अजय और शकुन के बीच दोनों के व्यक्तिगत अहम अहम् के कारण बात तलाक तक हो जाती है | लेकिन उनलोगों के सिद्धांत के बीच उनके एकमात्र संतान 'बंटी' ही सबसे ज्यादा पिसा जाता है, जो बिल्कुल ही निर्दोष, निरीह हुआ करता था, लेकिन वह ही असुरक्षित-सा महसूस करने को विवश जो जाते थे | उपन्यासकार भंडारी जी ने इस उपन्यास में बच्चे की चेतना से बड़ों के संसार को उजागर किया है | इसी कारण उपन्यास का हर एक पृष्ठ बाल मनोविज्ञान की गहरी समझ-बूझ के कारण अत्यंत मर्मस्पर्शी बन गई है |

जब भी किसी पति-पत्नी के बीच तलाक हो जाता है, उनके बच्चों की कोमल मन इस स्थिति को स्वीकार नहीं कर सकते है | बंटी भी ठीक ऐसी ही स्थिति से गुजर रहा था | उनका शिशु सुलभ कोमल मन अत्यंत संवेदनशील और भावुक हो गया था | दरअसल, वह एक अंतर्मुखी व्यक्तित्ववाला बालक बन गया था, जो छोटी-सी बातों को भी बड़ी गंभीरता के साथ लेता था, और उस पर सोचता रहता था | परिस्थिति से मोकाविला भी कर नहीं सकता था और न ही समझोता करने को तैयार था | इसी कारण मानसिक यातनाओं को झेलता रहता था | उपन्यास में बंटी के मानसिक तनाव को अच्छी तरह विश्लेषित किया गया हैं | जब बंटी को अपना दोस्त टीटू से यह पता चलता है कि उसके माँ-पापा एक साथ इसलिए नहीं रहते है क्योंकि, दोनों के बीच तलाक हो हो गया है | तब तक बंटी को तलाक शब्द का अर्थ भी मालुम नहीं था | लेकिन टीटू से इसके बारे में जानने के बाद उसके शिशु मन में किस तरह गुस्सा उफन रहा था, और, किस तरह की अनेक इतिवाचक और नेतिवाचक भावनाएँ आने लगी थीउसका वर्णन लेखक ने इस तरह किया है - " मन में जाने कैसा गुस्सा उफन रहा था | उसके ममी-पापा की बात उसे नहीं मालूम और टीटू को मालूम ! पापा साथ नहीं रहते तो क्या हुआ, वे तो शुरू से ही साथ नहीं रहते | वह तो हमेशा से ही ममी के पास रहता है | उसकी कोई ऐसी-वैसी है ? कॉलेज की प्रिंसिपल हैं, आते-जाते लोग कैसे सलाम ठोंकते हैं | करेगा कोई ऐसे सलाम इनकी अम्मा को ?

और पापा पास नहीं रहते तो क्या हुआ ? उसे प्यार तो खूब करते है | टीटू के पापा जब देखो तब डाँटते ही रहते हैं |

पर ममी को तो ऐसा नहीं करना चाहिए न ? ममी उसे पापा की बात बताती क्यों नहीं है ? कितनी ही बार उसने ममी से यह बात करनी चाही, पर जब भी वह ऐसी बात करता है, ममी क

चेहरा जाने कैसा-कैसा हो जाता है |उसे डर-सा लगने लगता है |फिर भी उससे कुछ भी नहीं पुछा जाता |"१

बंटी हमेशा पापा से मिलने का इंतजार करता रहता है |उसके मन में बार-बार कुछ प्रश्न आते रहते है कि माँ और पापा फिर से दोस्ती क्यों नहीं कर लेते है ?आख़िर दोनों के बीच लड़ाई हुई ही क्यों ?क्या इतने बड़े-बड़े लोग भी लड़ते हैं ?माँ कभी भी पापा की बात क्यों नहीं कहती है ? पापा आते तो सरकिट हाउस में क्यों ठहरते है ?पापा भी क्यों कभी भी माँ को वहाँ नहीं बुलाते है ?पापा भी क्यों कभी भी माँ की बात नहीं करती है ?क्या दोनों के बीच इतनी बड़ी लड़ाई हो गयी है कि फिर कभी दोस्ती हो ही न पाए !इसी तरह बंटी के मन में हमेशा कुछ न कुछ चिंता घूमता रहता था |एक छोटा बच्चा होते हुए भी वह एक बड़ा संवेदनशील, भावुक बन गया था | अपनी माँ की हाव-भाव, रहन-सहन को वह निरीक्षण करता रहता था और उसके अनुरूप आचरण प्रदर्शन करके माँ को प्रसन्न करने का प्रयास करता था |बंटी क संवेदनशीलता का वर्णन कथाकार ने बहुत अच्छी तरह प्रस्तुत किया है- "उसने ममी की और देखा |ममी वैसे ही आसमान की ओर देख रही है |क्या देखती रहती हैं ममी आँखे गड़ाकर– कभी आसमान में, कभी छट में ?उसे तो वहाँ कुछ नहीं दिखाई देता |"२

वकील चाचा, जो बंटी के ममी-पापा के बीच कुछ फाइल लाने और ले जाने का काम करते थे | उनके बारे में भी बंटी के मन में अनेक भाव पैदा हुई थी |एक दिन वह चाचा को पुछ ही लेता है कि-"चाचा पापा कब आएँगे इस बार ?"३ बंटी को लगा कि उसका प्रश्न सुनकर चाचा उदास हो गया |पीठ सहलाता हुआ उनका हाथ उसे कॉपता-सा लगा |बंटी सोचने के लिए विवश हो गया कि पापा कि बात पुछकर उसने कहीं गलती तो नहीं कर दिया !उसे यह समझ नहीं आता है कि जब भी वह पापा की बात करता है क्यों सबकुछ गड़बड़ा जाता है !इसलिए सोचता रहता है कि किससे उसे यह बात करे ?किसे पापा के बारे में पूछे ?उसके कोमल मन में इस बात ने भी घर बना लिया है कि आखिर क्यों वकील चाचा एक-दो दिन के लिए उनके घर में आकर दस-बारह दिनों के लिए ममी को बदल जाते है !इसके पीछे का कारण जानने के लिए बंटी का मन बैचैन हो उठता था |इसलिए ममी और चाचा के बीच हुई बातों को छुप-छुपकर सुनने की कौशिश भी करते थे |लेकिन, बातों के अर्थ समझ न पाने के कारण टीटू से भी पूछने गया था ,इसी से यह समझ में आता है कि बंटी ये सब जानने के लिए कितना व्याकुल हो रहा था |वह साहस इकठ्ठा करके ममी से भी चाचा जी ने क्या कहा था जानने की आग्रह प्रकाश किया था |लेकिन उसके इस प्रश्न का उत्तर ममी ने ऐसी चुभती भरी नजरों से दिया कि वह भीतर तक सहमा गया |फिर फिर भी उसके भीतर एक सवाल रह ही गया कि -क्या चाचा की कही हुई बात बहुत बुरी थी ? उसके बाद जब वह धीरे से आखे उठाकर ममी की तरफ़ देखा तब ममी हमेशा की तरह छत की ओर देख रही थी |आँखों से आंसू भीग रहे थे ,तब बंटी के मन में चाचा के लिए आक्रोश पैदा हुई क्योंकि ममी को उसने उदास होते देखा था ,लेकिन उस दिन से पहले कभी रोते हुए नहीं देखा था |इसी कारण बंटी को ममी का रोना बिल्कुल सहा नहीं जाता था |एक साधारण बालक की ही तरह बंटी भी पापा से मिलने जाने के लिए व्याकुल हो जाते थे, लेकिन उसके पापा से

मिलने जाना ममी को क्यों अच्छा नहीं लगता था, उसी बात को लेकर वह भीतर-ही-भीतर परेशान हो जाता था | वह मन-ही मन यह भी सोचता रहता था कि जो बात वह ममी से पूछने से डरता है, पापा से ही पुछ लेंगे, लेकिन यह सोचकर भी डर जाता है कि कहीं ये बात पापा को भी अच्छा न लगे तो क्या होगा ? इसी कारण पापा से भी खोलकर बात नहीं कर पाता था, फिर भी वह ममी-पापा के बीच फिर से दोस्ती करने, एक साथ रहने, घुमने जाने की सपना सजाते रहते थे | लेकिन चाहते हुए भी वे ये सब कर नहीं सकते थे, इसी कारण उसका मन बहुत ही दुःख ओर दर्द में ग्रसित हो रहा था | उसके आँखों में आँसू भी आ जाया करता था | एक छोटा बच्चा इससे ज्यादा कर ही क्या सकता था | बंटी का यह दर्द हर तलाकशुदा पति-पत्नी के संतानों क दुःख हैं | सच में, उपन्यास को पढ़ते समय हर एक संवेदनशील पाठक का बंटी में साधारणीकरण हो जाना स्वाभाविक है |

बंटी के मन का हलचल कुछ इस प्रकार हो रहा था किवह ममी को भी दुःख देना नहीं चाहता था और पापा को भी भुल नहीं पाया था | इसी के बीच सामंजस बनाने की भूमिका बंटी को अदा करना पड़ता था, इसलिए उनके मन में बहुत सारे प्रश्न, बहुत सारी बातें झकझोर रहे थे | कभी वह ममी के लिए रोता था तो कभी पापा के लिए | कभी ममी से गुस्सा तो कभी पापा से गुस्सा आता था, लेकिन कभी भी वह अपना गुस्सा प्रकाश नहीं कर पाया था, जो भीतर-ही-भीतर उसे ज्यादा से ज्यादा भावुक बनाने लगा था और कम उम्र में ही बड़ा बनाया था |

हर किसी को अपनी ममी बहुत अच्छी लगती है | बंटी तो छोटा बच्चा था, वह अपनी ममी से इतना प्यार करता था कि उसे सिर्फ उसका ही समझता था | हर बच्चों की तरह बंटी को भी ममी उससे ज्यादा किसी दूसरे को ध्यान देना उससे सहा नहीं जाता था | इस उपन्यास में बंटी को अपनी ममी का डॉ. जोशी से लगाव रखना, उनके साथ घुमने जाना, बातें करना, उनके बच्चों से प्यार करना देखकर कुछ अजीब-सामहसूस होता है, इसी कारण उसके मन में ममी के प्रति कुछ अभिमान, थोड़ा आक्रोश का भाव उत्पन्न होता है जिसका वर्णन उपन्यासकार ने बखूबी किया है- "तुम्हें मेरी बिल्कुल परवाह नहीं रह गई है | मत करो मेरा कोई काम | बस, डॉक्टर साहाब के पास बैठकर चाय पियो | तुम्हारा क्या है सजा तो मुझे मिलेगी | मैं अब स्कूल ही नहीं जाऊंगा, कभी नहीं जाऊँगा, कभी भी..."४

"ये ममी इतना सटकर क्यों बैठी हैं डॉक्टर साहब से | ऐसे तो कभी किसी के साथ नहीं बैठती | बंटी को बहुत अजीब लग रहा है | अजीब और बहुत ख़राब भी |"५

डॉ. जोशी से ममी का संबंध जोड़ जाने से उनके आचरण में बंटी को कुछ परिवर्तन दिखाई देने लगा था | वह खुद को असुरक्षित-सा महसूस करने लगा था | कहीं-न-कहीं अब जान बुझकर भी वह ममी को दुःख देना चाहता था क्योंकि उसका शिशुमन अपनी ममी को किसी दूसरों के साथ देखकर विद्रोह कर उठता था | डॉ. जोशी के साथ रहना तो उसे कतई अच्छा नहीं लगता था |उनके लिए स्वेटर बुनना, उनके घर के लिए फर्नीचर चुनना, उनके बच्चे अमि और जोत से प्यार करना देखकर बंटी को ऐसा लगने लगा था कि ममी सिर्फ उनका ही नहीं रह गया है, जिसके कारण बंटी के मनोजगत में ममी के प्रति कुछ खिन्न भावना जागने लगा था | भीतर ही

भीतर खुद भी बहुत दर्द महसूस किया करते थे, लेकिन वह इतना विवश था कि ये सब प्रकाश करना भी उनके लिए मुमकिन नहीं था | बंटी की ममी शकुन को भी बंटी के गुस्से, अप्रसन्नता, दुःख का पता लग चुकी थी, लेकिन वह चाहकर भी डॉ.जोशी से शादी करने से इनकार नहीं कर पाई थी | क्योंकि खुद सुखी होने से ज्यादा अजय से प्रतिशोध लेना चाहती थी |

डॉ.जोशी से अपनी ममी की शादी के बाद फिर से बंटी के मनोजगत में अंतद्वन्द्व बढ़ने लगा और उसी से वह ग्रसित भी होने लगा था | क्योंकि, न चाहकर भी बंटी को अपना घर छोड़कर ममी के साथ डॉ. जोशी के घर में आना पड़ा था | लेकिन, कभी भी वह डॉ. जोशी को अपना पापा, और उनके बच्चों को भाई-बहन के रूप में स्वीकार नहीं करने के लिए खुद को प्रस्तुत नहीं कर पाया था | उस नई घर में खुद को बहुत अपरिचित और असुरक्षित-सा महसूस करने लगा था | इसी कारण डरा-डरा सा रहने लगा था | उस घर में आकर बंटी की मनःस्थिति कितनी मर्मस्पर्शी हो गयी थी, इसका वर्णन कथाकार ने बहुत ही गंभीरता से बताने क प्रयास किया है –"ममी इस तरह चल रही हैं इस घर में जैसे यहाँ सबकुछ बहुत जाना चीन्हा हो | उसे तो यहाँ का कुछ भी नहीं मालुम | जिधर जोत ले जाएगी उधर ही जाता है, उसके साथ-साथ बल्कि उसके पीछे-पीछे |"६

"अमि और जोत की यह लाओ, वह लाओ...ऐ बंसीलाल, इसमें हरी मिर्च क्यों डाली....आज अंगूर क्यों नहीं है....मेरे नमकीन बिस्कुट... के बीच बंटी अपनी नजरों में जैसे कहीं से बड़ा बेचारा हो आया और उपेक्षित |"७

जब ममी खुद को मिसेस जोशी कहती थी पता नहीं क्यों बंटी के कोमल मन में ये बात बहुत चुभती थी | शायद इसीलिए कि वह पापा को अभी भी भुलाकर भी भूल नहीं पाया था | डॉ. जीशी के साथ ममी को सोते देखकर बंटी को बिल्कुल अच्छा नहीं लगता था | दर के मारे वह अकेला सो भी नहीं सकता था | सच कहा जाए तो उस घर को वह कभी अपना मन ही नहीं सकता था | उसके मन मुस घर के लिए विचार कुछ ऐसा था-" कैसे रहेगा वह इस घर में ? यह उसका घर बिल्कुल नहीं है | यह डॉ. साहब का घर है, जोत और अमि का घर है | वह किसी के घर में नहीं रहेगा, अपने घर जायेगा, अपने घर में सोएगा |"८

एक दिन वह डॉ.जोशी और ममी को कुछ ऐसी अपरिचित हालत में देख लिया था जिसके बाद उसके मन में कुछ अनबन पैदा हुई थी, उसके शिशुमन में वह दृश्य विरूप प्रतिक्रिया छोड़ता था | उस नई घर में ममी को खुद काम करते देखकर उसे बिल्कुल अच्छा नहीं लगता था | बातों ही बातों में अमि से झगरा हो जाने से ममी जब उसे थप्पड़ मारती थी तब उसे बहुत दुःख और गुस्सा आता थे, इसके आलावा भी उस घर में ऐसा बहुत कुछ हुआ था जो बंटी को थोड़ा-सा भी पसंद नहीं आया था वहाँ तो खुद को केवल फालतु, अनचाहा-सा ही महसूस करने लगा था | उन सबसे बंटी अब ऊब चूका था और पापा की यादें अब उसे सताने लगे थे | वह पापा के लिए बहुत बार छुपकर,छिपाकर चिट्ठी भी लिखते थे, लेकिन भेजने से पहले ममी चिट्ठी देख लेती है |फिर, ममी उससे यह पूछती है कि सच में क्या वह पापा के साथ रहना चाहते है ! ममी बताती है कि अजय उसे लेने आ रहे है | तब बंटी को लगा कि ममी को आघात करकर उसने अच्छा किया

है, अब ममी रोएगी, उसे पापा के साथ जाने से रोक लेगी | पता नहीं क्यों, ममी से इतना प्यार करने के बाद भी उसे आघात देकर उसे अब अच्छा लगने लगा था | इसलिए तो वह जन-बुझकर भी ऐसी बहुत सी चीजे करने लगे थे, जिससे ममी परेशान हो | अब तो बंटी के मन में ममी को खोने की आशंकाओं ने ज्यादा तनाव ला दिए थे, जिसके परिणामस्वरूप उसका स्वभाव भी आक्रोशात्मक होने लगा था |बंटी पापा के साथ कलकत्ता चले जाते है | लेकिन वहाँ जाकर भी बंटी बंटी को फिर से वहीं समस्याएँ झेलना पड़ा | जिस वजह से उसके मन में अपनी ममी के प्रति विद्रोहात्मक मनोभाव जाग उठा था, ठीक एक ही वजह से पापा को भी अपना पापा नहीं लगने लगा था | जिस तरह वह डॉ. जोशी को पापा के रूप में स्वीकार नहीं कर पाया था, कलकत्ता आकर आकर अपने पापा की दूसरी पत्नी मीरा को भी अपनी ममी के रूप में स्वीकार नहीं कर पाया था | डॉ.जोशी का घर घर जिस तरह अपरिचित-सा, दूसरों के जैसा लगता था उसी तरह पापा का घर भी अपना-सा नहीं लगने लगा था | पापा के पास आकर भी कभी-कभी ममी की बहुत याद आती थी | हर जगह फूफी की यादे, पुराना घर, खुद का बगीचे की यादें उसके आगे-पीछे घूमते रहते थे | दिन-व-दिन वह अंतर्मुखी होता जा रहा था | खुद को बहुत बेसहारा-सा लगने लगा था | इसलिए मन न होते हुए भी पापा के हर बात पर 'हाँ' बोलने को विवश हो गया था |कलकत्ते आकर उसका उसका मनोदशा और ज्यादा दर्दनाक होने लगा था | हमेशा वह सुस्त-सुस्त, सहमा-सहमा-सा, डरा हुआ-सा, थका हुआ-सा रहने लगा था | उपन्यासकार ने कलकत्ते में जाकर बंटी कैसा महसूस करने लगा था उसी का वर्णन बहुत ही मार्मिक रूप से किया है-"अकेले में डरोगे तो नहीं, सो जाओगे न ?

बंटी का मन हो रहा है कि वह कह दे- वह बहुत डरेगा | इस घर में तो वह अकेला सो ही नहीं सकता | वहाँ तो फिर भी अमि और जोत थे, यहाँ तो... वह सारे दिन भी एक तरह से डरता ही रहा | पता नहीं कैसा-कैसा डर |"९

"बंटी तुम मीरा को क्या कहते हो ?

बंटी छुप |

ममी कहोगे ?

बंटी डॉक्टर साहब को पापा कहा कर बेटे

...और तड़ाक से दिया हुआ जबाब ही कानों में गूंज गया- मेरे पापा तो कलकत्ते में रहते है |

पर अब ? जैसे कोई जबाब ही नहीं सूझ रहा | वह सिर्फ पापा की ओर देखता रहता है |"१०

अजय मीरा के बाधा करने के बाबजूद भी बंटी को हॉस्टल भैजने का फैसला ले लेता है | बंटी को हॉस्टल जाने का बिल्कुल मन न होने के बाबजूद भी विरोध करने का साहस न था | इसका वर्णन भी उपन्यास में सटीक तरीके से किया गया है- " बंटी बहुत हिम्मत जुटा रहा है कि कह दे वह हॉस्टल नहीं जाना चाहता | रात-भर वह जो सोचता रहता है, सब कह दे, पर कुछ भी तो नहीं कहा जाता |"११

जब पापा उसे यह समझाते थे कि हॉस्टल बंटी को अच्छा लगेगा, उसके उम्र के बच्चों को हॉस्टल में ही रहना चाहिए | वहाँ अपने बराबरी बच्चों के साथ पढ़ोगे, खेलोगे, एक साथ रह भी पाओगे |

पापा के ये बात सुनकर ममी की कुछ बातें याद आने लगते हैं, जब ममी कहा कहती थी कि- डॉ. जोशी के घर में जाकर बंटी को भी अच्छा लगेगा क्योंकि वहाँ जोत और अमि हैं | उनके साथ बंटी अच्छी तरह रह पाएंगे, यहाँ तो अकेला-अकेला वह बोर ही होता रहता है | बंटी के लिए अपना पापा भी अजनबी जैसा लगने लगा था | उसे मीरा और पापा के झगरे से यह भी पता चल गया था कि पापा ने उसे हॉस्टल में रखने के लिए ही लाये थे | अंततः पापा बंटी को हॉस्टल में छोड़ने के लिए आते है | बंटी को ऐसा लगने लगा कि पूरी दुनिया ही अजनबी की तरह हो गया है | वस्तुतः उपन्यास में बंटी की कहानी जहाँ खत्म होती है, असली जिन्दगी में वहीं से बंटी की कहानी शुरू होती है |

उपसंहार :

प्रस्तुत उपन्यास के आलोचना के बाद सिर्फ यही कहना उचित समझती हूँ कि भले ही मानवीय जीवन को अनेक भौतिक आयामों से आधुनिक जीवन शैली ने सहज बना दिया हो, लेकिन संबंधों को उतना ही जटिल बना दिया है | व्यक्ति की निरपेक्ष स्वतंत्रता की आकांक्षाओं ने संबंधों के प्रति, उसके द्वायित्व को पालन करने में अवहेलना किया हैं, जिसके परिणामस्वरूप बंटी जैसे अनेक जीता जागता उदाहरण हमारे समाज में उपस्थित हो जाते हैं |

सहायक ग्रंथ :

१.भण्डारी, मन्नु, आपका बंटी, राधा कृष्ण प्राइवेट लिमिटेड, नयी दिल्ली पटना इलाहाबाद, २०११

संदर्भ ग्रंथ सूची :

१. भण्डारी, मन्नु, आपका बंटी,राधा कृष्ण प्राइवेट लिमिटेड, नयी दिल्ली पटना इलाहाबाद, २०११, पृष्ठ संख्या १४
२.वहीं, पृष्ठ संख्या १६
३. वहीं, पृष्ठ संख्या१९
४. वहीं, पृष्ठ संख्या ६६
५.वहीं, पृष्ठ संख्या ७०
६.वहीं, पृष्ठ संख्या ९२
७.वहीं, पृष्ठ संख्या ९३
८.वहीं, पृष्ठ संख्या ९६
९.वहीं, पृष्ठ संख्या १४६
१०. वहीं पृष्ठ संख्या १४७
११. वहीं, पृष्ठ संख्या १४४

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY EDUCATIONAL RESEARCH
ISSN:2277-7881; IMPACT FACTOR :6.514(2020); IC VALUE:5.16; ISI VALUE:2.286
Peer Reviewed:VOLUME:9, ISSUE:4(1), APRIL :2020

TITLE: DEVELOPMENT OF ENVIRONMENTAL PRINCIPLE- A LEGAL STUDY

PSS Gowri Shangar
Assistant Professor
School of Law
Sathyabama Institute of Science and Technology, Chennai

Bhagavath Harini V. J
BA.LLB(HONS) - II Year
Sathyabama Institute of Science and Technology
Chennai, Tamil Nadu, India

Abstract
The analysis of the diffusion of Sustainable Development at the global level can provide an interesting starting point to see how even one of the most important and universally recognized concepts can give rise to different interpretations and applications. This diffusion is observed here through the mechanism of the circulation of legal models, the cornerstone of comparative legal studies. The circulation of legal models, made famous by Alan Watson with the metaphor of "legal transplant", provides a dynamic approach to the study of comparative law. According to this theory, a transfer of a rule from a legal system to another or from one people to another, not only is not an exception, but also proves to be a common practice since the most ancient of history. Sustainable Development, as a new paradigm adopted at the international level, has shown its dynamics through the vertical and horizontal circulation of its models. Moreover, this contribution will be an opportunity to propose a third type of circulation of legal models: the "oblique" circulation. Thus, the model of Sustainable Development becomes the starting point for the development of regulations based on its principles, but those have different characteristics depending on the context where they are implemented. Therefore, this contribution is an attempt at tracing the path made by Sustainable Development through different stages of its evolution and through various legal systems, trying to shed light on the dynamics of this journey without losing sight of the typical goals of Sustainable Development.

Keywords Circulation of legal models, Diffusion of sustainable development, Horizontal circulation, Vertical circulation, Oblique circulation, Development Principles.

Introduction
Within the theme Environment and Development, the research focuses on the prerequisites for sustainable ecological, social and economic development, with an emphasis on relations between natural resource use and political change.

Another key research area concerns synergisms and antagonisms among various aspects of sustainable development. For example, if a high priority is given to ecological sustainability in public planning, this may result in negative social and economic outcomes for marginalised social groups. Sustainability is thus analysed by taking into consideration the aspects related to socioeconomic distribution, power and gender. A key point is the critical examination of trends in development theory and praxis. Research questions may be issues such as how "development" is defined and by whom, the consequences of unequal development and the roles assumed by government, private and public stakeholders.

Over the last quarter of a century, two new and complementary themes have had considerable impact on the development of contemporary international law, namely, environmental protection and sustainable development.

Objectives

- To study about the Protection of Natural Resources
- To analyse the reforestation in the City
- To understand the Full Public Participation in Development Decisions
- To analyse the active promotion of sustainable development
- To examine about the promotion of environmentally sensitive lands and use of fertile soil for agriculture throughout the municipality.

Review of Literature

“Law is not static. It changes incessantly” (Sacco 1991, p. 390). According to the words of one of the most prominent comparative lawyers, man has always entertained the illusion that he can find a criterion, a legal truth, or principle “for choosing among rules and institutions that is invariable, Omni comprehensive and valid everywhere. Reality has so far refuted such illusions, even though this very noble aspiration to find eternal general rules is a powerful stimulus to the improvement of positive law, purging it of irrationality and spurring it on toward higher and higher values” (Sacco 1991, p. 390).

Thus, even in the still young history of environmental law multiple attempts to provide solutions to the many problems related to the environment occurred, which could be forever and universally valid. However, the complexity of the environmental field has quickly made it clear to the various decision-makers that, in front of the utopia derived from the creation of “one-size-fits-all” and eternal principles and rules, stood the economic, social, and political differences of each legal system, in addition to the advancing scientific and technological knowledge and new hazards to the environment.

The analysis of the diffusion of Sustainable Development (hereinafter SD) at the global level can provide an interesting starting point to see how even one of the

most important and universally recognized concepts can give rise to different interpretations and applications. This diffusion is observed here through the mechanism of the circulation of legal models, the cornerstone of comparative legal studies. According to Alan Watson, one of the most famous scholars of comparative history of law, the circulation of legal models would not only be the object of comparative investigation, but also the orientation criterion of this investigation and its goal. It is therefore considered as the foundation of comparative law (Watson 1977).

The circulation of legal models, made famous by Watson with the metaphor of "legal transplant", provides a dynamic approach to the study of comparative law. According to this theory, a transfer of a rule from a legal system to another or from one people to another, not only is not an exception, but also proves to be a common practice since the most ancient of history (Watson 1974). Indeed, Watson considers borrowing as the most fruitful source of legal change (Watson 1996). On the other hand, Edward M. Wise considers the term "circulation" as 'a more apt metaphor for the phenomenon in question than the term "transplant". The point involves more than terminology: it bears on the perceptions of the kinds of questions it is relevant to ask' (Wise 1990, p. 1). 'It seems less apt to talk in terms of "transplants"; that makes a process almost as natural as breathing sound like major surgery' (p. 12).

Research Methodology

The researcher has adopted Doctrinal and Non-Doctrinal Research Methodology for the purpose of doing this research. The research was conducted by relying upon both primary sources of data andsecondary sources of data. Researcher has collected the Primary Data from people by conducting several surveys and responses. The collected responses, thus was about 1502 responses.Secondary Data such as Books, Journals, Case laws and websites were also referred by the Researcher.

Discussion

1)Gender * 35) Is it mandatory that there must be public participation for the development of environment?

Crosstab

Count

		35) Is it mandatory that there must be public participation for the development of environment?		
		Yes	No	Total
1)Gender	Male	34	0	34
	Female	0	17	17
Total		34	17	51

Chi-Square Tests					
	Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	51.000[a]	1	.000		
Continuity Correction[b]	46.599	1	.000		
Likelihood Ratio	64.924	1	.000		
Fisher's Exact Test				.000	.000
N of Valid Cases	51				
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 5.67.					
b. Computed only for a 2x2 table					

From the above table, it is observed that the Chi Square value is greater than 0.05 which indicates that there is association between Gender and it is mandatory that there must be public participation for the development of environment. Hence null hypothesis is rejected.

1) Gender * 36) The principle of sustainable development attempts to maintain a balance between development and the environment?

Crosstab				
Count				
		36) The principle of sustainable development attempts to maintain a balance between development and the environment?		
		strongly agree	Agree	Total
1)Gender	Male	22	12	34
	Female	1	16	17
Total		23	28	51

Chi-Square Tests					
	Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	15.839[a]	1	.000		
Continuity Correction[b]	13.552	1	.000		
Likelihood Ratio	18.455	1	.000		
Fisher's Exact Test				.000	.000
N of Valid Cases	51				
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 7.67.					
b. Computed only for a 2x2 table					

From the above table, it is observed that the Chi Square value is greater than 0.05 which indicates that there is association between Gender and the principle of sustainable development attempts to maintain a balance between development and the environment.Hence null hypothesis is rejected.

Sustainable Utilisation of Natural Resources

In spite of being an important element of sustainable development, sustainable utilisation is an independent concept better understood in the context of international law concerning natural resources. The development of the concept of sustainable use has been supported by Treaties and other international acts through the use of terms that are closely related. International legal instruments have aimed for conservation measures and programs which are 'rational', 'wise', 'sound', or 'appropriate', or a combination of these. These words are usually used without definition and often interchangeably and accordingly the meaning of each term depends upon its application in each instrument.

The Integration of Environmental Protection and Economic Development

The second component of sustainable development is the integration of environmental consideration into economic and other development activities and to take into account the needs of economic and other social development in the interpretation and implementation of environmental obligations. The integration can be achieved through collection and dissemination of environmental information and by conducting environmental impact assessments. Integration of environmental protection and economic development can also form a prerequisite for bilateral and multilateral development assistance. In 1971, the UN General Assembly in its Resolution 2849 affirmed that, 'development plans should be compatible with a sound ecology and that adequate environmental conditions can best be assured by the promotion of development, both at the national and international levels'. Since the UNCED the relationship between environmental protection and economic development has been increasingly recognized by the international community. The UNCED instruments reflect the need to integrate environment and development. Principle 4 of the Rio Declaration provides that 'environmental protection shall constitute an integral part of the development process and cannot be considered in isolation from it'. This requirement is reflected in subsequent agreements and declarations including the 1994 Convention to Combat Desertification and the 1995 Washington Declaration on the Protection of the Marine Environment from the Land Based Activities. Numerous regional treaties also support such integration approach. Examples include the 1974 Paris Convention (calls for 'integrated planning policy consistent with the requirement of environmental protection'), the 1978 Amazonian Treaty (affirms

the need to 'maintain balance between economic growth and conservation of environment'), the 1985 ASEAN Convention ('conservation and management of natural resources are treated as an integral part of development planning at all stages and at all levels') and the 1989 Fourth Lome Convention (requires the 'preparation and implementation of coherent modes of development that have due regard for ecological balances').

Conclusion:

The idea of sustainable development was adopted by the international community with the objective of improving the quality of human life and to value other living and non-living components of environment. Although, there remains significant uncertainties regarding the precise meaning and legal status of the notion, there is, however, no doubt about the fact that it has had profound impact on international environmental law. The concept and its core elements have been repeatedly expressed in multiple numbers of international environmental law instruments.It has also influenced the principles of international environmental law and the tools that are used to implement these principles. The concept of sustainable development does represent a policy capable of influencing the decisions of international and municipal courts, interpreting treaties, the practice of states and international organizations and thus bears the competence to contribute towards changes and developments in the realm of existing international environmental law. States and international bodies are now required by international law to take into account the objective of sustainable development and the appropriate process to achieve the same.

References:

- Fundamental Principles of Environmental Protection - (http://www.legal servicesind ia.com /article/755/Fundamental-Principles-of-Environmental-Protection.html)
- Principles Of Environmental Law – (https:/ /www.britannic a.com/topic/ environ mental-law/Sustainable-development)
- Natural Resources, Economics, Sustainable Development And Sustained Growth, Sustainable Development- (https://science.jrank.org/pages/6642/Sustainable-Develo pm ent.html)
- Sustainable use of natural resources – (https://www.ymparisto.fi/en-us/cons umption_and_production/Sustainable_use_of_natural_resources)
- Integrating development with environmental protection –(https://ww w.sustainabl egoa ls.org.uk/integrating-development-with-environmental-protection/)
- Sustainable Development – (https://www.sciencedirect.com/topics/earth-and-planetary-sciences/sustainable-development)
- Sustainable Development Goals- (https://ww w.in.undp.org/con tent/india/en/h ome/sustain able-development-goals.html)
- Sustainable Development and India - (https://www.jagranjosh.com/current-affairs/sust ainab le-development-and-india-1503408725-1)

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY EDUCATIONAL RESEARCH
ISSN:2277-7881; IMPACT FACTOR :6.514(2020); IC VALUE:5.16; ISI VALUE:2.286
Peer Reviewed:VOLUME:9, ISSUE:4(1), APRIL :2020

CHALLENGES FACED IN MARKETING BY AGRO PRODUCERS THROUGH AGRICULTURAL PRODUCE MARKETING COMMITTEE'S: AN EMPIRICAL STUDY FROM THE STATE OF MAHARASHTRA

Prof. Yogesh Khandre
Assistant Professor
Maharashtra Institute of Technology
Aurangabad

Dr. U Y Memon
Assistant Professor
Sir Sayyed College of Arts
Science & Commerce
Aurangabad

Abstract:
Production and Marketing aspects of agricultural produce are the two sides of the same coin. Market-driven production would be the key to success than the production–propelled marketing. In the present distribution of agricultural produces, the agriculture and allied departments dealing with production enhancement are totally dissociated with the marketing setup. This has led to conspicuous absence of integration in planning and implementation of different schemes at district level. There exists a need of the hour to bring convergence amongst agriculture and allied departments in marketing of agricultural produce. This calls for convergence of schemes and resources therein to explore the synergies for the benefit of farmers. It seems the existing system reveals that the existing gaps on the marketing front are mainly due to absence of coordination between the production departments and marketing departments. In this literature review paper an attempt is made to examine the gaps and inadequacies of different agricultural marketing infrastructures, their geographical spread in the state of Maharashtra-India for strengthening of marketing and allied activities.

Keywords: Agricultural Produce, Infrastructure, Grading, Financial Resources and Marketing Information.

Introduction:

According to the National Commission on Agriculture – Agricultural marketing is a process which starts with a decision to produce a saleable farm commodity - involves all aspects of market structure of system, both functional and institutional, based on technical and economic considerations and includes pre and post- harvest operations viz. assembling, grading, storage, transportation and distribution. Maharashtra State is spread over an area of 3.07 Lakh Sq. km. The total population of the State is 11.7 Crore (estimated 2011). With more than half of the population being rural, agriculture and allied industries play an

important role in the states' economy. The agriculture and allied activities sector contributes 12.9% to the state's income. Staples such as rice and millet are the main monsoon crops. Important cash crops include sugarcane, cotton, oilseeds, tobacco, fruit, vegetables and spices such as turmeric. Animal husbandry is an important agriculture related activity. The share of Maharashtra state in the livestock and poultry population in India is about 7% and 10% respectively.[9] Marketing is an integral part of agriculture, it encourages the farmers to invest more and increase production. The simplest form of agricultural marketing is the buying and selling of the farm produce. However, in modern sense, the agricultural produce undergoes a series of exchanges from one hand to another before it finally reaches the consumer. A better and easy market access and efficient information flow can bring much desired market orientation of the production system.

Agricultural Produce Market Committees In the Report Year 1 April 2017 to 31st March 2018, there are 307 Main Markets and 597 Submarkets functioning in the state. The APMC's are functioning in all districts of the state. Division wise break-up of the APMCs functioning in the State is as follows:

Sr. No	Division	APMC Markets	Sub Markets
1	Ratnagiri	20	41
2	Nasik	53	117
3	Pune	23	67
4	Aurangabad	36	65
5	Latur	49	80
6	Amrawati	55	91
7	Nagpur	50	76
8	Kolhapur	21	60
	Total	**307**	**597**

Objective of the study: To review the existing challenges faced by agro producers w.r.t the agricultural produce marketing committee's in the state of Maharashtra.

Research Methodology:

To meet the objective of the study necessary data on agricultural marketing infrastructures such as agricultural produce markets, sub yards rural periodic markets, storage and warehousing facilities, roads, transport vehicles, grading, communication, and post harvest technology were collected from the annual report of various ministries & leading book publications. The study is essentially empirical and has utilized both the secondary and the primary source of information. The data has been gathered from websites of international

organizations such as Food and Agriculture Organization (FAO), Ministry of Finance, Agriculture Marketing Departments of Maharashtra state and websites of different institutes such like NAFED, NHRDF etc. Furthermore, the unpublished data has been collected through visiting agriculture and agriculture statistic departments of Maharashtra state.

Literature Review:

Agricultural marketing is inferred to cover the services involved in moving an agricultural product from the farm to the consumer. It is also the planning, organizing, directing and handling of agricultural produce in such a way as to satisfy the farmer, producer and the consumer. Numerous interconnected activities are involved in doing this, such as planning production, growing and harvesting, grading, packing and packaging, transport, storage, agro- and food processing, distribution, advertising and sale. Effectively, the term encompasses the entire range of supply chain operations. However, its key function is to help direct these services, by providing competent and able market information, thereby linking the other operations into an integrated service with targeted outcomes.[1]

An **Agricultural Produce Market Committee** (APMC) is a marketing board established by any state government in India. The Maharashtra State Agricultural Marketing Board runs 295 APMCs (Agricultural Produce Market Committee) in Maharashtra, under the APMC Act enacted by the Government of India.

In July, 2016, the Maharashtra State Government removed fruits and vegetables from the purview of the APMCs. The state government has urged the farmers to directly bring their produce for sale in Mumbai. Of the 307 APMCs in the state, 219 are currently operating.

The government has granted 148 Direct Marketing Licenses of which 91 are for fruits and vegetables. The Pune APMC, meanwhile, appealed to the farmers from the state as well as from outside to bring their produce to the market and sell those directly.[2]

It is roughly estimated that the farmer is able to receive barely 25% to 33% of the final retail price. Middlemen or broker receives the commission from both seller and buyer, thus making consumers pay for this spread. Also middlemen do not pass the benefit to either side. During peak seasons, when they buy from farmers at low prices, they do not drastically reduce the prices to final consumers.

Conversely, during lean seasons, when consumer prices are high, the farmers do not get higher returns on their produce.

Today's agricultural marketing in Maharashtra has to undergo a series of exchanges or transfers from one person to another before it reaches the consumer.

There are three major marketing functions involved in this;

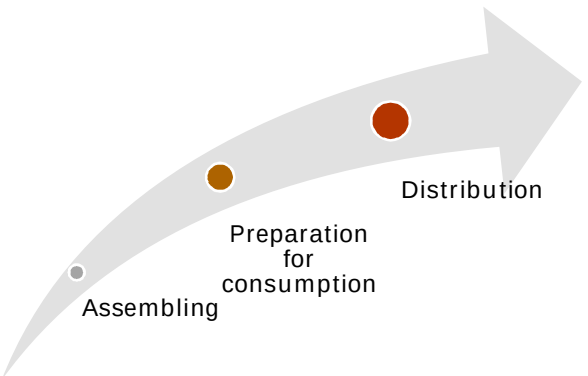


Figure 1.1 Functions of Agricultural Marketing

Selling on any agricultural produce depends on some couple of factors like the demand of the product at that time, availability of storage etc. The products may be sold directly in the market or it may be stored locally for the time being.

Moreover, it may be sold as it is gathered from the field or it may be cleaned, graded and processed by the farmer or the merchant of the village. Sometime processing is done because consumers want it, or sometimes to conserve the quality of that product. The task of distribution system is to match the supply with the existing demand by whole selling and retailing in various points of different markets like primary, secondary or terminal markets.

Most of the agricultural products in Maharashtra are sold by farmers in the private sector to moneylenders (to whom the farmer may be indebted) or to

village traders. Products are sold in various ways. For example, it might be sold at a weekly village market in the farmer's village or in a neighboring village. If these outlets are not available, then produce might be sold at irregularly held markets in a nearby village or town, or in the mandi.[3]

The Maharashtra state government has already amended the Maharashtra Agricultural Produce Marketing (Development and Regulation) Act, 1964. This enables e-marketing of agricultural produce and establishment of virtual markets, shifting the burden of levy from producers to purchasers and restricting the jurisdiction of the APMC to only the market premises instead of the entire tehsil.[4] Maharashtra is an industrial state of India, more than 65 percent of population is still engaged in agriculture.

Since 2nd July 2002, as per the government resolution No. APMC-1099/PC.305/11-c, Govt. of Maharashtra has decided to set up Shetkari Bazars in the state and MSAMB has been appointed as nodal agency for implementing this scheme. The produce brought by farmers will not be levied cess at the Shetkari bazaars in all districts and key taluka places by APMCs from the area. As per this resolution, a state level committee is setup under the chairmanship of Hon. Minister of Marketing, Govt. of Maharashtra, for implementing and monitoring of this scheme. The district level committees are also set up under the chairpersonship of respective district collectors with the following objectives:[5]

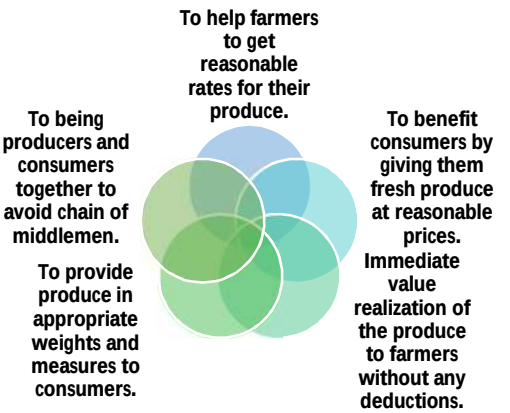


Figure # 1.2 The objectives behind setting up Shetkari Bazaars

The marketing channel in Maharashtra which is growing in conjunction with the conventional APMC set up i.e. Shetkari Bazars. The Farmer's Market (Shetkari Bazar) is an idea of marketing the agrarian produce directly to consumers by producers (farmers).

Challenges faced in marketing by agro producers through APMC's

 # The role of intermediaries:

The intermediaries are such as village traders, Kutcha Adhtiyas, Pukka Adhtiyas, Brokers, wholesalers, retailers etc. Intermediaries act as a link in the distribution process, but the roles they fill are broader than simply connecting the different channel partners. Wholesalers, often called "merchant wholesalers," help move goods between producers and retailers. By reducing the number of middlemen currently included within the APMC marketing process (such as dalals, auctioneers etc) along with increasing the number of licenses granted to more farmers and dalal shops from operating within the market yard shall lead to considerably reduced auction price rates since it inevitably leads to greater supply and more competitive bidding at the market auction yards at the market yards. The one main defect of the Indian Agricultural marketing is the presence of too many middlemen and exploitation of farmers by them. On one hand these middlemen exploit the farmers by purchasing the produce at lower prices and on the other hand they exploit the customers by demanding higher prices from them. The only aim of a number of commission agents, brokers etc. is to derive a higher income from the middle processes. These middlemen take undue advantage of the poor former on the basis of their financial resources.

 # Inadequate infrastructure for storage and transportation:

An important deficiency of Indian agricultural marketing is lack of store houses. Due to lack of this facility the farmer is unable to keep his product safely until it can fetch a fair price, and he is forced to sell his product at a low price. The insufficient and unscientific facilities of shortage which are available, waste large quantities of grains. Approximately 20% to 30% grains are lost due to rats, insects etc. and the farmers have to bear crores of loss due to lack of these facilities. There exists a need to improve farmer access to markets by establishing farmer associations and building community-level marketing capacities and infrastructure; providing access to warehouse receipt systems linked to commodity exchanges, establishing electronic trading platforms, improving market infrastructure and services of rural retail and traditional wholesale markets, and making market management more efficient and responsive to farmers' needs. The roads from Villages to cities are usually unmade which are not capable of transport during the rainy season. The bullock carts can take the product only up to a limited area. During lack of transport

facilities the farmer is unable to take his produce to the appropriate market and is unable to receive a fair price for his produce.

Studies indicate that covered and open auction platform exists only in two-thirds of the regulated markets, while only one-fourth of markets have common drying yards. Cold storages units exist in less than one tenth of the market and grading Facilities in than one third of the markets. Electronic weigh-bridge is available only in a few markets. APMc's are authorized to collect market fee ranging between .5% to 2% of the sale value of the produce. In addition commission charges vary from 1% to 2.5% in food grains and 4% to 8% in fruits and vegetables. Further other charges such as purchase tax, weighment charges and labour charges are also required to be paid. The share of farmers in consumer's price is very low particularly in perishables to a number of intermediaries, lack of infrastructure and poor holding capacity. Large Number of Marketing Channels with long supply chain also adds up more of costs without adding significant value.

Cold storage at the farm gate reduces wastage and increases the shelf life of the product, thus giving farmers more options to take the right marketing decisions. Around 460 cold storages have been set up in Maharashtra in the public, private and co-operative sectors with a capacity of 5.64 lakh MT, mostly around Thane, Nashik and Mumbai. There are about 35 pack houses owned by cooperatives, which include grading, sorting, waxing, packaging, pre-cooling and cold storages. These pack houses are being set up for export purposes, mainly grapes and pomegranate. Several pack houses have also been set up in the private sector, mainly by exporters. However, much of the existing infrastructure either remains idle after the particular fruit season is over or vegetables, chillies, dairy products and food grains are stored in the cold storages during the idle period. Therefore, production clusters having multiple products across the year are the ideal locations for the setting up of cold storage infrastructure. It is also necessary to promote multi-product cold storages and attract corporate investment for setting them up. At present, NHM provides a credit-linked back-ended subsidy of 40% of capital cost for cold storage, refer vans and ripening chambers, with different cost ceilings. For cold storages, the maximum capital cost permissible is Rs. 6,000/MT for 5,000 MT, i.e. a subsidy of Rs. 2,400/MT. However, in case of multi-chambered cold storages, the capital cost could increase from Rs. 6,000/MT to Rs. 10,000/MT for 5,000 MT. The Government will provide a subsidy of 25% on the additional capital cost (over and above Rs. 6000/MT provided for by NHM) subject to a ceiling which would determined separately, in order to encourage multi-product cold storages in the State.[12]

 # Lack of Financial Resources

The state rural areas lack in financial resources, due to which even their emergency requirements are not fulfilled. In such conditions the farmers sell their produce before its ripening. Similarly, some financial facilities, like, installments on loans for pumping-set, tractor, thrasher etc. have to be paid on monthly or quarterly basis due to which they have to sell the product as soon as possible. Thus, as the lack of financial assistance, is a problem for the farmers; so does the receipt of loan also puts them in problem. A farmer producing agricultural goods face problems in getting funds at right time due to procedural hassles. This make the business cycle come to halt. Farmers and small entrepreneurs, like small supply companies, need finance to allow them to expand production or diversify products. This can include, for example, finance for inputs (such as seeds and fertilizers), production (such as machinery and equipment) and marketing (such as processing, packaging and transport) (Food and Agriculture Organization [FAO] & World Bank, 2013).[6]

Financial and other support is available for food processing and other agro industries under several Central and State schemes from different Ministries, Departments and agencies. However, entrepreneurs are often not aware of these schemes or need more information. They have to deal with different agencies for various schemes across the value chain. There is, therefore, a need to bring them together at one place. A large number of project profiles and model project reports have also been prepared by various agencies, and are available with District Industries Centres (DICs), banks, etc., particularly for MSEs. The Directorate of Industries will coordinate with these agencies to update or prepare new model project reports to make them more relevant to different regions, products and investment levels by having new reports prepared, with funding by the State Govt. or its agencies if necessary.[7]

 # Lack of Standardization and grading:

Maharashtra is also a major cereals and pulses producer. Inadequate availability of post harvest facilities at the village level also leads to loss to cereals and pulses producers. Graded product will bring additional return to producers due to value addition. AGMARK is the acronym for agricultural marketing.It is a quality certification mark under central agricultural produced (Grading & Marketing) ACT, 1937. AGMARK is done for commodities of internal consumption like ghee, vegetable oil butter, etc.

The AGMARK label indicates the products meet curtain standards of purity and quality. Labels of different colors are used to indicate the grade of the products. Strict procedures are followed and rules are laid down to ensure conformity to the standards set as per the grade given. Quality check and tests are done to

maintain standards. With the help of such grades and standards, products produce can be sold through the right channel and the right prices. Also, the consumers are ensured value for money and can comfortably by a product without fear.

The lack of standardization and grading is clearly visible in the agricultural marketing, due to which fixing a deal in relation to these products becomes difficult. Due to lack of proper standardization and grading the customers have problem in purchasing the product.

 # Market information not easily accessible:

The state farmer has low knowledge about marketing. He believes on information acquired from the businessmen and money lenders of the village. Mostly, the farmers in the state are illiterate so they cannot read the newspaper. Thus, they do not have sufficient knowledge about the market. Now, government transmits the rates of the market on the ratio, which has definitely benefited them. There is a need for improvement in agricultural marketing system by adopting systematic approach and latest technology like Information Technology, for collection and dissemination of Market Information and Intelligence. One of the reasons for lack of returns in agriculture is traditional way of marketing through middlemen and absence of awareness about market information and intelligence. The other reasons are unscientific and inadequate crop planning, crop husbandry, post harvest management and inadequate alternative marketing channels. At present, APMCs are able to disseminate only price information to the farmers related to respective market area only. The scope and coverage of market information dissemination needs to be expanded.[8]

Conclusion and Suggestions

As we have a tradition of agricultural production, the marketing and allied commercial activities, now it is the time for us to brainstorm and come out with new ideas of value added services. These value added services will give the existing agricultural engine a new dimension. The next logical step could be food-processing which not only could be another revenue generating area but also can provide lots of full-time employment to our youths. With the changing agricultural scenario and global competition, there is a need of exploiting the available resources at maximum level.

The opportunity for farmers to realize higher prices for their produce, is to clean and grade the produce before bringing it to the market. The opportunity also lies in the form of procuring equipment for cleaning and grading, with minimum

investment under the co-operative setup, to process the produce before selling, either in the market, or directly to the demand centers.

There is an eminent need for the Agri-marketing initiatives to be large and organized. The present market must cover two aspects of marketing network and actual regulation of the conduct of market. The need to strength the regulated market system arises from changing nature of linkages between agriculture and markets. It has been observed that better and easy market access and efficient information flow can bring much desired market orientation of the production system. Indian agriculture, moving from commoditization to commercialization drives it towards market orientation.

Altogether we can claim to have largest network of agri-business cooperatives in the world, engaging in performing manufacturing, procurement and marketing of agricultural produce. These have proven to occupy important place in our economy. The government must examine its policies and regulations with view to strength the marketing network and ensure that prices are being determined on competitive basis and markets are being manipulated. Using modern ICT can bring out better solutions as it can facilitate agricultural marketing functions and processes include buying and selling, payment, grading, standardization, transportation in an efficient manner.

References:

[1] En.wikipedia.org. (2019). Agricultural marketing. [online] Available at: https://en.wikipedia.org/wiki/Agricultural_marketing [Accessed 1 Nov. 2019].
[2] En.wikipedia.org. (2019). Agricultural produce market committee. [online] Available at: https://en.wikipedia.org/wiki/Agricultural_produce_market_committee [Acces sed 1 Oct. 2019].
[3] Agritech.tnau.ac.in. (2019). Agricultural Marketing :: Agricultural Marketing in I ndia. [online] Available at: http://agritec h.tnau.ac .in/agricul tural_ma rketing/agrimark_India.html [Accessed 1 Dec. 2019].
[4] dna. (2019). State promotes direct marketing of agri produce. [online] Available at: https://www.dnaindia.com/mumbai/report-state-promotes-direct-marketing-of-agri-produce-2251020 [Accessed 1 Nov. 2019].
[5] UKEssays. November 2013. Maharashtra APMCs: Current Status and Substitute Marketing. [online]. Available from: https://www.ukessays.c om/ess ays/e conomi cs/maharashtras-apmcs-current-status-substitute-1135.php?vref=1 [Accessed 3 October 2019].

[6] Ruete, M. (2019). [online] Iisd.org. Available at: https://www.i isd.org/sites/default/files/publications/financing-agriculture-boost-opportunities-devloping-countries.pdf [Accessed 4 Nov. 2019].
[7] Badi, R. and Badi, N. (2006). Rural marketing. Mumbai: Himalaya Publ. House, pp.166-169.
[8] Macp.gov.in. (2019). Market Information Services | Maharashtra Agricultural Competitiveness Project (MACP). [online] Available at: http://macp.gov.in/market-information-services [Accessed 3 Oct. 2019].
[9] En.wikipedia.org. (2019). Maharashtra. [online] Available at: https://en.wikipedia.org/wiki/Maharashtra [Accessed 1 Dec. 2019].
[10] Exam Notes. (2019). Agricultural Marketing – Problems of Agricultural Marketing in India. [online] Available at: https://www.allexam notes.com/2017/05/agricultural-marketing-problems/ [Accessed 3 Dec. 2019].
[11] Managementparadise.com. (2019). Standardization and Grading | Management Paradise. [online] Available at: http://www.manage mentparadise.com/for ums/production-management-prod-mgmt/200401-standardization-grading.html [Accessed 5 Oct. 2019].
[12] Indiaenvironmentportal.org.in. (2019). [online] Available at: http://www.indiaenvironmentportal.org.in/files/AGRO%20INDUSTRIAL%20POLICY%202010.pdf (government of maharashtra agro industrial policy 2010 draft for comments & suggestions) [Accessed 6 Nov. 2019].

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY EDUCATIONAL RESEARCH
ISSN:2277-7881; IMPACT FACTOR :6.514(2020); IC VALUE:5.16; ISI VALUE:2.286
Peer Reviewed:VOLUME:9, ISSUE:4(1), APRIL :2020

SURFACE COATING: ANOTHER POSSIBILITY FOR TABLE GRAPES PRESERVATION

J. J. Jankar [1] , V.N. Pawar [2] , A. K.Sharma [3] , A.K.Sahoo [4] , R.C.Ranveer [5]
MIT College of Food Technology, MIT ADT University, Pune [1,2]
ICAR-National Research Centre for Grapes, Manjri, Pune [3]
Department of Food Technology, Shivaji University, Kolhapur [4]
PGI Institute of Post-Harvest Management, Raigad [5]

Abstract
Grapes are increasing in demand for their rich phenolic compounds, giving them an incredible nutritional value. Response for fresh grape is in this way, increasing as per the improvement in living standard and expanding mindfulness about the unsafe impacts of chemicals. Nevertheless, fresh berries effectively decay because of water loss and growth in microbes bringing about challenges for postharvest quality maintenance without treatment. However, interdisciplinary investigations increased extraordinary advances in postharvest technology for long term storage of table grapes to accomplish a superior balance between supply and market in table grape industry. Present interest focuses on the utilization of sound materials with protected, simple and innovative technology. As of late, there has been an expanding interest in surface coating and films in this area. This article reviews about the materials used for the coating of grapes and also different additives with the help of which shelf life of different variety grapes has been improved. It also focuses on antioxidant and antimicrobial surface coating of grapes.

Keywords: Grapes, Shelf Life, Surface Coatings, Antioxidant Agents, Antimicrobial Agents.

Introduction
Most fruits consumed come straight from nature, where a large number of them can be eaten promptly as we take them from the tree, vine or ground. Be that as it may, with expanded transportation distribution system, storage needs, and coming of ever bigger markets and warehouse stores, fruits are not eaten just in the orchards, on the field, in the farmhouse, or near handling offices. It requires some time period for a food item to arrive at the table of the consumer. During tedious advances engaged with storage, handling and transportation fruits begin to get dried out, weaken, and lose appearance, flavor and loss of nutritional components. In the event that no security is given, destruction can happen hours or days, regardless of whether this harm isn't promptly noticeable. Lot of techniques has been arisen to solve these problems. Edible films and surface coating is also one of them. Surface coatings and films on different fruits have

been utilized for a considerable length of time to counteract loss of water and to make a glossy fruit surface for an appealing purpose. These practices were acknowledged some time before their related sciences were comprehended, are still used in the present day. The term, edible film, has been identified with food applications just in the previous 50 years.As a rule, the terms film and coatings are utilized reciprocally to demonstrate that the outside surface of a food is covered by generally slim layer of material of certain structure is coating. Be that as it may, a film is sporadically distinguished from a coating by the idea that it is an independent wrapping material, though a coating is directly applied onto thefood surface itself.

Interest for fresh grapes is expanding all inclusive because of their rich constituents in phenolic mixes, which have strong antioxidant capacity. Nevertheless, fresh table grapes decay quickly because of berry water loss and increase in pathogen development, which make it hard to safeguard without treatment(Sabiret al.2018).Table grape is a non-climacteric fruit with a low physiological action, however is liable to severe physiological issue, water loss and mycological decay during postharvest handling. Stem browning and gray mold infection caused by the fungus Botrytis cinerea are the two principle factors which diminish table grape postharvest quality. As of late, natural products which are biologically active have begun to turn into a viable option for the replacement of synthetic fungicides in keeping up natural product quality during the storage(Shiriet al.2013).Various types of materials such as polysaccharide, proteins, lipids or their combination can be used for the coatings and films preparation. Previous studies reported that coating of grapes polysaccharide based material chitosan coating of grape variety El-Bayadi extended the shelf life during the storage of 32 days by maintaining its total soluble soilds, titratable acidity and antioxidant activity (Al-Qurashi and Awad,2015). Coating material derived from protein source such as pectin impregnated with cinnamon leaf oil increased the antioxidant activity of grapes (Melgarejoet al. 2013). Lipid based coating of grapes such as lemongrass oil amalgamated with chitosan, exhibited antagonistic properties to microbial count and showed similar sensorial characteristics as uncoated berries (Oh et al.2017).These materials can be enriched with different additives which may prove as advantageous to the food commodity.

Enriched surface coating of grapes with different additives

One of the significant rising elements of edible films and coatings is their utilization as transporters of different additives such as antimicrobials, antioxidants, antifungal agents etc to extend the shelf life of food. Grapes of different varieties have been coated by using variety of additives to improve its quality and for the extension of its shelf life.

Antioxidant coating of grapes

Grapes contain different supplement components, for example, nutrients, minerals, starches, edible fibres and phytochemicals. Sadly, table grapes show serious issues during postharvest storage and retailing. The loss of quality depend on weight reduction, changes in colour, induced softening and rachis browning, and high occurrence of berry damage(Crisostoet al.2002), which lead to a decrease of time span of usability. This browning problem of grapes can be solved by the addition of different antioxidants into coating material for the application on the surface. Use of antioxidant coatings in case of grapes is given in the table 1.

Table1. Antioxidant coating of grapes

Coating Material	Variety of grape	Positive Effect	Reference
Chitosan	Shahroudi	Lowered weight loss, decay, browning, shattering, and cracking. Total soluble solids (TSS), titratable acidity (TA), and TSS/TA ratio levels were higher, Changes of the total phenolics, catechin, and antioxidant capacity were delayed	Shiriet al.2013
Putrescine + chitosan	Shahroudi	Reduced weight loss, decay incidence, browning, and berry shattering and cracking	Shiriet al.2012
Pistachiaatlantica Essential oil+ Carboxymethylcellulose	Rasheh	Maintained higher anthocyanin, antioxidant capacity, phenol, tannin and titratable acidity.	Naseret al.2017
Alginate+ vanillin	Alphonse Lavallee and Razaki	Greater total phenolic content and antioxidant activity compared to others during postharvest storage	Takmaet al.2017
Pectin + Cinnamon leaf oil(CLO)	Redglobe	Controlled decay and increased the antioxidant health benefits of grapes due to CLO's antifungal and antioxidant properties	Melgarejoet al.2013
Xanthan gum and olive oil enriched with antioxidants (gallic acid, ferulic acid and ascorbic acid	Thompson seedless	Enhanced the level of phenolics, ascorbic acid and total antioxidant activity in grapes. The activities of cell wall modifying enzymes such as Polygalacturonase (PG) and PectateLyase (PL) were reduced in the fruits of treated sets as compared to that of the control set.	Baraiyaet al.2016

Antimicrobial coating of grapes

The grape is a profoundly perishable non-climacteric fruit with decreased shelf life due to loss of firmness, berry drop, stem fading, drying up and mycological decay (Menget al.2008). The decrease of losses due to fungal rot is a

noteworthy objective of postharvest innovation for table grapes, which looks to utilize safe and viable techniques to control the contamination and also the growth of spoiling microbes.(Martínez-Romero et al.2008). Coating of grapes with added antimicrobials can reduce the issue. Different antimicrobial coating of grapes is given in the table 2.

Table2. Antimicrobial Coating of grapes

Coating Material	Variety of grape	Positive Effect	Reference
Aloe vera gel	Crimson Seedless	Reduced the initial microbial counts for both mesophillic aerobic and yeast and molds, delayed rachis browning and dehydration and maintenance of the visual aspect of the berry without any detrimental effect on taste, aroma, or flavors.	Valverdeet al.2005
Chitosan+NaOH	Italia	Inhibitory effect originated from combination of coating and antifungal effects and stimulation of defense responses	Romanazziet al. (2002)
Chitosan + Origanumvulgare L. essential oil	Vitislabrusca	Preserved the quality of grapes &some of their sensory attributes improved.Control post-harvest pathogenic fungi in fruits, in particular, R. stolonifer and A. niger in grapes.	Dos et al.2012
Chitosan + Ethanol	Autumn Seedless, Thompson Seedless	Improved the control of gray mold of table grapes	Romanazziet al.2007
Chitosan+ lemongrass oil	Labruscana Bailey	Greater efficiency in increasing microbial safety against Salmonella and preserving grape berries,	Oh et al.2017
Chitosan + bergamot oil	Muscatel	Highest antimicrobial activity and the greatest control of respiration rates with a reasonably good control of water loss during storage	Sanchez et al.2011

Changes in coated grapes in terms of Physico-chemical means

Most of the coatings givethe positive effects on physic-chemical properties of grapes. This beneficial effect of coatings helps to increase the shelf life of grapes and maintains its quality characteristics. The positive effects of surface coating of grapes on its physicochemical parameters is given in the table 3.

Table3. Effect of surface coating on Physico-chemical parameters of grapes

Coating material	Grape variety	Positive effect	Reference
Chitosan	Alphonse Lavallee	Retarded the loss in weight, Extended the skin rupture force and total phenol content, Visual quality was higher	Sabiret al.2018
Chitosan+β-cyclodextrin	VitisLabruscakyoho	Lowered respiration rate &restrained weight loss	Youweiet al.2013
Aloe vera gel	Thompson Seedless	Shelf life increased spoilage due to fungal infection of grapes can be reduced.	Ali et al.2016
Low methoxyl pectin+ locust bean gum	-	Increased shelf life	Bryan 1972
Aloe vera gel	Vitisvinifera L. cv. Crimson Seedless	Delayed the changes in total phenolics and ascorbic acid ,total antioxidant activity (TAA), ripening process such as the retention of ascorbic acid during cold storage	Serrano et al.2006
Honey	(Vitisvinifera L., cv Razaki	Delayed quality loss and berry decay.Barrier to moisture and resist to water vapor diffusion during the cold storage	Sabır, et al.2011
Hydroxypropylmethylcellulose+ Propolis	Muscatel	Lowered down weight losses and controlled the oxygen consumption of the samples. Better microbial safety than uncoated samples.	Pastor et al.2011
Chitosan+acetonic extract of Salvia fruticosa Mill.	-	Controlled B. cinerea without deteriorating quality and physicochemical properties of grapes.	Kanetiset al.2016
Chitosan	Jingxiu	Decreased the weight loss, Inhibited the increase in rate of soluble solid content to titratable acid	Menget al.2008

Conclusion

Surface coatings are utilized from many years for storage of grapes of different varieties. Diverse coating materials are utilized for coating, for example, hydrocolloids, waxes, protein. Plenty varieties of additives such as antioxidants, antimicrobials, antifungal agents have been added to grapes coating to improve the quality and for the extension of shelf life. Lot of essential oils give beneficial effects and aids the basic coating material for enhancing the quality parameters of grapes. Surface coating act as barrier to moisture and gases thus preventing the decay of the fruit. Ecofriendly coating materials can replace the

plastic based coating and preserve the environment too. Thus, surface coating of grapes can enhance the marketability of grapes by preserving its shelf life.

References

- Ali, J.,Pandey, S., Singh, V., and Joshi,P.(2016). Effect of Coating of Aloe Vera Gel on Shelf Life of Grapes.Current Research in Nutrition and Food Science,**4**(1): 58-68
- Al-Qurashi, A. D., &Awad, M. A. (2015). Postharvest chitosan treatment affects quality, antioxidant capacity, antioxidant compounds and enzymes activities of "El-Bayadi" table grapes after storage. ScientiaHorticulturae, 197: 392–398.
- Baraiya, N. S., Ramana, T.V., Rao, and Thakkar, V. R. (2016). Composite Coating as a Carrier of Antioxidants Improves the Postharvest Shelf Life and Quality of Table Grapes (VitisviniferaL. var. Thompson Seedless) Journal of Agriculture, Science and Technology. 18: 93-107.
- Bryan, D.S.(1972). Prepared citrus fruit halves and method of making the same. U.S. patent 3, 707-383.
- Crisosto, C. H., Garner, D. and Crisosto, G. (2002).Carbon Dioxide-enriched Atmospheres during Cold Storage Limit Losses from Botrytis but Accelerate Rachis Browning of 'Redglobe' Table Grapes.Postharvest Biol. Technol., 11: 181-189.
- Dos Santos, N. S. T., AthaydeAguiar, A. J. A., de Oliveira, C. E. V., Verissimo de Sales, C., de Melo e Silva, S., Sousa da Silva, R., de Souza, E. L. (2012). Efficacy of the application of a coating composed of chitosan and Origanumvulgare L. essential oil to controlRhizopusstolonifer and Aspergillusnigerin grapes (Vitislabrusca L.). Food Microbiology, **32**(2): 345–353.
- Ghaderi, N., Shokri, B., and Javadi, T.(2017).The effect of carboxymethyl cellulose and pistachio (Pistaciaatlantica L.) essential oil coating on fruit quality of cold-stored grape cv. Rasheh.Iranian Journal of Horticultural Science ,63-78.
- Kanetis, L., Exarchou, V., Charalambous, Z.,andGoulas, V. (2016). Edible coating composed of chitosan and Salvia fruticosa Mill. extract for the control of gray mold of table grapes. Journal of the Science of Food and Agriculture.97:7745.
- Konuk, T., and Korel, F. (2017). Impact of preharvest and postharvest alginate treatments enriched with vanillin on postharvest decay, biochemical properties, quality and sensory attributes of table grapes. Food Chemistry. 221: 187–195.
- Melgarejo-Flores, B. G., Ortega-Ramirez, L. A., Silva-Espinoza, B. A., Gonzalez-Aguilar, G. A., Miranda, M. R. A., & Ayala-Zavala, J. F. (2013). Antifungal protection and antioxidant enhancement of table grapes treated with emulsions, vapors, and coatings of cinnamon leaf oil.Postharvest Biology and Technology.86:321–328.
- Melgarejo-Flores, B.G., Ortega-Ramírez, L.A., Silvaespinoza, B.A., González-Aguilar, G.A., Miranda, M.R.A., and AyalaZavala, J.F. 2013. Antifungal protection and antioxidant enhancement of table grapes treated with emulsions, vapors, and coatings of cinnamon leaf oil. Postharvest Biology and Technology.86: 321–328.
- Meng, X., Li, B., Liu, J., and Tian, S. (2008). Physiological responses and quality attributes of table grape fruit to chitosan preharvest spray and postharvest coating during storage.Food Chemistry.**106**(2), 501–508.
- Oh, Y. A., Oh, Y. J., Song, A. Y., Won, J. S., Song, K. B., & Min, S. C. (2017). Comparison of effectiveness of edible coatings using emulsions containing lemongrass oil of different size droplets on grape berry safety and preservation. LWT-Food science and technology, 75: 742–750.
- Oh, Y.A., Oh, Y.J., Song, A.Y., Won, J.S., Song, K.B. and Min, S.C. 2017. Comparison of effectiveness of edible coatings using emulsions containing lemongrass oil of different size drop lets on grape berry safety and preservation. LWTFood Science and Technology.75: 742–750.
- Pastor, C., Sanchez-Gonzalez, L., Marcilla, A., Chiralt, A., Chafer, M., & Gonzalez-Martinez, C. 2011. Quality and safety of table grapes coated with hydroxypropylmethylcellulose edible coatings containing propolis extract. Postharvest Biology and Technology, **60**(1), 64–70.
- Romanazzi, G., Nigro, F. ,Ippolito, A. , Di Venere, D. , Salerno, M .(2002). Effects of pre- and postharvest chitosan treatments to control storage grey mold of table grapes. Journal of Food Science **67**(5): 1862 – 1867.
- Romanazzi, G., Karabulut, O. A., &Smilanick, J. L. (2007). Combination of chitosan and ethanol to control postharvest gray mold of table grapes. Postharvest Biology and Technology, **45**(1): 134–140.

- Sabır, A., Sabır, F. K., & Kara, Z. (2011). Effects of modified atmosphere packing and honey dip treatments on quality maintenance of minimally processed grape cv. Razaki (V. vinifera L.) during cold storage. Journal of Food Science and Technology, **48**(3): 312–318.
- Sabir, F., Sabir, A.,Unal, S., Taytak, M., Kucukbasmaci, A., Faruk B., and Omer. (2018). Postharvest Quality Extension of Minimally Processed Table Grapes by Chitosan Coating.International Journal of Fruit Science, 1-12.
- Sanchez-Gonzalez, L., Pastor, C., Vargas, M., Chiralt, A., Gonzalez-Martínez, C., & Chafer, M. 2011. Effect of hydroxypropylmethylcellulose and chitosan coatings with and without bergamot essential oil on quality and safety of cold-stored grapes. Postharvest Biology and Technology, **60**(1): 57–63.
- Serrano, M., Valverde, J. M., Guillen, F., Castillo, S., Martinez-Romero, D., and Valero, D. (2006). Use of Aloe vera Gel Coating Preserves the Functional Properties of Table Grapes. Journal of Agricultural and Food Chemistry, 54(11): 3882–3886.
- Shiri, M. A., Ghasemnezhad, M., Bakhshi, D., &Sarikhani, H. 2012. Effect Of Postharvest Putrescine Application And Chitosan Coating On Maintaining Quality Of Table Grape Cv. "Shahroudi" During Long-Term Storage. Journal of Food Processing and Preservation, **37**(5): 999–1007.
- Shiri, M. A.,,Bakhshi, D., Ghasemnezhad, M., Dadi, Monad., Papachatzis , A., Kalorizou, H.2013.Chitosan coating improves the shelf life and postharvest quality of table grape (Vitisvinifera) cultivar Shahroudi.Turkish Journal of Agriculture.37: 148-156.
- Valverde, J. M., Valero, D., Martinez-Romero, D., Guillen, F., Castillo, S., & Serrano, M. (2005). Novel Edible Coating Based onAloeveraGel To Maintain Table Grape Quality and Safety. Journal of Agricultural and Food Chemistry, **53**(20): 7807–7813.
- Youwei, Y., and Yinzhe, R. (2013). Grape Preservation Using Chitosan Combined with β-Cyclodextrin. International Journal of Agronomy.1–8.

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY EDUCATIONAL RESEARCH
ISSN:2277-7881; IMPACT FACTOR :6.514(2020); IC VALUE:5.16; ISI VALUE:2.286
Peer Reviewed:VOLUME:9, ISSUE:4(1), APRIL :2020

SYNTHESIS, MOLECULAR MODELING AND ANTICANCER ACTIVITIES AGAINST MCF-7 CELL LINES OF 2-ETHOXY CHALCONES: STRUCTURE-ACTIVITY AND RELATIONSHIP

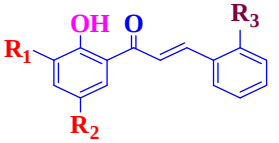
Ravi Ramlu Vidule[a], Madhav Marotirao Kendre[a], Ravindra Pramod Deshpande[c], Phanithi Prakash Babu[c], Mohammad Abdul Baseer[b]., Laxmikant Kamble[d]

[a] Department of Chemistry, Shri Sant Gadge Maharaj Mahavidylaya, Loha, Nanded
[a] Department of Chemistry, Yeshwant Mahavidyalaya, Nanded
[c]Department of Biotechnology & Bioinformatics, School of Life Sciences, University of Hyderabad
[d]Department of Life Sciences, School of Life Sciences, SRTM University Nanded

Abstract

A novel series of ethoxy chalcone derivatives were synthesized in a single step via Claisen-Schmidt condensation in rapid and efficient way at 0-5 ^{0}C in high yields. The 3,5-substituted-2-hydroxyacetophenones (**a, b, c** and **d**) condensed with 2-ethoxy benzaldehyde (**1**) in basic medium, after crystallization affords (**2a, 2b, 2c** and **2d)** novel substituted chalcones with ravishing colors. The synthesized compounds were characterized by FT-IR, ^{1}H NMR, ^{13}C NMR, LCMS, HRMS and elemental analysis. These derivatives were tested for their efficacy to inhibit the growth of human breast cancer cell line (MCF-7) in vitro using MTT assay. All derivatives showed significant dose dependent inhibition, among the tested compounds the (E)-1-(3-bromo-2-hydroxy-5-methylphenyl)-3-(2-ethoxyphenyl) prop-2-en-1-one (**2b**) was found to have highest IC_{50} value of 10.9 µM and binding energy of -9.2. SAR revealed that chalcones possessing electron donating groups at ortho and meta position to carbonyl moiety of phenyl ring-A and ortho position of phenyl ring-B showed better inhibitory activity. Molecular docking studies performed to know ligand-receptor complex with optimized conformation with the intention of possessing less binding free energy.

Graphical abstract



2(a-d)

R_1= Br / I **R_2= Cl / CH_3 / I**

R_3= OEt

- **Claisen-Schmidt condensation**
- **Good Inhibitory activity against MCF-7 cell line**
- **2b evince highest IC_{50} value for MCF-7 10.9 μM**

Research Highlights:-

- A novel series of substituted ethoxy chalcones were designed and synthesized by Claisen-Schmidt condensation.
- Structures of the all synthesized compounds were elucidated by TLC, FT-IR, ^{1}H NMR, ^{13}C NMR, LCMS, HRMS and elemental analysis.
- The synthesized analogues were screened for antiproliferative activity against human breast cancer cell line (MCF-7) in vitro.
- All the derivatives showed significant anticancer activity as evident from the MTT assay.
- Molecular docking performed to achieve ligand-receptor complex with optimized conformation with the intention of possessing less binding free energy.

[1]Abbreviations:-

EDGs - electron donating groups; MCF-7 - Michigan Cancer Foundation-7; MTT assay - methyl thiazolyl tetrazolium.

Key Words: Chalcones, Claisen-Schmidt, MCF-7, IC_{50}, anti-proliferative, MTT assay.

Introduction

Breast cancer is the most prominent form of cancer prevalent among females, estimating 15% of total deaths reported due to cancer [1]. Initial treatment for breast cancer and its absolute benefits vary according to the patients characteristics [2]. Stages of breast cancer progression, the residual recurrence free survival was noted to be 89% for 5 year with 7% risk of cancer recurrence in all three stages [3]. The chalcones can acts as versatile scaffold in the design of new anticancer drugs. Chalcones are reported to encompass pharmacological potentials as molecular targeted approaches to cancer therapy and prevention [4], antibacterial [5], antimicrobial, antileishmanial agents [6] antioxidant and antimalarials [7-8]. Chalcone analogues having imine fragment are found to exhibit a strong antiangiogenic effect [9]. Anti-cancer activity was also shown by isatin-linked chalcones and benzofuran substituted chalcones [10-11]. The hydroxyl group substitutions in chalcones have been shown to play a key role in their anticancer activities [12]. These findings encouraged us to synthesize novel chalcones with different substitution patterns and investigate their anti-proliferative activity against human breast cancer cell line (MCF-7).

The synthesis of chalcones was reported by various methods like Suzuki reaction [13], Fries rearrangement catalyzed by $TiCl_4$ [14], Friedel-Crafts acylation of phenols [15], Wittig reaction [16] or by Claisen-Schmidt condensation [17]. The different condensing agents used are alkalies, hydrochloric acid and anhydrous aluminium chloride. In the present work we

used the most convenient method i.e., the Claisen-Schmidt condensation which is a single step, rapid with excellent yields as compared to other methods, involving condensation of equimolar quantities of substituted aromatic acetophenones with substituted aromatic aldehydes in the presence of aqueous alcoholic alkalis. Alkali particularly aq. NaOH has been the most widely used as condensing agents for synthesis of chalcones [18]. It is used as an aqueous solution of suitable concentration from 10% to 60%. The substituted 3,5-substituted-2-hydroxyacetophenones were condensed with 2-ethoxy benzaldehyde in aqueous alkaline medium using 40% NaOH, up to 3 mL by maintaining the temperature 0-5 ^{0}C, the reaction mixture was kept overnight then neutralized by dilute hydrochloric acid which is then crystallized by glacial acetic acid.

Results and discussion:

Chemistry:

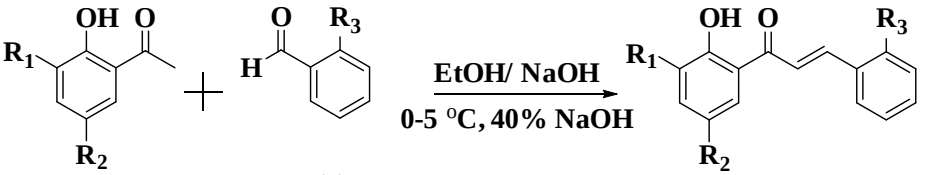
All the novel ethoxy chalcone derivatives substituted with electron donating groups (EDGs) and the hydroxyl group in ring-A at ortho position. The major substitutions in ring-A are electron donating halogens (Cl, Br, I) and CH_3 groups presents on meta positions and in the ring-B, -OEt group is substituted at ortho positions.

The **2a, 2b, 2c,** and **2d** series of chalcones were synthesized from the reactions of an equimolar quantities of a 3,5-substituted-2-hydroxyacetophenones (**a, b, c, d**) with appropriate with 2-ethoxy benzaldehyde (**1**) to afford (E)-3-(2-ethoxyphenyl)-1-(2-hydroxy-3,5-substituted phenyl)prop-2-en-1-one **2**(**a-d**), using Claisen-Schmidt condensation in cold condition, maintaining the temperature 0-5 ^{0}C, by the addition of aq. base [19]. In the Claisen-Schmidt reaction, the concentration of alkali used 40 %. The reaction mixture was stirred vigorously for two hours then kept overnight, neutralized with 10% dil. HCl, crystallized by glacial acetic acid.

Synthesis of ethoxy chalcones : Scheme-I:

A solution of substituted acetophenone (**a-d**) (1 mmol) and appropriate amount of aromatic aldehydes (**1**) (1 mmol) in 25 ml RB flask with magnetic stirrer bar in ethanol (15 mL) was cooled to 0-5 ^{o}C in an ice bath, then added aqueous 40%, NaOH drop by drop slowly. The reaction mixture was magnetically stirred for two hours and then left overnight, monitored by TLC. The reaction mixture was diluted with ice cold water and neutralized using 10% dil. HCl. The targeted chalcones were separated as colored solids, further purified by crystallization using glacial acetic acid, which afford the chalcones **2a, 2b, 2c,** and **2d**. The characterization of synthesized compounds was performed based on spectroscopic evidences.

Scheme-I:



(a-e) **(1)**

R_1= Br / I

R_2= Cl / CH_3 / I **(R_3= OEt)** **2a, 2b, 2c, and 2d**

2.1.1. Spectral interpretation of (E)-3-(2/4-ethoxyphenyl)-1-(2-hydroxy-3,5-substituted phenyl)prop-2-en-1-one(2a-d):

IR Spectra of chalcones:

The IR band in the range 1334-1349 cm^{-1} indicate the presence of (-OCH_2CH_3) groups, a band in between 1561-1580 cm^{-1} indicate the presence of (>C=C<) (olefinic) group. The band 1628-1646 cm^{-1} suggest the presence of (>C=O) group. A band ranges from 3431-3455 cm^{-1} indicates the presence of (Ar-OH) group. [20]

^{1}H NMR spectra of chalcone derivatives:

The ethylenic protons nearer the carbonyl group are called H_α and H_β protons. The H_α protons of chalcones show chemical shift at higher field than those of H_β protons. This is possibly due to the polarization of the >C=C< double bond in the system being predominately caused by the carbonyl group so as to make electron density at α-position than at β-position. The H_α and H_β protons of chalcones occur as two doublets (J = 16 Hz) in the H_α ranges of δ 8.19-8.26 ppm and H_β in the range of δ 7.76-7.93 ppm in the ^{1}H NMR spectra. However α, β doublets with respect to carbonyl group are coalesced with aromatic protons, these values are in agreement with the literature values [21].

The -OH group appear as a ^{1}H singlet at δ 13.53-13.93 ppm for chalcone derivatives. The high frequency region of these protons may be due to the intramolecular hydrogen bond formed with the carbonyl group. The quartet of –OCH_2- for two protons appear at δ 4.17-4.23 ppm, the triplet of –CH_3 of ethoxy group for three protons appear at δ 1.57-1.64 ppm and the six aromatic proton multiplet appear in the range of δ 6.96-7.89 ppm for chalcone derivatives. In 2**d** derivatives of chalcones, the singlet for 3H (-CH_3) appear at δ 2.35 ppm.

^{13}C NMR spectra of chalcones derivatives:

In the ^{13}C NMR of chalones, the carbonyl carbons appear in the range δ 192.1- 193.9 ppm. The α- and β-carbon atoms with respect to carbonyl group gave rise to characteristics signals in between δ 128.2-131.4 and δ 138.3-143.6 ppm.

HRMS spectra of chalcone derivatives: The structures of all obtained compounds were supported by HRMS.

Anti-proliferative effects of Chalcones on Breast cancer cells (MCF-7): It's Structure Activity Relationship:

Chalcones synthesized in present study were tested for their antiproliferative effects for 24 hours at 37 ^{0}C in CO_2 incubator using the methyl thiazolyl tetrazolium (MTT) assay on a human oestrogen receptor positive breast cancer cells (MCF-7).

The compounds **2a**, **2b**, **2c** and **2d** showed significant reduction in cell viability at concentration of 15 µM. It is evident, that these compounds showed more than 50% cell death. The **2a**, **2b**, **2c** and **2d** chalones have shown significant reduction in cell viability at concentration of 60 µM, which was evident that these compounds showed more than 50% cell viability. The effect of electron withdrawing and electron donating substituent to antiproliferative effect and the concentration used at 15, 30 and 60 µM effect was assessed by making following comparison.

The electron donating –OH group is present at ortho position to carbonyl group of ring- A, on all derivatives of **2a**, **2b**, **2c** and **2d** chalcones. The hydroxyl group substituted chalcones have been reported to play a key role in anticancer activity of chalcones [22]. The chalcones with –OH group at ortho position in ring-A showed potent and significant antiproliferative effect on MCF-7 cells. The results suggests that the –OH group present on ring-B and its position on B-ring was important in determining the potency and selectivity [23].

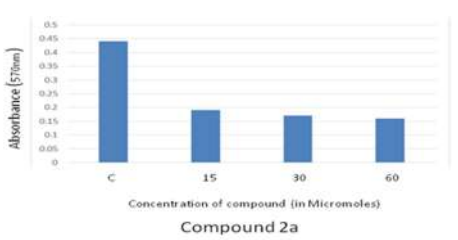
The **2a**, **2b**, **2c** and **2d** of ethoxy chalcones in our study in which –OH group at ortho position showed significant reduction in cell viability at 15 µM for **2a**, **2b**, **2c** and **2d** at 30 µM, With respect to substitution pattern present on ring-A showed that, at 15 µM concentration the **2a**, **2b**, **2c** and **2d** of chalcone showed significant reduction of cell viability, at 30 µM. As researchers reveal that, the $–OCH_3$ group present on either ring-A or ring-B showed potent anticancer activities [24-26]. The recent publications of anticancer and molecular docking studies of chalcone derivatives, namely (E)-3-(3-ethoxy-4-hydroxyphenyl)-1-(4-hydroxyphenyl)prop-2-en-1-one [27], showed significant anticancer activity.

In case of the chalcones **2a**, **2b**, **2c** and **2d** having electron donating –OEt group at ortho position on ring-B, it was found that compound **2a**, **2b**, **2c** and **2d** showed significant anticancer activity with IC_{50} value of 13, 10.9, 11.2 and 11.7 µM respectively. Among the derivatives tested, **2b** was found to have significant IC_{50} value of 10.9 µM.

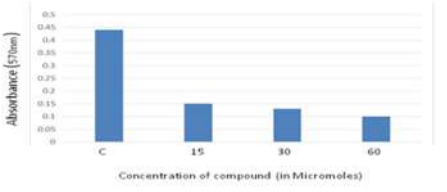
Table 1: IC_{50} values of ethoxy chalcones.

Sr. No	Compound Code	Compound Structure	IC_{50} value (μM)
1	2a		13
2	2b		10.9
3	2c		11.2
4	2d		11.7

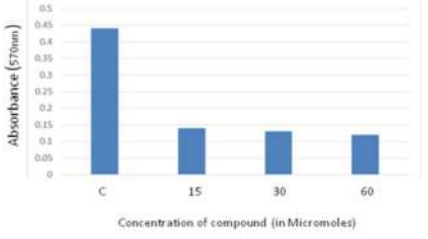
Figure: 1. MTT assay for ethoxy chalcone derivatives in MCF-7 cell line.



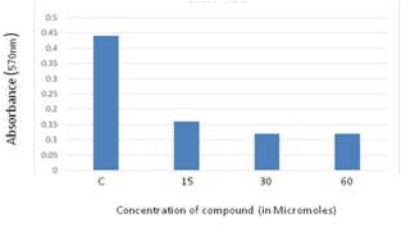
Compound 2a



Compound 2c



Compound 2b



Compound 2e

Conclusion

In summary **2a, 2b, 2c and 2d** (E)-1-(2-hydroxy-3,5-substituted phenyl)-3-(2-ethoxy phenyl)-prop-2-en-1-one were synthesized. These derivatives containing electron donating groups -OH, halogens (Cl, Br, I) and CH_3, in **2a, 2b, 2c** and **2d** chalcones the –OEt group present on ortho position of ring- B were synthesized and studied for their anticancer properties.

The synthesized compounds were subjected for antiproliferative activities against breast cancer cell line (MCF-7). The structure activity and relationship (SAR) has been examined to evaluate between the chalcone composition and anti-breast cancer activities. We found that chalcones **2a**, **2b**, **2c,** and **2d** showed significant anticancer activity with IC_{50} value of 13, 10.9, 11.2, and 11.7 μM respectively and binding energy of -8.7, -9.2, -8.5 and -8.6. In the series of the entire tested derivatives, the present data demonstrate that, (E)-1-(3-bromo-2-hydroxy-5-methylphenyl)-3-(2-ethoxyphenyl)prop-2-en-1-one (**2b**) found to have great potential and effective anti-breast cancer activity with IC_{50} value of 10.9 μM.

3. Experimental Section:

3.1.1. Chemistry:

The chalcones are synthesized in laboratory by Claisen-Schmidt condensation of substituted aromatic acetophenones with ethoxy benzaldehyde in alkaline medium. The purity of the compounds was checked by thin-layer chromatography on silica gel G plates of 0.5 mm thickness as stationary phase and combination of n-hexane: ethyl acetate in different ratios as mobile phase. The IR spectra of the synthesized compounds were recorded on a Fourier Transform IR spectrometer (model Shimadzu 8700) in the range of 400-4000 cm^{-1} using KBr pellets.

^1H NMR spectra was recorded on Bruker 400 MHz NMR spectrometer using $CDCl_3$ and the chemical shifts (δ) reported are in ppm downfield using tetramethylsilane (TMS) as internal reference. ^{13}C NMR spectra was recorded on Amx-100 MHz NMR spectrometer using $CDCl_3$ and the chemical shifts (δ) reported are in ppm downfield using tetramethylsilane (TMS) as an internal reference. The NMR data is reported as follows: chemical shift, multiplicity (s = single, d = doublet, t = triplet, q = quartet, m = multiplet. The coupling constant (J) is given in Hz. HRMS was recorded using ESI-TOF technique. The purity of all new derivatives was confirmed by elemental analysis (CHN) using thermo finnigan flash EA 1112 Thermo Finnigan with more than 95%. The melting points were determined open capillary method and are uncorrected.

General procedure for the synthesis of ethoxy chalcones:-

The **2a, 2b, 2c** and **2e** chalcones were synthesized from the reactions of an equimolar quantities of a 3,5-substituted-2-hydroxyacetophenones (**a-d**) (1 equiv.) was taken in RB flask, dissolved in minimum amount of ethanol (5 mL) with appropriate ethoxy benzaldehyde (**1**) (1 equiv.) in an ice bath by maintaining the temperature 0-5 ^{0}C, then the aqueous solution of alkali 40% NaOH about 3 mL was added drop by drop during 15 minutes slowly. Here noticed the color of reaction mixture changed stirring was continued two hours vigorously. The reaction mixture was kept overnight, after completion of reaction monitored with TLC, it was quenched with crushed ice. Then it was neutralized by drop wise addition of 10% dil HCl. The obtained solid was filtered dried and crystallized with glacial acetic acid, ravishing colored novel derivatives of chalones obtained to give (E)-3-(2-ethoxyphenyl)-1-(2-hydroxy-3,5-substituted phenyl)prop-2-en-1-one **2a, 2b, 2c** and **2e** were obtained with 2-ethoxy benzaldehyde (**1**), by using Claisen Schmidt condensation [19].

(E)-1-(3-Bromo-5-chloro-2-hydroxyphenyl)-3-(2-ethoxyphenyl)prop-2-en-1-one (2a).

Color = Yellow solid, yield = 83%, mp 134-136 ^{0}C; IR (KBR cm^{-1}): 3431, 1634, 1562, 1340 cm^{-1}; ^{1}H-NMR (400 MHz, $CDCl_3$): δ 13.67 for (s,1H, -OH) , 8.22 - 8.26 (d, J = 16 Hz, 1H, H_α), 7.76 - 7.79 (d, J = 16 Hz, 1H, H_β), 6.97 - 7.88 (m, 6H, Ar-H), 4.18 - 4.23 (q, 2H, –OCH_2), 1.58 - 1.62 (t, J = 16 Hz, 3H): ^{13}C-NMR (100 MHz, $CDCl_3$): δ 193.1, 158.9, 158.7, 143.7, 138.3, 132.8, 131.1, 128.2, 123.6, 121.0, 121.1, 120.8, 119.8, 112.9, 112.1, 64.1, 14.8; HRMS (ESI-MS) calcd. for $C_{17}H_{14}BrClO_3$: 380.9888 $[M + H]^+$, found 380.9881; Elemental analysis (CHN) Calculated for $C_{17}H_{14}BrClO_3$: C, 53.50; H, 3.70; found: C, 53.41; H, 3.76.

(E)-1-(3-Bromo-2-hydroxy-5-methylphenyl)-3-(2-ethoxyphenyl)prop-2-en-1-one (2b).

Color = Yellow solid, yield = 86%, mp 140-142 ^{0}C; IR (KBR cm^{-1}): 3431, 1628, 1561, 1339 cm^{-1}; ^{1}H-NMR (400 MHz, $CDCl_3$): δ 13.53 for (s, 1H, -OH), 8.20 - 8.23 (d, J = 12 Hz, 1H, H_α), 7.89 - 7.93 (d, J = 16 Hz, 1H, H_β), 6.96 – 7.69 (m, 6H, Ar-H), 4.17 - 4.22 (q, 2H, –OCH_2), 1.57 - 1.61 (t, J = 16 Hz, 3H); ^{13}C-NMR (100 MHz, $CDCl_3$): δ 193.9, 158.7, 157.8, 142.4, 140.3, 139.8, 132.3, 130.7, 129.9, 128.9, 128.7, 123.3, 120.7, 120.5, 112.1, 64.0, 20.3, 14.8; HRMS (ESI-MS) calcd. for $C_{18}H_{17}BrO_3$: 361.0434 $[M + H]^+$, found: 361.0438; Elemental analysis (CHN) Calculated for $C_{18}H_{17}BrO_3$: C, 59.85; H, 4.74; found C,59.72; H, 4.81.

(E)-1-(5-Chloro-2-hydroxy-3-iodophenyl)-3-(2-ethoxyphenyl)prop-2-en-1-one (2c).

Color = red solid, yield = 83%, mp 145-147 ^{0}C; IR (KBR cm^{-1}): 3431, 1629, 1562, 1334 cm^{-1}; ^{1}H-NMR (400 MHz, $CDCl_3$): δ 13.88 (s,1H, -OH) , 8.21 - 8.25 (d, J = 16 Hz, 1H, H_α) , 7.91 - 7.95 (d, J = 16 Hz, 1H, H_β), 6.97 - 7.89 (m, 6H, Ar-H), 4.17 - 4.23 (q, 2H, –OCH_2), 1.58 - 1.62 (t, J = 16 Hz, 3H); ^{13}C-NMR (100 MHz, $CDCl_3$): δ 193.9, 160.9, 158.9, 144.2, 143.6, 132.8, 131.1, 129.1, 124.2, 123.0, 120.7, 120.2, 119.6, 112.1, 87.3, 64.1, 14.8; HRMS (ESI-MS) calcd. for $C_{17}H_{14}ClIO_3$: 428.9749 $[M + H]^+$, Found: 428.9746; Elemental analysis (CHN) Calculated for $C_{17}H_{14}ClIO_3$: C, 47.63; H, 3.29; found C, 47.56; H, 3.23.

3.1.2. (E)-1-(2-hydroxy-3,5-diiodophenyl)-3-(2-ethoxyphenyl)-prop-2-en-1-one (2d).

Color = dark red solid, yield = 75%, mp 168-170 ^{0}C; IR (KBR cm^{-1}): 3455, 1646, 1580, 3443, 1399 cm^{-1}; ^{1}H-NMR (400 MHz, $CDCl_3$): δ 13.93 for (s, 1H, -OH), δ 8.18-8.23 (m, 3H) H_α merged with aromatic two hydrogen's, H_β; 7.81 - 7.91 (d, J = 16 Hz, 1H), 6.96 - 6.99 (m, 4H, Ar-H), 4.18 - 4.23 (q, 2H, –OCH_2), 1.58 - 1.64 (t, J = 24 Hz, 3H,); ^{13}C-NMR (100 MHz, $CDCl_3$): 192.8, 161.9, 159.0, 152.03, 145.7, 138.3, 132.7, 131.4, 123.0, 121.9, 120.8, 119.8, 112.1, 88.4, 80.1, 64.1, 14.9; HRMS (ESI-MS) calcd. for $C_{17}H_{14}I_2O_3$: 520.9105, $[M + H]^+$, Found: 520.9100 ; Elemental analysis (CHN) Calculated for $C_{17}H_{14}I_2O_3$: C, 39.26; H, 2.71; found C, 39.32; H, 2.65.

Biology.

The human breast cancer cell lines (MCF-7):-

Methods: Maintenance of cell line and MTT assay:

The human breast cancer cell lines, MTT (3-(4, 5-dimethylthiazole-2-yl)-2, 5-diphenyl-2H-tetrazolium bromide) colorimetric assy is commonly used to determine mitochondrial reductive function and hence is a good indicator of cell inhibition of growth. After incubation of cells with a range of concentration of compounds the MTT assay [28], in combination with cell viability of controls containing no compounds can be used to obtain an IC_{50} value. This is the concentration of compounds where 50% of cells are viable.

MCF-7 cell line was obtained from National Center for Cell Science (NCCS), Pune. Cells were maintained in DMEM medium (HIMEDIA, Cat.No.:-AL007A-500ML) with 10% FBS (HIMEDIA, RM9955-500ML) with 5% CO_2 at 37 ^{0}C. The compounds were dissolved in dimethyl sulfoxide (DMSO) (Molecular grade) and treated with concentration of 15, 30, and 60 micromoles. Cells in control set were treated with vehicle. For MTT assay, approximately 5000 cells were seeded per well in 96 well plates. The cells attached to plate were preceded for treatment for desired drug concentration and incubated for 24 hours at CO_2 incubator at 37 ^{0}C. After incubation time, each well was added with 10 micro liters of MTT reagent (HIMEDIA; Cat. No.TC191) (5mg/ml), the cells were then incubated for 2-4 hours until the purple precipitate was visible [29-30]. The precipitate was then dissolved with DMSO and the absorbance was recorded at 570 nm.

Molecular Docking:-

The main objective of molecular docking is to achieve ligand-receptor complex with optimized conformation with the intention of possessing less binding free energy. The net evaluated binding free energy is expressed in terms of various parameters like hydrogen bond, tortional free energy, electrostatic energy, dispersion and repultion, dissolvation, total internal energy.[31] Molecular docking consists of three major steps like Ligand preparation, protein preparation, and grid preparation. Here Autodock Tools version 1.5.6rc2 was used. The structures of the compound were obtained from IR, ^{1}H NMR, ^{13}C NMR, LCMS, HRMS, and elemental analysis.

Preparation of ligand :-

SDF file was run through the Marvin view application for cleaning the structure into 2D and 3D form and then the cleaned structure were saved into Mol2 format. Later the structures were run through Autodock tool to set the number of torsions and save the ligand into PDBQT format. To compare these ligand structures, standard compound for breast cancer drug like Cisplatin [32] was used.

Preparation of protein:-

PDB structures Zitex was retrieved from protein data bank (http://www.rcsb.org) using their using their PDB ID (Zitex). Here the protein in opened in Biovia Discovery Studio Visualizer 4.1 (http://accelrys.com/product/discovery-studio) to remove the water molecules and other ligand group followed by addition of polar hydrogen atoms. Later they were saved in PDBQT format files. Ligplot is generated to calculate the X, Y, Z coordinates from PDBSUM database.

Preparation of grid:-

In the grid preparation the target protein PDB structure is opened into Autodock and instantly they will be converted to PDBQT file along the same

path. The arrangement of X. Y.Z co-ordinates as 60x60x60 obtained from Ligplot is set and the file is saved to GPF (Grid parameter file) format. Default optimization parameters were done in order to involve active residue sites with Lamarkian Genetic Algorithm and docking was run using Autodock tool.[33] after completion of docking most suitable conformations were retrieved based in lowest binding energy (kcal/mol). After docking the structure obtained were examined for specific amino acid or hydrogen involved in ligand-protein interaction. This was done by opening the complex in the discovery-studio visualized.

Sr. No.	Ligand	Binding Affinity	rmsd/ub	rmsd/lb
1	2itx_2a	-8.7	2.023	1.133
2	2itx_2b	-9.2	0.278	0.278
3	2itx_2c	-8.5	2.08	1.159
4	2itx_2d	-8.6	2.017	1.003

Acknowledgement:

The author Dr. Ravi Ramlu Vidule is thankful to UGC, New Delhi for granting FDP. Authors are thankful to Prof. R. Nagarajan, School of Chemistry, University of Hyderabad for giving permission to use laboratory facilities under UGC-NRC scheme. Specially thankful to Dr. Rajan Abraham, Asst. Professor, Dept. of Chemistry, Kammavar Sangam College of Atrts and Science, Theni (TM)-625534 for sharing his ideas and support during the work. The author acknowledges Dr. Anwita Mudiraj, Research Associate, Department of Biotechnology and Bioinformatics, School of Life Sciences, University of Hyderabad for constructive suggestions.

Highlights:-

- A novel series of substituted chalcones were designed and synthesized by Claisen-Schmidt condensation.
- Structure of the all synthesized compounds is elucidated by FT-IR, ^{1}H NMR, ^{13}C NMR, HRMS, and elemental analysis.

- The synthesized analogs were screened for antiproliferative activity against human breast cancer cell line (MCF-7) in Vitro.
- Molecular docking performed to achieve ligand-receptor complex with optimized conformation with the intention of possessing less binding free energy.
- All products are showing potent anticancer activity.

References

1. R. L. Siegel, K. D. Miller, A. Jemal , Cancer statistics, C A Cancer J Cli. 65 (1) (2015) 5-29. http://dx.doi.org/10.3322/caac.21254.

2. A. M. Brewster, G. N. Hortobagyi, K. R. Broglio, S.W. Kau, C. A. Santa-Maria, B. Arun, A. U. Buzdar, D. J. Booser, V. Valero, M. Bondy, F. J. Esteva, Residual risk of breast cancer recurrence 5 years after adjuvant therapy, J. Natl Cancer Inst. 100 (2008)1179-1183.

3. S. Darby, P. McGale, C. Correa, C. Taylor, R. Arriagada, M. Clarke, D. Cutter, C. Davies, M. Ewertz, J. Godwin, R. Gray, L. Pierce, T. Whelan, Y. Wang, R. Peto, Early Breast Cancer Trialists' Collaborative G, Effect of radiotherapy after breast-conserving surgery on 10-year recurrence and 15-year breast cancer death: meta-analysis of individual patient data for 10,801 women in 17 randomised trials, Lancet, 378 (2011) 1707-1716.

4. D. Danielle Jandial, A. Christopher Blair, Saiyang Zhang, S. Lauren Krill, Yan-Bing Zhang, and Zi. Xiaolin, Molecular Targeted Approaches to Cancer Therapy and Prevention Using Chalcones, Curr Cancer Drug Targets, 14 (2) (2014) 181–200.

5. S. A. Khan, A. M. Asiri, Green synthesis, characterization and biological evaluation of novel chalcones as anti bacterial agents, J. arabjc. 10 (2014) S2890–S2895. http://dx.doi.org/10.1016/j.arabjc.2013.11.018.

6. S. Gupta, R. Shivahare, V. Korthikunta, R. Singh, S. Gupta, N. Tadigoppula, Synthesis and Biological Evaluation of Chalcones as Potential Antileishmanial Agents, Eur. J. Med. Chem. 81 (2014) 359-366 http://dx.doi.org/10.1016/j.ejmech, 2014.05.034.

7. N. Tadigoppula, V. Korthikunta, S. Gupta, P. Kancharla, T. Khaliq, A. Soni, R. Kumar, S. Kumkum Srivastava, S. Kumar Puri, K. Siva Rama R. Wahajuddin, P. Singh Sijwali, V. Kumar, and I. Siddiqi Mohammad, Synthesis and Insight into the Structure Activity Relationships of Chalcones as Antimalarial Agents, J. Med. Chem. 56 (2013) 31–45. http:// dx.doi.org/10.1021/jm300588j.

8. R. Pingaew, A. Saekee , P. Mandi , C. Nantasenamat , Synthesis and biological evaluation and molecular docking of novel chalcone-cumarin hybrids as anticancer and antimalarial agents. Eur. J. Med. Chem. 85 (2014) 65-76. http://dx.doi.org/ 10.1016/ j.ejmech. 2014. 07.087.

9. B. Kolundz, ijaa, V. Markovic, T. Stanojkovic, L. Joksovic, I. Matic, N. Todorovic, M. Nikolic, M. D. Joksovic, Novel anthraquinone based chalcone analogues containing an imine fragment: Synthesis, cytotoxicity and anti-angiogenic activity, Bioorg. Med. Chem. Lett. 24 (2014) 65–71. http://dx.doi.org/10.1016/j.bmcl.2013.11.075.

10. S. Shenvi, K. Kumar, S. Kaushik, S. Hatti, K. Rijesh, L. Diwakar, G. Chandrasekara Reddy, Synthesis, anticancer and antioxidant activities of 2,4,5-trimethoxy chalcones and analogues from asaronaldehyde: Structure-activity relationship, Eur. J. Med. Chem. 62 (2013) 435-442. http://dx.doi.org/10.1016/j.ejmech.2013.01.018.

11. H. Iqbal, V. Prabhakar, A. Sangith, et al. Synthesis, anti-inflammatory and antioxidant activity of ring-A-monosubstituted chalcone derivatives, Med Chem Res. 23 (2014) 4383-4394. http://dx.doi.org/10.1007/s00044-014-1007-z.

12. L. H. Wang, X. R. Jiang, G. L. Chen, W. Guo, J. Y. Zhang, L.J. Cui, H. H. Li, M. Li, X. Liu, J. Y. Yang & C. F. Wu, Anti-tumor activity of SL4 against breast cancer cells: induction of G_2/M arrest through modulation of the MAPK-dependent p21 signaling pathway. Sci. Rep. 6 (2016) 36486. http://dx.doi.org/10.1038/srep36486.

13. S. Edrarir, N. Cotelle, Y. Bakkaour, C. Rolando, An Efficient Synthesis of Chalcones Based on the Suzuki Reaction, Tetrahedron Letters 44 (2003) 5359–536. http://dx.doi.org/10.1016/S0040-4039(03)01140-7.

14. Jae-Ho Jeon, Deok-Mo Yang and Jong-Gab Jun, Selective Synthesis of 3,4-Dihydrocoumarins and Chalcones from Substituted Aryl Cinnamic Esters, Bull. Korean Chem. Soc. 32 (2011) 65-70. http://dx.doi.org/ 10.5012/bkcs.2011.32.1.65.

15. M. Nakajima, H. Fukami, K. Konishi, J. Oda, Synthesis of Aromatic Carbonyl Compounds by Friedel-Crafts Reaction Using BF3 Catalyst, Agr. Bioi. Chem. 27: 10 (1963) 700-705. http://dx.doi.org/10.1080/00021369.1963.10858166.

16. C. Xu, G. Chen, X. Huang, Chalcones by the witting reaction of a stable ylide with aldehydeds under microwave irradiation, Organic Preparations and Procedures International, The New Journal for Organic Synthesis, 27(5) (1995) 559-561. http://dx.doi.org/10.1080/00304949509458500.

17. D. N. Dhar, J. Behari LA, Chalcones. Condensation of Aromatic Aldehydes with Resacetophenone. II, J. Org. Chem. 23 (8) (1958) pp 1159–1161. DOI: 10.1021/jo01102a021

18. T. Geissman, R. Clinton, Flavanones and Related Compounds, I. The Preparation of Polyhydroxychalcones and Flavanones, Am. Chem. Soc. 68 (1946) 697-700. http://dx.doi.org/10.1021/ja01208a051.

19. V. S. Dinakaran, D. Jacob, J. E. Mathew, Synthesis and biological evaluation of novel pyrimidine-2(1H)ones/thiones as potent anti-inflammatory and anticancer agents, Med Chem. Res. 21 (2012) 3598–3606. http://dx.doi.org/10.1007/s00044-011-9909-5.

20. Begum Evranos- Aksoz. O, Rahmiye Ertan, Spectral Properties of Chalcones II, FABAD J. Pharm. Sci. 37,4 (2012) 205-216.

21. A. Dandia, V. Sehgal, and P. Singh, "Synthesis of fluorine containing 2-aryl-3-pyrazolyl/pyranyl/isoxazolinyl-indole derivative as antifungal and antibacterial agents," Indian Journal of Chemistry Section B, vol.32, pp.1288–1291,1993.

22. Ruby John Anto, K. Sukumarana, Girija Kuttana, M.N.A. Raob, V. Subbarajuc, Ramadasan Kuttana , Anticancer and antioxidant activity of synthetic chalcones and related compounds, Cancer Letters. 97 (1995) 33-37.

23. Chun Wai Mai., Marzieh Yaeghoobi b , Noorsaadah Abd-Rahman , Yew Beng Kang, Mallikarjuna Rao Pichika, Chalcones with electron-withdrawing and electron-donating substituents: Anticancer activity against TRAIL resistant cancer cells, structureeactivity relationship analysis and regulation of apoptotic proteins. Eur. J. Med. Chem. 77 (2014) 378-387.

24. S. Shenvi, K. Kumar, S. Kaushik, K. Hatti, K. Rijesh, L. Diwakar, G. Reddy, Synthesis, anticancer and antioxidant activities of 2,4,5-trimethoxy chalcones and analogues from asaronaldehyde: Structur reactivity relationship. Eur. J. Med. Chem. 62 (2013) 435-442. http://dx.doi.org/10.1016/j.ejmech.2013.01.018.

25. K. Patel, C. Karthikeyan,V. Solomon, N. Moorthy, H. Lee, K. Sahu, G. Deora, P. Trivedi, Synthesis of Some Coumarinyl Chalcones and their Antiproliferative Activity Against Breast Cancer Cell Lines. Drug Design and Discovery, 8 (2011) 308-311. http://dx.doi.org/10.2174/156701801179839475.

26. B. Bandgar, S. Gawande, R. Bodade, J.Totre, C. Khobragade, Synthesis and biological evaluation of simple methoxylated chalcones as anticancer, anti-inflammatory and antioxidant agents, Bioorg. Med. Chem. 18 (2010) 1364–1370. http:// dx.doi. org/ 10. 1016/ j.bmc.2009.11.066.

27. R.Vasanthi, D. jonathan, G.Usha, Anticancer and Molecular Docking Studies of Chalcone Derivatives, Int. J. of Chem Tech Res. 9 (2016) 419-428.

28. N. Kolocouris, G. Foscolos, A. Kolocouris et al. Synthesis and antiviral activity evaluation of some aminoadamantane derivatives, J. Med. Chem. 37 (1994) 2896–2902.

29. H. Kucukbay, A. Mumcu, S. Tekin, S. Sandal, Synthesis and evaluation of novel N,N′-disubstituted benzimidazolium bromides salts as antitumor agents, Turk.J.Chem. 40 (2016) 393-401.

30. T. Perundevi, D. Reuben, Jonathan, S. Kothai, Synthesis and In-Vitro Evaluation of Novel Bischalcone Polymers as Potential Anticancer Agents, Int. J. Pharm. Sci. Rev. Res, 33 (2015) 97-101.

31. Dar A M, Mir S (2017). Molecular Docking: Approaches, Types, Applications, and Basic Challenges. Journal of Analytical & Bioanalytical Techniques.

32. Shokrzadeh M, Rajabali F, Habibi E, Survey cytotoxicity and genotoxicity of hydroalcoholic extract of stevia rebaudiana in breast cancer cell line (MCF7) and human fetal lung fibroblasts (MRC-5). J Can Res Metastasis. 2018; 1(2) :12-7.

33. Dallakyan, S., and Olson, A. (2015).Small-Molecule Library Screening by Docking with PyRx. In J.E.Hempel, C.H. Williams,& C.C. Hong (Eds), Chemical Biology SE- 19 (Vol. 1263, pp. 243-250). CHAP, Springer New York. http://doi.org/10.1007/978-1-4939-2269-7_19

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY EDUCATIONAL RESEARCH
ISSN:2277-7881; IMPACT FACTOR :6.514(2020); IC VALUE:5.16; ISI VALUE:2.286
Peer Reviewed:VOLUME:9, ISSUE:4(1), APRIL :2020

EFFECT OF EISENIA FETIDA VERMIWASH ON THE GROWTH OF DIANTHUS PLANT

Vaishali M. Bansod
Head
Department of Zoology
BG College, Sangvi
Affiliated to S.P.P. University, Pune

Abstract
The excess use of chemical fertilizers and pesticides, insecticides have made soil sick, thereby losing important micronutrient and mineral that is associated with the growth of plants. It has also caused environmental hazards affecting human health. Farmers are encouraged to undertake organic farming and chemical free method of cultivation of crops. Animal wastes and plant residues like dried leaves are converted into nutrient rich vermicompost in organic farming. In the present investigation the vermiwash was collected from the vermiculture bed using Eiseniafetida species of earthworm. Its effect on the growth of Dianthus was studied. Dianthus is a flowering plant. Vermiwash was collected from the vermiculture bed prepared by using standard method. Vermiwash is brown colored liquid. It is a collection of excretory products and excess secretion of earthworms along with micronutrients from soil and digested organic materials. Vermiwash was sprayed on the potted Dianthus plant. Vermiwash provides more bio available nutrients to plant over time and it also has growth promoting biochemical factor which is not found in the conventional compost and also cannot be made available by chemical fertilizers. There was increase in the growth of plant and also number of flowers increased as compared to the untreated plant.

Key words: Vermiwash, Eiseniafetida, Dianthus

Introduction

The excess use of chemical fertilizers and pesticides, insecticides have made soil sick, as it lost important micronutrient and mineral that is associated with the growth of plants. It has also caused environmental hazards affecting human health. Millions of tons of animal, agro and kitchen wastes are produced annually leaving odour and pollution problems. In recent years much attention is being paid to manage organic wastes. Farmers are encouraged to undertake organic farming and chemical free method of cultivation of crops. Animal wastes and plant residues like dried leaves are converted into nutrient rich vermicompost in organic farming. Vermicomposting by earthworm is an eco-biotechnological process that transforms energy rich and complex organic

material / substances to a stabilized vermicompost. During composting the nutrients are released and converted into soluble and available forms to plants. The molecular techniques can further enhance understanding of the interactions between earthworms and microorganisms and their functional significance.
The commonly used species of earthworm in vermiculture is Eiseniafetida. It is a surface dweller that scavenges organic wastes. It is also well adapted to different climatic conditions including variable temperatures, moistures, pH level. It is a commercial; species. Ot is found in manure piles on farms or fields. It has excellent composting abilities. Earthworms play a vital role in the growth of plants. It is possible to effect quick change over for sustainable agriculture by harnessing new vermicompost technology to soil. Vermiwash is brown colored liquid. It is a collection of excretory products and excess secretion of earthworms along with micronutrients from soil and digested organic materials. It could be utilized effectively for sustainable plant production at low input basis green farming (Edwards et al., 2004). Vermiwash was sprayed on the potted Dianthus plant. Vermiwash provides more bio available nutrients to plant over time and it also has growth promoting biochemical factor which is not found in the conventional compost and also cannot be made available by chemical fertilizers. In an experiment by Brintha and Govindarajan it was shown that the nutrient content of nitrogen, phosphorus and potassium significantly increased in MSW vermicompost.

Material and methods

A plastic vessel of 15 litre capacity was taken. A hole was made in the centre of the vessel. It was sealed with pebbles. Vermiculture bed was prepared and mature e.fetida were introduced. The set up was left undisturbed for about 20 days. The water was sprayed everyday to maintain the moisture of the bed. On the 21st day 1 liter water was poured over the bed. The seal at the bottom of the vessel was removed the liquid was then collected. This is called as 'Vermiwash'. The vermiwash was stored in tightly closed 500 ml bottle.
Physicochemical analysis was undertaken

Methods of preparation of vermiwash

Large container made of plastic was selected. Drill a hole in the center. A base layer of gravel, small pieces of bricks are placed of 10- 15cm. above the gravel a layer of coarse sand of 15 cm is put. Over it pre-decomposed organic wastes of 40- 45cm were put. All layers were moistened using water. A layer of vermicompost was put over it. To get vermiwash continuously, a mud pot holes with was suspended. Small bamboo sticks were placed in the holes so water would trickle down. About 3- 4 litres of water was collected daily. After 10

days vermiwash starts forming in the container. earthworms for the project was procured from M. Phule college of agriculture, Pune, India.
Chemicals required : FeCl2, dil. H2SO4, sodium phosphate and Urea.
Test for presence of nutrient

- For nitrogen test : Sample + FeCl2. Boil the mixture. Add 1-2 drops of dil.H2SO4. FeSO4 is formed giving blue color with the liberation of ammonia gas. It is an indication of presence of nitrogen in the mixture.
- Test for calcium: test sample+ sodium phosphate. Precipitate of calcium is formed.
- Test for Iron: the test is based on indicator molecule called 1,10phenanthroline. The indicator is added in the sample that produced orange- red color solution indicating the presence of iron.
- Test for Urease: in the sample urea is added that resulted in formation of red color which then converts into pink indicating the presence of Urea.

Result and discussion

Vermiwash is the collection of excretory products and excess secretion of earthworms along with micronutrients from soil and digested organic matter and molecules. As the main substrates presented in the wastes is rich in micro and macronutrients, the resultant complex materials can easily broken by secretary enzymes of earthworms. The physic- chemical, nutritional and biochemical parameters were observed in the present study that include iron, nitrogen, calcium and urea produced in vermiwash. The presence of earthworms in soil and the conditions of soil affects the parameters in plants for its growth. The vermicompost resulted from the ability of earthworms to consume a wide range of of organic residues such as sewage sludge, animal waste, crop residues and industrial wastes. It becomes a valuable manure and is rich in macro and micronutrients, plant growth promoters, hormones, vitamins and microorganisms. the present investigation was carried out in this direction. The use of vermiwash on plant resulted in increase in growth of parameters like the length of root, and shoot, number of leaves and twigs. The germination percentage and seedling growth in terms of length of hypocotyl and radical was maximum in 10% vermiwash treatment (Fathima and Sekar) The alkalinity, nitrogen and protein levels were more in the experiment. All this indicates that there is presence of all the nutrients in the vermiwash produced by the action of Eiseniafetida. According to Umamaheshwari and Vijayalakshmi, 2003 it also is capable of working on strong pollutants like paper mill sludge and petrochemical sludge (Rajeshbhanu et al., 2005). the role of earthworm in the production of vermiwash also depends on the type and nature of organic input. the quality of the parameters of the analyzed samples increased with the increase in number of days of composting(Curry and Olaf, 2007). It was also

observed that the plants treated with vermiwash were reduced insect-pest population (SudhanshuVermaet al). The present study thus offers promotion of organic farming and sustainable agriculture. Vermiwash provides the biological available nutrients to plants over a period of time and it also has biochemical factors which is not found in the conventional compost and also not found in the chemical fertilizers. Use of vermiwash can also reduce and also has the potential to stop the use of chemical fertilizers, pesticides.

Observation

Vermiwash is brown colored liquid. It is a collection of excretory products and excess secretion of earthworms along with micronutrients from soil and digested organic materials. Nitrogen, Calcium, Iron, Urease are present. the biomass i.e the height, length of the Dianthus plant is increased. the number of flowers are also increased in vermiwash treated plants. It is as observed by laboratory scale trial showed effectiveness of vermiwash on Cowpea plant growth (Zambareet al).

Conclusion

Vermiwash revealed potential application in sustainable development in agriculture biotechnology with respect to its origin, cost effectiveness, easy availability, time saving, reliability and ecofriendliness.

Acknowledgment

The author express gratitude to the principal of BG College to set up the Vermiculite unit and to carry out the research. Also thankful to the teaching and non- teaching staff of Department of Zoology for kind cooperation.

References

1. James P. Curry & Olaf Schmidt 2007: The feeding ecology of earthworm- A review. Pedobiologia, Vol. 50 Issue 6, Jan 2007 pp- 463- 477
2. Nehru Brintha and *GovindarajanManimegala 2007: The feeding ecology of earthworms – A review ISSN: 2347-8314 Int. J. Modn. Res. Revs. Volume 3, Issue 6, pp 711-715,
3. Edwards CA, Domínguez J, AranconNQ 2007: . The influence of vermicomposts on plant growth and pest incidence. In, S.H Shakir and W.Z.A. Mikhaïl, (Eds. Soil Zoology for Sustainable Development in the 21st century. 2004, 397-420.
4. SudhanshuVerma, Ajay Babu, Alok Patel, Shani Kumar Singh, Swati Swayamprbha Pradhan, SK Verma, JP Singh and RK Singh 2018: Significance of vermiwash on crop production: A review E-ISSN: 2278-

4136 P-ISSN: 2349-8234 JPP 2018; 7(2): 297-301 Journal of Pharmacognosy and Phytochemistry 2018; 7(2): 297-301

5. MujeeraFathima* and MalathySekar 2014: Studies on Growth Promoting effects of Vermiwash on the Germination of Vegetable Crops Int.J.Curr.Microbiol.App.Sci (2014) 3(6) 564-570.
6. Rajeshbhanu, S. Esakkiraj. R. Nagendran, L. Subramanian 2005: Biomanagement of petrochemical sludge using an exotic earthworm EudrilusEuginaeJournal of Environmental Biology 26 (2): 43-7, Feb 2005
7. Umamaheshwari and Vijayalakshmi2003: Vermicomposting of paper mill sludge using an African earthworm species EudrilusEugeniae (Kinberg) with a note on its physico- chemical features Journal Pollution Research vol. 22 pp: 339- 341
8. Zambare V. P., Padul M. V., Yadav A. A. and Shete T. B. 2008: Vermiwash: Biochemical and Microbiological Approach as Ecofriendly Soil Conditioner ARPN Journal of Agricultural and Biological Science vol. 3, no.. 4, July 2008

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY EDUCATIONAL RESEARCH
ISSN:2277-7881; IMPACT FACTOR :6.514(2020); IC VALUE:5.16; ISI VALUE:2.286
Peer Reviewed:VOLUME:9, ISSUE:4(1), APRIL :2020

INFLUENCE OF NACL SALINITY ON ACTIVITY OF GLUTAMINE SYNTHETASE (GS) AND GLUTAMATE DEHYDROGENASE (GDH) IN THE LEAVES OF CROTALARIA L. SPECIES

Pratima Kadam
Department of Botany
Prof Ramkrishna More Arts Commerce Science College
Akurdi, Pune

Abstract
The present study focuses on the influence of NaCl salinity on the activity of Glutamine Synthetase and Glutamate dehydrogenase in the leaves of Crotalaria L. Species. A sand culture technique was employed. Around 30 seeds were grown in polyethylene culture containers containing acid free silica sand. Hoagland nutrient solution (2 litres) was added to these plants after every 6th day throughout the crop duration. After one month of establishment the plants were subjected to treatment of sodium chloride following levels of NaCl were selected0 (control), 50, 100 and 150 mM for salt tolerance studies and then the activity of Glutamine Synthetase was studied. It was noticed that increasing salinity stimulated GS activity in the leaves of C. juncea Var. K-12 Yellow, while there was decrease in the activity of GS in C.juncea, C. retusaand C. verrucosa with increasing salinity. The activity of GDH increased in the leaves of all species of Crotalaria maximum increase was observed in leaves of C. retusaand least in C. juncea.

Keywords: Crotalaria, GDH, GS, NaCl salinity

Introduction
Soil Salinity is a global problem and it is found to be more prominent in arid and semiarid regions of the world and the cause is limited rainfall, high transpiration & high temperature soil salinity causes a number of metabolic changes in plants such as reduced water absorption, specific ion toxicity altered nutrient uptake and metabolism, reduction in chlorophyll content and photosynthesis, due to which there is reduction in plant growth and development (Bartels 2013)Roychoudhury et al. 2015
In plants nitrogen and carbon metabolism is greatly influenced by NaCl Stress and it occurs in physiological and biochemical processes (Ashraf & Harris 2004, Anjumetal. 2017) Increased NaCl levels cause interference in nitrogen assimilation and reduction in nitrogen level in plants Flores etal. 2004, Debouba etal. 2007) Higher plants mostly fix nitrogen by first reducicng its inorganic form (NO_3^-) to $NH_4^+$and then incorporating it into organic form Hachiya &

sakakibara 2017) Glutamine synthetase Glutamate dehydrogenasecycle are the two pathways involved in yielding glutamine and glutamate (Liu – C Von kliren 2017)

GS and GDH are the enzymes which play an important role in amino acid assimilation which yield protein. The aim of the present investigation is to determine the changes in the activity of GS & GDH in leaves of Crotalaria .species

Materials and Methods

Seeds of Crotalaria L. Species were obtained through the courtesy of Sunnhemp Research Station Pratapgarh U.P. India.

A sand culture technique was employed. A total of 30 seeds were sown in polyethylene culture containers (42 cm x 31 cm) with 2 holes at the bottom, one on each side containing acid free silica sand of about 10 meshes. Hoagland nutrient solution (2 liters) was added to these plants after every 6^{th}throughout the crop duration. After one month of establishment, the plants were subjected to treatment of sodium chloride, Following levels of NaCL were selected 0 (control), 50, 100, and 150 mM. The salt treatment was given along with the culture medium twice a week alternating with equal amount of water to avoid evaporation and excess salt accumulation.

Glutamine Synthetase (EC 6.3.1.2) :

GS activity was determined according to the method of Lea (1982) 0.5 g material was homogenized in 10 ml ice cold extraction medium (0.5 mM EDTA, 1 mM DTT, 2 mM $MnCl_2$, 20% glycerol in 50 mM imidazole acetate buffer pH 7.8). The extract was filtered through double layered cheese cloth, and filtrate was centrifuged at 10,000 g for 15 min at 0-4°c. 0.25 ml of the enzyme preparation (supernatant) was incubated in 1 ml of assay mixture (12.5 mm glutamate, 5 mM ATP, 10 mM $MgCl_2$, 6 mM hydroxylamine hydrochloride and 2 mM EDTA in 100 mM Imidazole acetate buffer pH 7.8). Two sets were prepared - first for 0.0 min in which the reaction was immediately terminated by adding 1 ml $FeCl_3$, reagent (mixture of 6g$FeCl_3$, 2.11 ml concentrated HCL and 3.27 g TCA in 100 ml distilled water) and the second for 15 min in which the reaction was terminated after 15 min. Change in optical density was recorded at 540 nm.
Blank was prepared using distilled water in place of enzyme.
Enzyme activity is expressed as $\Delta OD\ min^{-1}\ mg^{-1}$protein.

II) Glutamate Dehydrogenase (EC 1.4.1.3) :

GDH was studied following the method described by Jain and Srivastava (1981) with slight modification. 0.5 g leaves were homogenized in 10 ml ice cold

extraction medium containing 120 mM sucrose, 0.6 mM EDTA, 0.3 mM Cysteine in 15 mM phosphate buffer pH 7.5. The extract was filtered through double layered cheese cloth and the filtrate was centrifuged at 5000 g for 15 min at 0-4°c. All the operations during enzyme isolation were carried out at 0 to 4°C (0.2ml enzyme was mixed with 2.8 ml assay mixture containing 4 mM α-keto glutarate, 30 mM ammonium sulphate and 0.5 mM NADH in 400 mM phosphate buffer pH 8.1. The reaction was started by adding enzyme and decrease in absorbance at 340 nm following the oxidation of NADH was recorded continuously for every 30 seconds till 4 min on double beam UV spectrophotometer (Shimadzu-190) 0.2 ml distilled water in place of enzyme served as a blank.

The enzyme activity is expressed as $\Delta OD\ min^{-1}\ mg^{-1}$ protein.

Results

Effect of NaCl salinity on activity of GS in leaves of Crotalaria species is depicted in Fig. 1 it can be noticed from the figure that increase in salinity has stimulated GS activity in leaves of C. juncea var. K-12 yellow while there is decrease in the activity of C.juncea, C.retusa&C.verrucosawith increase in salinity.

The influence of NaCl salinity on the activity of GDH in the leaves of Crotalaria is depicted in Fig. 2 it appears that the activity of GDH is stimulated in the leaves of all species of Crotalaria. Maximum increase in GDH activity has been observed in leaves of C.retusa and least in C.juncea. In C.juncea increase in GDH activity is observed only at 100mM NaCl salinity while in C.juncea var.K-12 yellow increase in GDH activity is observed only at higher salinity levels.

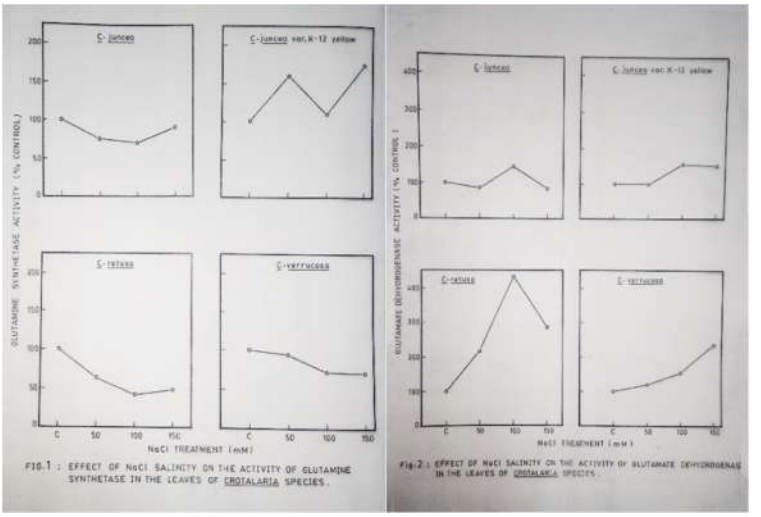


FIG.1 : EFFECT OF NaCl SALINITY ON THE ACTIVITY OF GLUTAMINE SYNTHETASE IN THE LEAVES OF CROTALARIA SPECIES.

Fig-2 : EFFECT OF NaCl SALINITY ON THE ACTIVITY OF GLUTAMATE DEHYDROGENASE IN THE LEAVES OF CROTALARIA SPECIES.

Discussion

GS has an important role in the assimilation of toxic NH_3 derived from NH_4^+ root uptake nitrogen fixation NO_3 reduction and photorespiration GS is the main enzyme of NH_3 assimilation. These enzyme catalysesNH_3into glutamine and transfers inorganic nitrogen into organic nitrogen.Ashraf etal. 2018 are the opinion that increasing NaCl concentration causes a marked decrease in GS activity.Kwinta &Cal 2005have reported that the activity of GS was decreased in shoots of Triticale seedlings and slight increase in roots which was 16%.Nathawat etal. 2005 and Siddhique etal. 2009 have reported decrease in GS activity under increased level of salinity in Brassica juncea.According to Wang etal. 2007 GS activity is decreased under salinity stress and it may be attributed to direct inhibition of the enzyme Wei etal. 2008low GS enzyme synthesis Kawakami etal. 2013 low availability of glutamate Debouba etal. 2006 are also in accordance to this low enzyme synthesis due to low availability of glutamate.Taxeria and Fidago 2009 have observed that the GS activity and its transcript accumulation is affected by salt stress in an organ dependent manner with increase ammonia assimilation in roots and decrease assimilation in leaves of potato plants.Younesi & Moradi 2015 have reported decrease in GS activity in nodules of Medicago sativa the activity decreased with 50 mm NaCl treatment.

The essential function of GDH enzyme is the deamination of glutamate to provide carbon skeletons and reducing power for plant cells. Glutamate is a central intermediate of nitrogen metabolism Forde & Lea 2007Robinson etal.1991Kwinta&Cal 2005 have reported increase in the enzyme in both roots and shoots under 100mM NaCl nutrition. In Triticale and hexapiloide seedlings they are of the opinion that NaCl inhibited NH_4 assimilation as a result accumulation of NH_4 ions in the plant cells lead to stimulated GDH activity. Surabhi etal.have observed an increase in GDH activity due to salt stress may be an alternative nitrogen assimilation pathway for NH_4 detoxification and glutamate synthesis.Ashraf etal. 2018 are of the opinion that there is increase in GDH activityGDH activity was reported to be increased in salt tolerant rice cultivar upto 800mmGDH activity in the shoots of was inhibited with the presence of 200mM NaCl in the growth medium in salicornia(Tinbiao al 2018).

Conclusion

An interspecific difference was evident in Crotalaria regarding the enzyme GS & GDH and GDH might be probably taking over the function of ammonia assimilation it appears that GDH is not playing a major role in the process of ammonia assimilation. The salinity stress effect of nitrogen metabolism is complicated and complex regulatory mechanisms are involved in it nitrogen metabolism in response to salinity stress must be known and this could play a

crucial role in the direction of salinity research in stress physiology further research at molecular level in understanding enzyme activities and enzyme expression under salinity stress.

References

[1] Anjum SA, Ashraf U, Tanveer M, Khan I, Hussain S, Shahzad B, Zohaib A, Abbas F, Saleem MF, Ali I, Long C, Wang LC. 2017. Drought induced changes in growth, osmolyte accumulation and antioxidant metabolism of three maize hybrids. Frontiers in Plant Science 8:69 DOI 10.3389/fpls.2017.00069.
[2] Ashraf M, Harris PJC. 2004. Potential biochemical indicators of salinity tolerance in plants. Plant Science 166(1):3_16 DOI 10.1016/j.plantsci.2003.10.024.
[3] Ashraf M., Shazad M.S., Emtiyaz M., Rizwan M.S. 2018, Salinity effects on nitrogen metabolism in plants focussing on the activities of nitrogen metabolizing enzymes: A review, Journal of plant nutrition, DOI:10.1080/01904167.2018.1431670
[4] Bartels D, Dinakar C. 2013. Balancing salinity stress responses in halophytes and no halophytes: a comparison between Thellungiella and Arabidopsis thaliana. Functional Plant Biology 40(8):819_831.
[5] Debouba M, Maâroufi-Dghimi H, Suzuki A, Ghorbel MH, Gouia H. 2007. Changes in growth and activity of enzymes involved in nitrate reduction and ammonium assimilation in tomato seedlings in response to NaCl stress. Annals of Botany 99(6):1143_1151 DOI 10.1093/aob/mcm050.
[6] Flores PM, Botella Á, Cerdá A, Martínez V. 2004. Influence of nitrate level on nitrate assimilation in tomato (Lycopersicon esculentum) plants under saline stress. Plant, Cell and Environment 82(2):207_213.
[7] Forde, B.G.; Lea, P.J. Glutamate in plants: Metabolism, regulation, and signalling. J. Exp. Bot. 2007, 58,2339–2358.
[8] Hachiya T, Sakakibara H. 2017. Understanding plant nitrogen metabolism through metabolomics and computational approaches. Journal of Experimental Botany 68(10):2501_2512.
[9] Jain, A. and Srivastava, H.S. (1981). Effect of salicylic acid on nitrate reductase and glutamate dehydrogenase activities in maize roots. Physiol. Plant., 53: 285-288
[10] Kawakami, E., D. Osterhuis, and J. Snider. 2013. Nitrogen assimilation and growth of cotton seedlings under NaCl salinity and in response to urea application with NBPT and DCD. Journal of Agronomy and Crop Science 199:106–117.doi:10.1111/jac.12002.
[11] Kwinta, J., and K. Cal. 2005. Effects of salinity stress on the activity of glutamine synthetase and glutamate dehydrogenase in triticale seedlings. Polish Journal of Environmental Studies 14:125–130.
[12] Lea P.J (1982) The assimilation of ammonia, In “Techniques in bioproductivity and photosynthesis” (Eds. Coombs,J. and Hail ,D.O.) Pergamon Press, Oxford, New York, Teranto, Sydney, Paris, Frankfurt. Pp.10-141.
[13] Liu Y, Von Wirén N. 2017. Ammonium as a signal for physiological and morphological responses in plants. Journal of Experimental Botany 68(10):2581_2592 DOI 10.1093/jxb/erx086.

[14] Naliwajski M.R. and Sklodowska M. 2018 , The relationship between carbon and nitrogen metabolism in cucumber leaves acclimated to salt stress, Peer J DOI 107717/PeerJ.6043
[15] Nathawat, N. S., M. S. Kuhad, C. L. Goswami, A. L. Patel, and R. Kumar. 2005. Nitrogen metabolizing enzymes: Effect of nitrogen sources and saline irrigation. Journal of Plant Nutrition 28:1089–1101. doi:10.1081/PLN-200058911.
[16] Robinson, D., D. J. Linehan, and S. Caul. 1991. What limits nitrate uptake from soil? Plant Cell and Environment 14:77–85. doi:10.1111/j.1365-3040.1991.tb01373.x.
[17] Roychoudhury A, Banerjee A, Lahiri V. 2015. Metabolic and molecular-genetic regulation of proline signalling and its cross-talk with major effectors mediates abiotic stress tolerance in plants. Turkish Journal of Biology 39(6):887_910
[18] Siddiqui MH, Mohammad F, Khan MN. Morphological and physio-biochemical characterization of Brassica juncea L. Czern. & Coss. genotypes under salt stress. J Plant Interact. 2009; 4: 67–80.
[19] Surabhi, G. K., A. M. Reddy, G. J. Kumari, and C. Sudhakar. 2008. Modulations in key enzymes of nitrogen metabolism in two high yielding genotypes of mulberry (Morus alba L.) with differential sensitivity to salt stress. Environmental and Experimental Botany 64:171–179. doi:10.1016/j.envexpbot.2008.04.006.
[20] Texieira J, Fidalgo F. Salt stress affects glutamine synthetase activity and mRNA accumulation on potato plants in an organ-dependent manner. Plant Physiol Biochem. 2009; 47: 807–813. doi: 10.1016/j.plaphy.2009.05.002 PMID: 19481951
[21] Wang, R., X. Xing, and N. Crawford. 2007. Nitrite acts as a transcriptome signal at micromolar concentrations in Arabidopsis roots. Plant Physiology 145:1735–1745. doi:10.1104/pp.107.108944.
[22] Wei, H. Y., H. C. Zhang, J. Hang, Q. G. Dai, Z. Y. Huo, K. Xu, S. F. Hang, L. Q. Ma, Q. Zhang, and J. Zhang. 2008. Characteristics of N accumulation and translocation in rice genotypes with different N use efficiencies. Acta Agronomica Sinica 34:119–125. doi:10.3724/SP.J.1006.2008.00119.
[23] Younesi.O Moradi.A 2015, Effect of salinity on nodulation glutamine synthatase and glutamate synthase activity in nodules of Alpha Alpha, Cercetari Agronomice in Moldova Vol. XL.VIII, No.4 (164) 2015.

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY EDUCATIONAL RESEARCH
ISSN:2277-7881; IMPACT FACTOR :6.514(2020); IC VALUE:5.16; ISI VALUE:2.286
Peer Reviewed:VOLUME:9, ISSUE:4(1), APRIL :2020

DIELECTRIC BEHAVIOUR OF ALLYL AMINE (AA) AND 2-METHOXY ETHANOL (2-ME), AT 9.85 GHZ MICROWAVE FREQUENCY

S.S. Meshram
Department of Physics
B.N.Bandodkar Science College
Thane, (MS) India

A.S. Goswami-Giri
Department of Chemistry
B.N.Bandodkar Science College
Thane,(MS) India

U.B. Tumberphale
Department of Physics
N.E.S. Science College
Nanded, (MS)India

P. G. Gawali
Department of Physics
B.S. College, Basmath, Dist. Hingoli
(MS)India

Abstract
The liquid dielectrics mainly serve as impregnates for high voltage cables, capacitors and act as heat transfer agents that is for cooling in transformers.Using Surber's technique of measuring reflection coefficient from air dielectric boundary of the liquid dielectric constant (έ) and dielectric loss (ε̋) of Allyl Amine (AA) with 2-Methoxy Ethanol for different mole fractions of AA, have been measured at single microwave frequency 9.85 GHz at 30^0C. Density (ρ), viscosity (η) and squared refractive index (n^2_D), including pure liquids are reported. Dielectric constant (έ) and Dielectric Loss (ε̋) used to evaluate loss tangent (tanδ), molar polarization (P_{12}) and excess dielectric parameters. Dielectric and excess parameters are being used to explain the formation of complexes in the system. The intermolecular hydrogen bonding interaction between Allyl Amine (AA) AND 2-Methoxy Ethanol (2-ME), has been investigated by FT-IR spectroscopy.The information about dielectric behaviour of material gives superior understanding in the selection of solid and liquid insulating materials. These results confirm that the mixtures form hydrogen-bonded structures, which are strongly influenced by the numbers of hydroxyl groups and carbon atoms of the alcohol molecules and vary with the concentrations of the mixtures.

Keywords: Complex formation, X-band microwave bench, Allyl Amine (AA), 2-Methoxy Ethanol (2-ME)

Introduction
Dielectric analysis of binary mixtures exhibited composition and formation of complexes by interacting between the molecules. Molecules change its

characteristics when it forms the complexes. Dielectric evaluations assisted for detection of the interaction between molecules along with its orientation and thermodynamic properties[1]. According to literature, researcher paid attention towards the amines as one of the constituent components in the binary mixtures and suggest the strong interaction between the alcohols and amine molecules.[2-8] Bhupesh G. Nemmaniwar[5] observed solute-solvent molecular associations in 2-chloroaniline (2CA) + 2-methoxyethanol (2ME) and 2-chloroaniline (2CA) + 2-ethoxyethanol. U.Tumberphale[9] investigated the significant role of dielectric of binary mixtures for the multiple complex formations formation and they also proposed the strong interaction between 2-Alkoxyethanols with Aniline molecules. The formation of 1:1 complexes in ethyl methyl ketone and ethylenediamine and methyl isobutyul ketone and ethylenediamine at 9.44 GHz frequencies at 30^0C[4]. The heterogeneous interaction between the unlike molecules when studied the complex permittivity spectra of 2-butoxyethanol in anilines[10]. When thermodynamic evaluation of the binary mixture of diisopropylamine (DIIPA) + 2-methyl-1-propanol+2-propanol and + 1-butanol evaluated, the presence of strong molecular interactions was observed between the molecules[11]. In both systems N, N-dimethylacetamide + methanol N,N-dimethylacetamide + ethanol [7] . Multiple frequency capacitance-voltage (C-V) measurements of Allyl amine (AA) with water was carried out by Yifan Xu et al 2004[11]. They observed that during film deposition, the insulator dielectric constant was increased by radio frequency (RF) pulsed plasma polymerization[11]. Dielectric Constant measurements are not possible with deposited film layers, which are very thin insulating sheets sometimes used to prevent material from adhering to a mold or platen[12].

With this background, present paper is focused on the molecular interaction between binary mixtures of polar liquids. The possible formation of AA and 2-ME complex may be due to molecular association between these liquids. The aliphatic 2-ME is amphoteric in nature having (-O-) and hydroxyl (-OH-) group in the same molecule[13] while Allyl amine is a stable organic compound and the simplest unsaturated amine having extensive pharmaceutical applications. The presence of (-O-) and (-OH-) groups in 2-ME form intra and intermolecular hydrogen bonds disturb the binary mixture condition Because ,in solid states, the amino group of aniline's derivatives has more than two absorption bands.[14] In physiologically important systems, hydrogen bonding is responsible for biological activity. Hydrogen bonding is formed between functional group and an atom or group of atoms in the same or different molecules[15-17]. Hence, FTIR spectroscopic studies have been carried out on the binary mixture of AA and 2-ME.Therefore, the dielectric behaviour of 2-ME and AA mixture is given deep sense of interest to analyse the molecular interactions and the formation of complexes in the mixture.

Materials and Methods:

AR grade Allyl Amine (AA) and 2-Methoxy Ethanol (ME) from S.D fine chemicals where used without further purification.

Binary mixtures with different mole fraction of Allyl Amine in the mixture were prepared and kept for six hours in well stoppered bottles to ensure good thermal equilibrium. The density (ρ) and viscosity (η) of pure components and their mixtures were measured at room temperature by pykometer and oswals's vicometer, respectively.

The refractive indices for Sodium-D-lines were measured by Abbe's Refractometer. The Dielectric constant measurements were carried out from the X-band microwave bench of oscillating frequency 9.85 GHz using Surber's technique at 30^0C[18]. FTIR spectra of polar mixtures in different concentration were carried out by Thermofischer Scientific Nicolet iS5.

Calculations:

The values of (έ) and (ε̋) for low loss liquids are calculated according to Hestone, W. H.et al ;1950[19]

$$\acute{\varepsilon} = [\frac{\lambda_0}{\lambda_c}]^2 + [\frac{\lambda_0}{\lambda_d}]^2 \quad \text{----------(1)}$$

$$\ddot{\varepsilon} = \frac{2}{\pi}[\frac{\lambda_g}{\lambda_d}][\frac{\lambda_0}{\lambda_d}]^2[\frac{\partial\rho}{\partial n}] \quad \text{----------} \quad (2)$$

The free energy of activation E_a is obtained using relation[20]

$$\eta = \frac{hN}{V} e^{\frac{Ea}{RT}} \quad \text{----------} \quad (3)$$

Where,

η is viscosity and V is molar volume of the liquids.

And Molar polarization were obtained using[21]

$$P_{12} = (\frac{\acute{\varepsilon}-1}{\acute{\varepsilon}+2})[\frac{M1x1+M2x2}{\rho}] \quad \text{----------} \quad (4)$$

The excess parameters are calculated by the formula defined by

$$\Delta Y = Y_m - (X_1Y_1 + X_2Y_2) \quad \text{----------} \quad (5)$$

Where,

ΔY-Excess parameter and Ym Dielectric parameters for mixture.

The subscripts m, 1 and 2 represents mixture, component 1 and component 2 respectively.

X_1 and X_2 is mole fraction of the 2 components.

The values of Mole fraction (x) of Allyl Amine AA and (X_B) 2-ME, density (ρ), refractive index (n), dielectric constant (έ), dielectric loss (ε̋), loss tangent (tan δ), activation Energy (E_a) and molar polarization (P_{12})for binary mixture measured at 30^0 C which is represented in Table-1.

The excess dielectric parameters provide significant information regarding interaction between the polar-polar liquid mixtures. The values of Mole fraction (x) of Allyl Amine AA and 2-ME and its binary mixtures, excess parameter like dielectric constant ($\Delta\acute{\varepsilon}$), dielectric loss ($\Delta\ddot{\varepsilon}$), loss tangent ($\Delta\tan\delta$), activation Energy ($\Delta E_a$) and molar polarization (ΔP_{12}) for binary mixture at 30^0C were reported in Table 2. The feasible associations between AA-solvent and 2-ME-2-ME molecules exhibited different prospective which is completely absent in pure state of liquids. With the aid of excess values, the deviations from ideal behaviour are articulated by different parameters such as dielectric constant and refractive index.

Table-1 Mole fraction (X_A) of Allyl Amine AA and (X_B) 2-ME and its binary mixture, density (ρ), refractive index (n), dielectric constant ($\acute{\varepsilon}$), dielectric loss ($\ddot{\varepsilon}$), loss tangent ($\tan\delta$), activation Energy (E_a) and molar polarization (P_{12})

X_A	X_B	Density ρ	Viscosity η cp	$\acute{\varepsilon}$	$\ddot{\varepsilon}$	Tan ∂	P_{12} cm^3/mole	E_a Kcal/mole	N^2_D
0	1	0.9591	1.52246	9.06152	0.79940	0.08822	57.82596	3.40644	1.97240
0.1317	0.8698	0.9403	1.47475	9.49182	0.90874	0.09574	57.63767	3.38729	2.00070
0.2578	0.7422	0.9157	1.33396	8.47029	0.77287	0.09124	54.93758	3.32687	1.98370
0.3847	0.6153	0.8854	1.18454	8.28683	0.42953	0.05183	54.54411	3.25550	1.99787
0.5103	0.4897	0.8464	1.01818	7.77268	0.76413	0.09831	54.05569	3.16436	1.99795
0.6346	0.3654	0.8302	0.77051	7.93830	0.96538	0.12161	53.75659	2.99650	2.00075
0.7576	0.2424	0.8038	0.6068	7.61249	1.06539	0.13995	52.28085	2.85251	1.31442
0.8794	0.1206	0.7897	0.53120	6.88519	1.01215	0.14700	49.67696	2.77238	2.02069
1	0	0.7610	0.41301	6.38018	1.02394	0.16049	48.45093	2.62083	2.01785

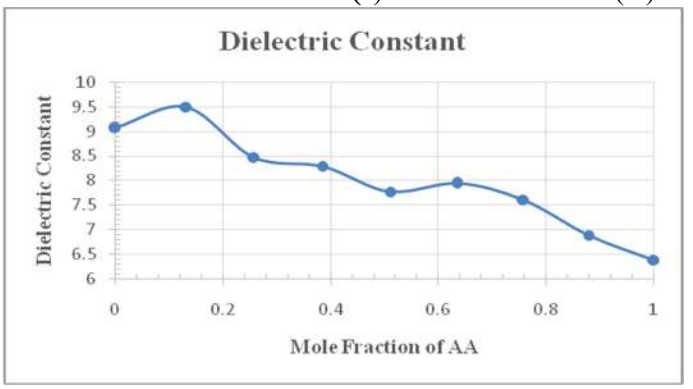
Table-2 Mole fraction (x) of Allyl Amine AA and 2-ME, excess parameter like dielectric constant (Δέ), dielectric loss (Δε̋), loss tangent (Δ tan δ), activation Energy (ΔE_a) and molar polarization (ΔP_{12}) for binary mixture at 30^0 C.

X_A	X_B	Δ η	Δέ	Δε̋	Δtan∂	ΔP_{12}	ΔE_a
0	1	0	0	0	0	0	0
0.1317	0.8698	0.0975	0.7780	0.0793	-0.0021	1.0512	0.0823
0.2578	0.7422	0.1032	0.1000	-0.0844	-0.0156	-0.3942	0.1230
0.3847	0.6153	0.0889	0.2568	-0.4563	-0.0642	0.4401	0.1508
0.5103	0.4897	0.0619	0.0794	-0.1499	-0.0268	1.1669	0.1588
0.6346	0.3654	-0.0480	0.5785	0.0235	-0.0125	2.0704	0.0886
0.7576	0.2424	-0.0824	0.5825	0.0958	-0.0032	1.7847	0.0412
0.8794	0.1206	-0.0192	0.1817	0.0153	-0.0048	0.3591	0.0568
1	0	0	0	0	0	0	0

Result and Discussion

The density, viscosity, molar polarization and activation energy are decreasing with increase in mole fraction of Allyl Amine in the binary mixture. Density of pure AA is less than that of pure 2-ME.The variation of Dielectric constant (έ) with mole fraction (X) of AA in the mixture is depicted in figure1**.** Dielectric constant non-linearly increases with decrease minima by increased mole fraction of AA, which suggest formation of the hydrogen bonded complex.[22]

Figure 1 Variation of Dielectric constant (έ) with mole fraction (X) of AA



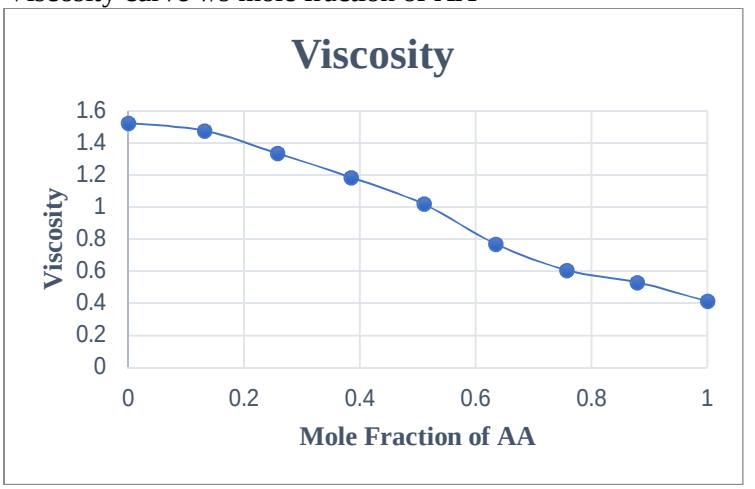
The έ value exhibited in decreasing wave format by increase in AA concentration. The έ values proliferated initially when added AA and reaches to a maximum at approximately X= 0.1317, AA mole fraction with minimum at X= 0.5103, followed by maximum at X= 0.6346 and then declining. The

mixture, ε values are significantly lower compared to the ε values of 2-ME at low AA concentration range, showing stronger hetero-association than the self-association in alcohol molecules. The dielectric constant varies non-linearly as a function of amine concentration in binary systems, due to H-bond interaction between the mixture constituents.

Though Allyl Amine and 2-ME has equal number of carbon atom in their molecular structure, the dielectric constant decreases non-linearly with the increase in the mole fraction of AA. Pure 2-ME has higher dielectric constant. However, R.J. Sengwa (2006)[23] reported that equal number of the carbon atoms in molecular structure of different molecules with hydroxyl groups having high dielectric constant.

According to Figure 2, Viscosity curve indicates that due to solute-solvent interaction, viscosity decreases with increase in the mole fraction of AA[24]. The formation of associates compared with the composition range of the binary mixture is held together by comparatively lesser intermolecular dipole-dipole interactions in the complex.

Figure 2 Viscosity curve v/s mole fraction of AA



The variation of dielectric loss and loss tangent figure (3) and figure (4) with mole fraction of AA shows the 2 maxima (λ_{max}) and single minima is at X=0.3847. In case of 2, 3 DCA + 2EE and aniline + 2-Aloxyethanol, the formation of addact complex is also at the minima. The wobbling nature of the mixture may be due to –O– and –OH group in 2-ME results in multiple complexions[25-27].

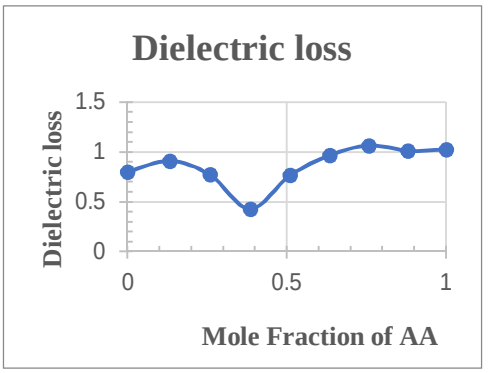


Figure 3 variation of dielectric loss v/s mole fraction of AA

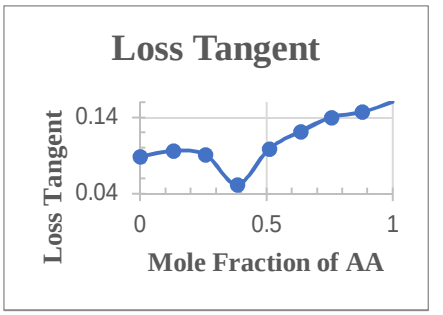
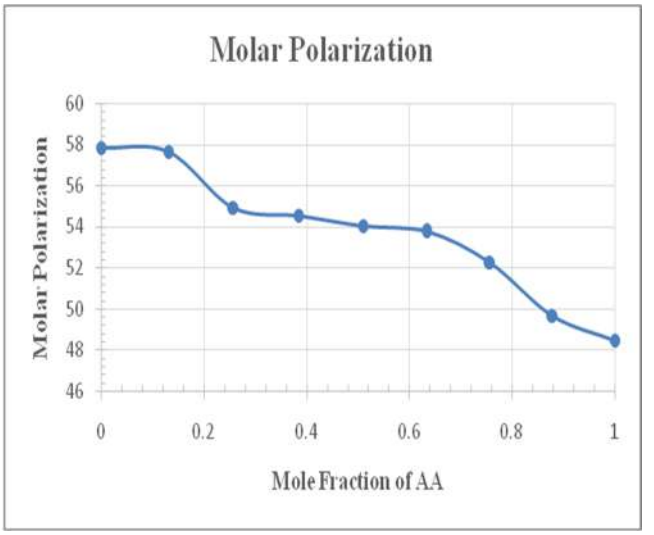


Figure 4 loss tangent v/s mole fraction of AA

Non-linear decrease in molar polarization (figure 5**)** indicates that the degree of polarity of the solution decreases with increase in mole fraction of AA. Molar polarization is representing 2 regions at high and low concentration. The intersection of the straight line represents separate regions that indicates the point of concentration in which maximum formation of complex at X=0.3847 mole fraction of AA[18]. The variation of excess dielectric constant Δέ nonlinearly decreases with minima at X=0.5103**.**

Figure 5 Molar polarization v/s Mole fraction of AA



Excess Parameters

The excess dielectric constant Δέ , excess dielectric dielectric loss (Δε̋),, loss tangent (Δ tan δ), excess activation Energy (ΔEa) and excess molar polarization (ΔP12) values of pure and binary mixtures of AA and 2-ME are calculated for various mole fractions at room temperatures. The excess dielectric constant Δέ indicates the strength and nature of intermolecular interactions in binary liquid mixtures. Observation of variation of the excess dielectric constant (Δέ) of AA with 2ME binary mixtures are positive and less in magnitude. According to Ch. V. V. Ramana [28], dielectric constant (Δέ) > 0 indicates that there is an increase in number of effective dipoles contributed in the mixture dielectric polarization, results in formation multimers and dimmers .The positive excess dielectric constant (Δέ), figure (6) also suggest that the effective number of dipoles in the mixture might be greater than the corresponding average number in the pure liquids, probably due to the creation of new structure leading to a higher macroscopic permittivity [29,30]

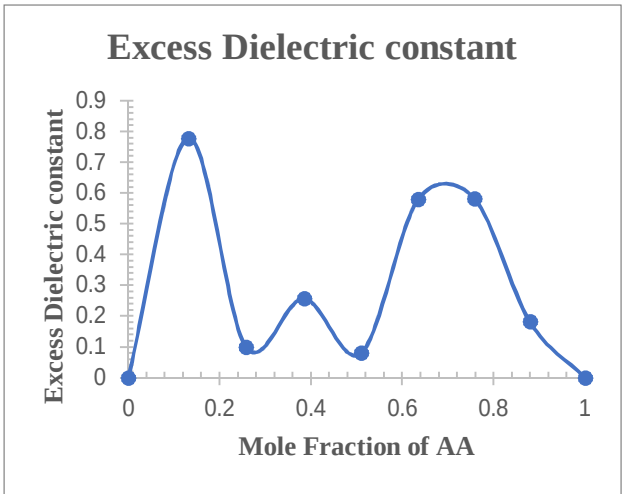


Figure 6 The variation of excess dielectric constant Δέ with mole fraction of AA+2-ME

The variation of excess dielectric loss (Δε̋) is observed in figure 7 showing negative for the low molar concentration region and positive for the high molar concentration region of AA showing minima at X= 0.3847. The dielectric loss is regarded due to molecular motion which is governed by the complex forces of molecular interactions. Variation in excess loss tangent figure 8 supports this showing minima at X=0.3847 and is negative for entire molar concentration region of AA.

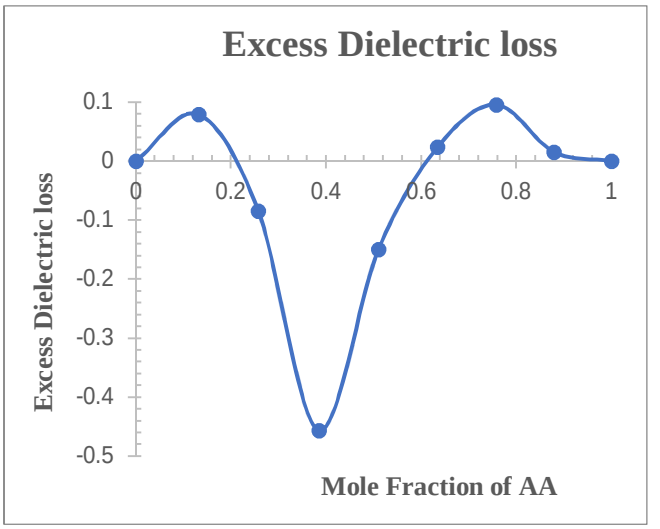


Figure 7 Excess dielectric loss (Δε̈) with mole fraction of AA+2-ME

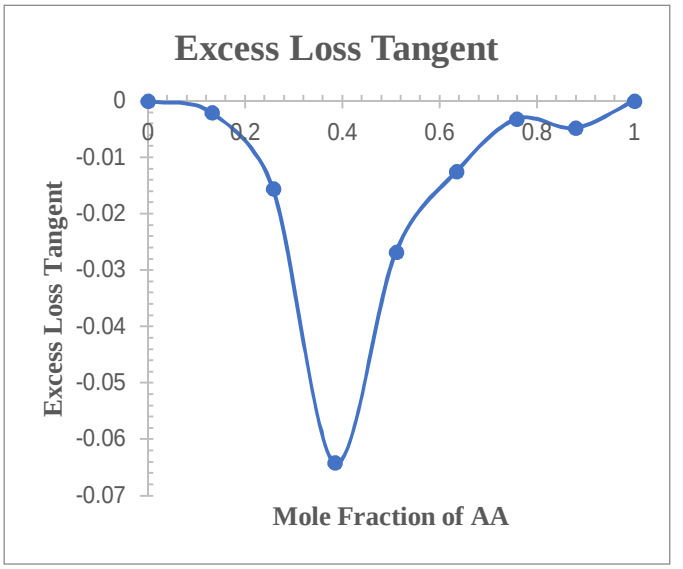


Figure 8 Excess loss tangents with mole fraction of AA+2-ME

According to Solimo and Riggio[31] positive values of excess viscosity due to strong specific interaction causes complex formation and negative value of

excess viscosity are observed for system of different molecular size in which the dispersion forces are dominant.

Excess viscosity figure 9, is initially positive upto X=0.5103 and later on becomes negative as the mole fraction AA increases .This may be due to strong specific interaction and system of different molecular size in which the dispersion forces are dominant giving an estimation of the intermolecular interaction[32].

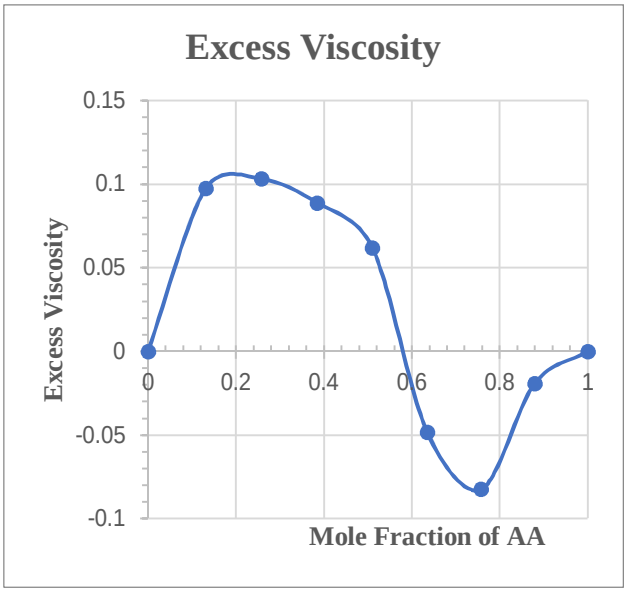


Figure 9 Excess viscosity v/s mole fraction AA+2-ME

Excess Activation energy ΔE_a, noted in figure 10 is positive indicating strong interaction between AA and 2-ME molecules. Maxima occur at about X=0.3847 and X= 0.5103 Δέ designates that there is a strong interaction between solute and solvent[9, 33]. The similar was observation were noted in case of propane diol (PD) and Etyhylene diamine (EDA) molecules[32].

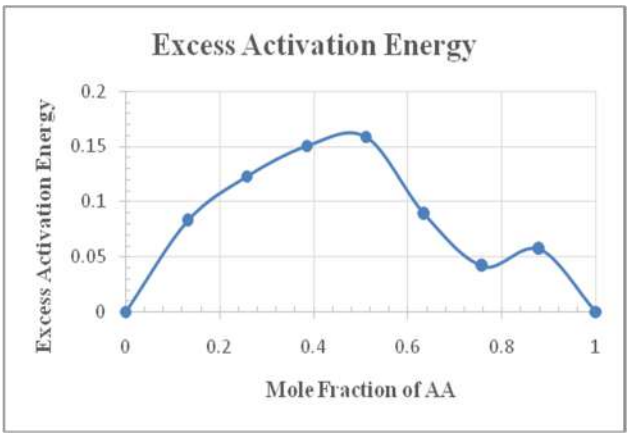
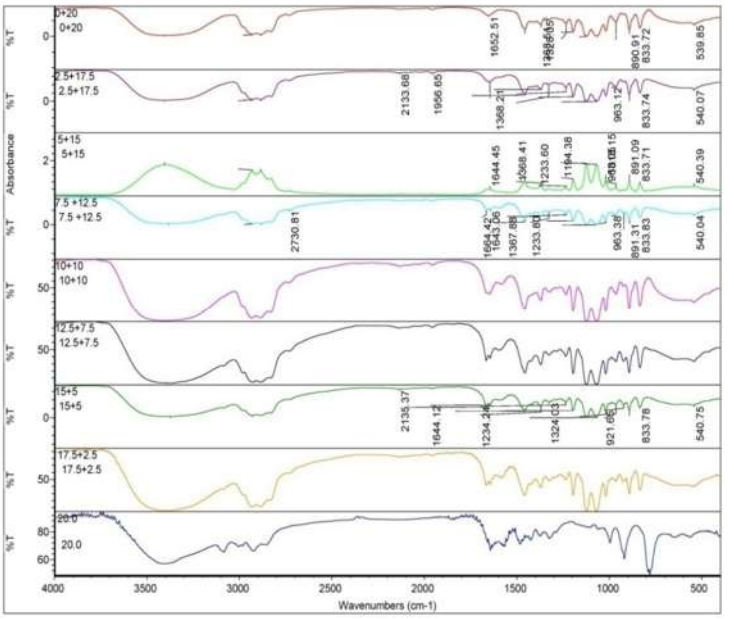


Figure 10 The Plot of excess activation energy (ΔEa) with mole fraction of AA+2-ME

FT-IR Spectral Analysis

The figure11 shows the FT-IR spectra of AA in 2-ME at room temperature between 3000 cm-1 and 3800 cm-1, in the range of the hydroxyl stretching vibration, these spectra strongly influenced by H-bonding. Small variation in frequency shift is observed indicating solute – solvent interaction. No significant change in the hydroxyl group bands with various concentrations, the spectrum is a strong indication of intra molecular (internal) hydrogen bonding[34]. Lump at 2730.81cm^{-1} gradually disappeared at X=0.3847 indicating complex formation. In the absence of 2-ME, characteristic carbonyl band has been observed at 1652 cm^{-1} by increasing concentration of 2-ME decreases the intensity of the original band. The bands due to linear bonded methoxy CO is observed in the 2000–2170 cm−1.The bands observed at 1956 cm-1is due to the formation of intermolecular bond between AA and 2ME. New band appear at the frequency of 1643.08cm $^{-1}$when the concentration of AA is higher. This behavior indicates the existence of 1:1 and 1:2 complexes[35], observed the same behavior of p-chlorophenol in carbon tetrachloride at 25^{o}C.Characteristic carbonyl band has been observed at 1664-1641 cm^{-1} that is in the range of 1500 and 1750 cm^{-1} of the carbonyl stretching vibration. The Fourier-transform infrared spectroscopy (FTIR) analysis of AA+2-ME proved the presence of amines, alcohols, Nitro compounds, carboxylic acids, esters, ethers and hydroxyl group. The spectrum clearly indicates multiple functionality, occurring mutual interaction.[36]

Figure 11 FTIR Spectra of AA and 2-ME at various concentration (0+20, 2.5+17.5, 5+15, 7.5+12.5, 10+10, 12.5+7.5, 15+5, 17.5+2.5 and 20+0)



Conclusions

Values of dielectric parameter, viscosity, activation energy have been reported for different mole fractions of AA. Dielectric loss, loss tangent, excess parameters like excess dielectric loss ($\Delta\varepsilon$) , excess loss tangent suggests possibility of complex formation at X=0.3847 and X= 0.5103 which is confirmed by the molar polarization curve. Excess activation energy indicates strong interaction between unlike molecules. The molar polarization curve and FTIR suggests approximately 1:2 type complex formations in the mixture. This positive excess permittivity of the mixtures also suggests any significant intermolecular interaction is effectively present at room temperature.

The FTIR spectra of binary mixture have been recorded and analyzed which clearly indicates multiple functionality, occurring mutual interaction between AA and 2-ME.The above evaluation is advances in biomedical, pharmaceutical and industrial application.

Acknowledgement:

The authors are greatly thankful to N.E.S. Science College, Nanded-431605, Maharashtra India for providing laboratory facilities, support and B N Bandodkar College of Science, Thane for providing FTIR facility.

Declaration of interest statement:

We wish to confirm that there are no known conflicts of interest associated with

this publication and there has been no significant financial support for this work that could have influenced its outcome.

References

1. Bhupesh Nemmaniwara , Vijaykumar Panchalb , Potaji Kadam Dielectric Behavior of Binary Mixture of 2, 3-Dichloroaniline with 2-Methoxyethanol at 200 C International Journal of Sciences: Basic and Applied Research (IJSBAR) (2014) Volume 17, No 2, pp 183-195)
2. Chelliah N and Sabesan R ,Indian J. Pure Appl. Phys. 32 (1994) 425 .
3. Tripathy S, Roy G S and Swain B B Indian ,J. Pure Appl. Phys. 31(1993) 828 .
4. Singh P J and Sharma K S , Pramana – J. Phys. 46 (1996)259.
5. Bhupesh G. Nemmaniwar, Namdeo V. Kalyankar and Potaji L. Kadam ,Orbital Elec. J. Chem. 5 (1): (2013) 1.
6. P. Jeevanandham,S. Kumar, P.Periyasamy, A.C. Kumbharkhane, Adv. Phys. Chem. (2014) 1.
7. F. Hevia, A. Cobos, J.A. Gonzalez, I.G. de la Fuente, L.F. Sanz, J. Chem. Eng. Data 61 (2016) 1468.
8. K.L. Pattebahadur, P.B. Undre, A.G. Mohod, S.D. Deshmukh, S.S. Patil, P.W. Khirade, Ferroelectrics 519 (2017) 23.
9. U. Tumberphale, R. Kawale, B. Narwade, N. Pawar, G. Karhale and G. Kalamse, International Journal of Physics and Mathematical Sciences Vol. 2 (2), (2012) 28-32.
10. Gyan Prakash Dube and Krishna Kumar J. Chem. Eng. Data 2016, 61, 6, 1967-1980
11. Yifan Xu, Paul R. Berger, Jai Cho & Richard B. TimmonsCapacitance-voltage characterization of pulsed plasma polymerized allylamine dielectrics for flexible polymeric field effect transistors Journal of Electronic Materials volume 33, pages1240–1247(2004)
12. Huan L. Lee (2017)Dielectric Constant measurements are not possible with deposited film layers, which are very thin insulating sheets sometimes used to prevent material from adhering to a mold or platen (Huan L. Lee The Handbook of Dielectric Analysis and Cure Monitoring Lambient Technologies © 2017 by Lambient Technologies LLC)
13. Alejandre AG, Larrubia MA, Raminez J, Basla G, Vibrational spectroscopy, 41, (2006)42.
14. Ramaekers R, Mas G, Adamonicz L, Dkhissi A, J. Mol. Struct., , 560, (2001)205.
15. B.G. Nemmaniwar Ahmed Hemida Journal of Engineering Research and Application www.ijera.com Vol. 8(12), (2018), 51.
16. A. P. Maharolkar, Y. Sudkes, S. Kamble, N. D. Tidar, A. G. Murugkar, S. S. Patil, P. W. Khirade, and S. C. Mehrotra, Int. J. Chem., 2(2), (2010), 250.
17. RJ Sengwa, Indian journal of pure and applied physics vol 41, (2003) 295
18. P.J.Singh and K.S.Sharma Pramana Journal of Physics Volume 46, (4), (1996), 259.
19. Hestone, W. H.; Frankline, A. D.; Hennely, E. L.; Smyth, C. P. J. Am. Chem. Soc. 1950, 72, 3443
20. Fort R J and Moor W R, Trans Faraday Soc., 62,(1966) 1112.

21. BG Lone; PB Undre; SS Patil; PW Khirade and SC Mehrotra, J. Mol. Liq. 141,(2008) 47.
22. VV Navarkhele; MK Bhanarkar, J. Physics and Chemistry of Liquids, 48,(2010) 89
23. R.A. Meyers. John Coates Coates Consulting, Newtown, USA Interpretation Of Infrared Spectra, A Practical Approach Encyclopedia of Analytical Chemistry (Ed.) Copyright Ó John Wiley & Sons Ltd,1-23
24. R.J.Sengwa, Madhvi, Abhilasha and Sonu Sankhala Indian Journal of pure and applied physics.Volume 44,(2006), 942.
25. Mallick and M Malathi Indian journal of Physics. https;//doi.org/10.1007/s12648-018-1225-1
26. Kinart C M and Klimczak M, J Mol Liq., 2009, 148(2-3), 132-139;DOI:10.1016/ j.molliq.2009.07.009,
27. Bhupesh Nemmaniwar and Pothaji Kadam*Chemical Science Transactions DOI:10.7598/cst2014.839 2014, 3 (3), 995-1000
28. Ch. V. V. Ramana,1 A. B. V. Kiran Kumar,2 M. Ashok Kumar,3 and M. K. Moodley1 Hindawi Publishing Corporation Journal of Chemistry Volume 2013, Article ID 687106, 4 pages http://dx.doi.org/10.1155/2013/687106
29. BG Lone; PB Undre; SS Patil; PW Khirade and SC Mehrotra, J. Mol. Liq. 141,(2008) 47.
30. VV Navarkhele; MK Bhanarkar, J. Physics and Chemistry of Liquids, 48,(2010) 89
31. Solimo H N, Riggio R, Davolio F and Katz, Can J Chem.., 1975, 53, 1258-1262.
32. Rekha Pande and G.M.Kalmase Int. J. Chem .Sci 3(1),2005,155-160.
33. N. P. Pawar, U. B. Tumberphale, R. S. Kawle, V. G. Kalamse and A. G. Chavan. Bionanofrontier, Vol.8(3), (2015), 315.
34. R.A. Meyers. John Coates Coates Consulting, Newtown, USA Interpretation Of Infrared Spectra, A Practical Approach Encyclopedia of Analytical Chemistry (Ed.) Copyright Ó John Wiley & Sons Ltd,1-23
35. P. Krishnamurthi P., Ramalingam H. B. and *Raju K Pelagia Research Library. ISSN: 0976-8610 CODEN (USA): AASRFC. Advances in Applied Science Research, 6(12) (2015)44.
36. A. Anis Fathima spectroscopic studies on molecular interactions in binary liquid mixtures a.anis fathima madurai kamaraj university May 2008 synopsis of the thesis submitted to madurai kamaraj university in partial fulfilment of the requirements for the degree of doctor of philosophy in physics

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY EDUCATIONAL RESEARCH
ISSN:2277-7881; IMPACT FACTOR :6.514(2020); IC VALUE:5.16; ISI VALUE:2.286
Peer Reviewed:VOLUME:9, ISSUE:4(1), APRIL :2020

FLORA OF ETHNBOTANICAL PLANTS OF RAIGAD DISTRICT MAH. INDIA

Naikade Shantaram M.
B.N. College,Pen- Raigad

Abstract

This study contributes to Flora of Ethno botanical plants of Raigad District regions, Maharashtra. In this region,floral study was situated on the hilly & forests regions. Ethno medico botanical plants play significant role among tribal and other local people who live in nearby forest and remote areas. The plants collected, indicated by the locals,ortribals were identified with the help differentFlora. A total 27 plant species are distributed into 18 families are used as ethno medicoplants around the study areaare listed in this research paper. The botanical name,family name, part of the plant used and their uses are indicated. The results of this survey suggest that theindigenous traditional knowledge of Ethno medico botanical plants related to the this recorded species uses came from local tribalpeople aged 30 -70 years.

Keywords: Ethnobotanical Plants,Tribal, Raigad Regions

Introduction

Popular knowledge of plants used by humans is based on thousands of years' experience. By "trial and error", It is estimated that nearby 80% of the people worldwide depends on traditional health care system and largely on herbal medicines Jain (1963). Nature has been a source of medicinal plants have been used as remedies for health care preparation in daily life to treat diseases all over the world. Tribal have acquired methods of treating sickness using his bio cultural environment. Ayurveda and other Indian literature mention such uses of plants in treatment of various human ailments. India harbors about 15 percent (3000 – 3500) medicinal plants, out of 20,000 medicinal plants of the world. Kamble and Pradhan (1980). About 90 percent of these are found growing wild in different climatic regions of the country. The tribal and rural people of various parts of India are highly depending on medicinal plant therapy for meeting their health care needsRanganathan, R. (2012).. This is attracting the attention of several botanists and plant scientists who directing vigorous researches towards the discovery or rediscovery of several medicinal plants along with their medicinal remedies for various diseases. Several workers were reported the utility of plants for the treatment of various diseases like diabetes, cold & cough and jaundice etc. Kulkarniand D,K. Kumbhojkar M.S. (2002)In

such a way, the present work was carried out to explore the medical remedies of some medicinal plants used by the rural people. At the present time, a number of barriers exist to the sustainable cultivation, gathering and use of medicinal plants.

The present study was, therefore, initiated to investigate and describe the existing population structure, status, availability and distribution of selected plants; and to find out the effect of exposure altitude and vegetation on their population set up. Moreover, the impact of current harvest on the population size of targeted medicinal plants was also determined. The findings might lead to locate ways and means to identify strategies to improve the management of the medicinal plant populations of the study area.

Materials and methods

Field trips were arranged in order to collect information about the ethno medico botanical plants and uses of plants by the local tribal people during 2017-18 in Raigad regions, The standard methods were followed with regard for collection,identification,drying, mounting, poisoning, labeling, and preservation of plants specimens. The medicinal plants were identified with their correct nomenclature and arranged alphabetically by family name, local name, and ethno medicinal uses. The identification and nomenclature of the listed plants were based on the different Floras.A questionnaire and different interviewmethod was adopted for documentation of ethnomedico knowledgeand to document local name and ethno medicinal uses.

Results

The investigations revealed that a total number of 27 species distributed into 18 families are used as ethno botanical plants around the study area. These species were found to have varying therapeutic uses by the local tribal communities. The data on the correct identification including botanical name,families, local names, plant parts used, and the ailments treated are summarized in Table.

Table: 1: **Flora of ethno medico botanical plants.**

Sr. No.	Family	Botanical Name	Local Name	Parts used /Ethno medicinal uses
1.	Combretaceae	Annogissuslatifolia Bedd.	Dhavada	Gum, Bark.Healing of Wounds & Vomiting.
2.	Malvaceae	Abelmoschusmanihot(L) Medik.	Junglibhendi	Root Decoction of root- jaundice and hepatitis.
3.	Meliaceae	AzadirctaindicaA.Juss.	Kadunimb	Leaf, Leaves Flower, Bark - Small pox, Migraine, Diabetes, Skin diseases, irregular menstruation and nosal bleeding, Quick delivery etc.

4	Bombacaceae	Bambusaarundinacea(Retz.) Willd.	Bamboo	leaf Body cooling.
5	Caesalpiniaceae	Bauhinia racemosaLam.	Apta	Bark, leaves Headache, malaria, and diarrhea.
6	Caesalpiniaceae	Bauhinia tomentosaL.	Kanchan.	It Bark, Root, Leaves. is used in treatment against poisonous bite, Leucorrhoea, Menstrual disorder and leprosy, boil, glandular swelling.
7	Asclepiadaceae	Calotropisgigantea (L.) R. Br.	Rui	Leaf, root juice and root parts.Root juice on antiseptic headache, waist pain. Root part paste is applied on scorpion bite. Leaf used for preparation of pipe for smoking.
8.	Asclepiadaceae	Canna indicaL.	Kardal	Root Jaundice, Hepatitis.
9	Cannaceae	Carica papayaL.	Papaya	Leaves.Root, Crushed leaves.Kidney stones, jaundice, and Rheumatism.
10	Caricaceae	Crossandrainfundibuliformis(L.) Nees	Aboli	Considered as aphrodisiac.
11	Acanthanceae	CuscutareflexaRoxb.	Amarvel	Stem-.Paralysis, Hair treatment.
12	Convolvulaceae	Cyperus articulatesL.	Cyperus.	Stem.Considered as vermifuge.
13	Cyperaceae	Datura metalL.	Dhotra	Leaves, Leaf oil, leaf juice Leaf paste is used for swelling, ear pain, hair loss and rheumatism. Leaves extract is used on poisonous dog bite. Seed paste is applied on various skin diseases.
14	Solanaceae	EcliptaprostrataL.	Maka	Leaves, Leaf oil, leaf juice Cough, fever and toothache, snake bite, malarial fever. Leaf oil for hair growth and darkening of hair, to Cure Mental disorder. Drug preparation: leaf decoction applied on the affected area to relief pain of scorpion sting.
15	Asteraceae	FicusracemosaL.	Umbar	Stem Bark.Stem bark is used in the form of powder for skin diseases. Bark paste in water or dry powder is utilized for rind expert (a contiguous disease by Virus).
16	Fabaceae	FicusreligiosaL.	Pimpal	Bark Decoction of roots and leaf is given during cough urinary tract infection. Stem bark is decoction is used in scabies.
17	Moraceae	Hygrophilaschulli(Buch.Ham.) M.R.Almeida&S.M	Tamil khana	Leaf, seeds.Cough and cold, Strength and Vigor

		.Almeida		
18	Acanthaceae	Lantana camaraL.	Tantani, Ghaneri	Leaf, Leaves, Root,Constipation, Fever, stopping bleeding, Cough, Fresh wounds etc.
19	Fabaceae	Nyctanthus arbor-tristisL.	Parijatak	Leaves, seeds Leaf is used in treatment of fever and malaria. Preparation- seven leaves added with piper nigram and some honey is taken for seven days.
20	Oleaceae	Ocimumamericanu mL.	Sabja	Seeds used in sarbat, to reduce acidity, cold, cough etc.
21	Lamiaceae	Ocimumtenuifloru mL.	Tulshi or tulas	Leaf, Juice. For Diarrhea, malaria, indigestion, loss of appetite, Cold and cough, diabetes. Leaf juice with honey is given for 3-7days for cough and cold. Ratio of 1:1Tulassi and Neem leaves pasties very effective for diabetes.
22	Lamiaceae	Pithecelloiumdulce (Roxb.) Benth.	Villayati chinch	Bark,used to cure febrifuge, decoction of leaf given an enema.
23	Fabaceae	Ricinuscommunis L.	Erand	Seeds, Leaves and root oil.are the remidy for Constipation, stomachache, bowels, Jaundice, piles, burn, wound, Rheumatism etc.
24	Euphorbiaceae	Senna tora(L.) Roxb.	Takla	Leaf, Root, Leaves. Skin eruptions, leprosy, and psoriasis.
25	Fabaceae	TectonagrandisL.f.	Sag	The wood oil is used to cure Eczema. The fruit oil is used in skin itching. The crushed seeds are given orally to pregnant women on first month to avoid miscarriage.
26	Lamiaceae	Tridaxprocumbens L.	Dagadipala	Leaves cure Healing of wounds.
27	Asteraceae	VitexnegundoL.	Nirgudi	Leaf, Root.usedtocure Headache, Toothache, Malaria.

Medicinal plants are an important source of drugs in traditional system of medicine They are used locally as a crude drug for the treatment of human and livestock health care since time immemorial. Even today, they are the main source of traditional health care especially in the remote hilly areas. The present investigation reported 50 plants species used by the local indigenous system of medicine.

Studied tribal culture and folk medicines from Western Maharashtra. Rials are mostly handled by unskilled persons. As a result valuable medicinal plants are

damaged due to lack of scientific methods of collection. Secondly over-extraction, destructive harvesting techniques and habitat loss are severe threats to medicinal and aromatic plants in Europe and same is true for our study area. It was also discovered that collectors now have to put more efforts and to walk longer distances to collect the same materials of targeted plants when compared to twenty years ago. The present study also revealed that with the increase in elevation and remoteness of the area within the study valley, of the involvement of children and women in the collection of, and dependence on medicinal plants increased. The present study, therefore, suggest that some management measures should be taken with the participation of local communities through village organization to conserve medicinal plant resources from becoming extinct. The foremost important thing is to give awareness/training to local communities on multidimensional basis about sustainable exploitation of medicinal plant wealth in hillsides and information on price of marketable species. Vartak (1982), studied on Ethno-botany of Maharashtra and Goa' Tribes. The natural regeneration of economically important medicinal plants is adversely affected by deforestation, over grazing, unabated urbanization and by their unauthorized collection in the study area.

Conclusion

Medicinal plants are the source of sustained income, provided efforts are made to stream line the regeneration protection and extraction of medicinal plants on proper scientific lines. Collection of medicinal plants carried out by the collectors may be streamlined in such a manner so as to provide ample regeneration time to the plants keeping their optimum time of growth in view. The various diversity and consensus indices show considerable vitality of local plant use. The high number of plants and uses reported, as well as the number and novelty of common plant names, supports this idea. Nevertheless, since informants were selected from among people known for their wide knowledge of plants and their uses, and their mean age was 72, we may conclude that folk phototherapy is "aging", in the sense that knowledge of medicinal plants

Acknowledgement:

The author is thankful to the tribal and non-tribal people of Raigad regions for their lucid discussion and comment pertinent to the subject and also for revealing their valuable information.

References

1. Kamble and Pradhan (1980).Ethnobotany of the corcus in Maharashtra. Bull. Bot. Surv. India. 22(1-4):201-202.
2. Kulkarni and D,K.Kumbhojkar M.S.(2002). Status and Properties of ethonobotany in Western ghats of Maharashtra. Ethnobotany (Ed. Dr,P.C.Trivedi,University of Rajasthan,Jaipur.) Pub.Avishkar Publishers, Distributers, Jaipur , India. p.p.98-118.
3. Ranganathan,R.(2012).Ethno medicinal plants and their utilization by villages in Jawadhuhilla of Thiruvannamalai district of Tamilnadu, India. International Journal of Pharmaceutical Research and Development 44;174-183.
4. KulkarniD.K.& Despande Adwait (2011).Folk therapies of Katkaris from Maharashtra, India. Journal of Traditional knowldgeVol.103,p.p.554-558.
5. Kalpit Mhatre &Rajendra Shinde(2017).Ethnomedicinal study on medicinal plants used in the treatment of Snakebite from Raigad District of Maharashtra state, India. Bull. Env. Pharmacil. Life Sci.Vol.67p.p.56- 59.
6. Naikade S. M.and Rathod L.R.(2014).Diversity of ethno medicinal plants used by Tribals of Pen taluka in Maharashtra, India. Research Innovator,1(6): 23-27.
7. Kothari, M. J.& Moorthy, S. (1996). Ethnobotany in human welfare of Raigad district in Maharashtra state, India. In Ethno biology in human welfare (Ed. S. K. Jain.) Deep Publication, New Delhi : 403-407.
8. Jain S.K.and Tarafdar, C.R. (1963).Native plants remedies for snakebite among Advises of central India. Ind.Med.Jur,57:307-309

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY EDUCATIONAL RESEARCH
ISSN:2277-7881; IMPACT FACTOR :6.514(2020); IC VALUE:5.16; ISI VALUE:2.286
Peer Reviewed:VOLUME:9, ISSUE:4(1), APRIL :2020

PLANT DISEASE DEFENCE HORMONE SALICYLIC ACID PRESENCE ALONG WITH AUXINS IN WHEY OF *Cassia Tora*. L INFLUENCE ON RHIZOBIUM GROWTH WITH EMPHASIS ON CYTOKININS *INVITRO*

[*1]Jadhav Rajesh K, [2]Castelino Deena and [3]Gandhi Aditi
Department Of Botany, D.G. Ruparel College, Mahim, University Of Mumbai, Mumbai, India

Abstract
The weed *Casia tora* utilised to obtain its root nodules consisting of *rhizobium* bacteria to prepare the nitrogen fixing source in the horticultural crops for the application as biofertilizer. For the purpose of *rhizobium* growth, the liquid deproteinised juice (DPJ) was taken into consideration *invitro* for the purpose of its treatment as nutient source. DPJ obtained from *Moringa* and Papaya leaves were utilised. There was striking influence of Papaya DPJ to become responsible in enhancing the rhizobial biomass after 9 days. This experiment was reported by earlier workers during 1980. While in case of *Cassia tora* DPJ, due to presence of salicylic acid, it controlled the growth of rhizobia.

Whey obtained from the foliage of moringa and banana which were responsible for plant as well as rhizobial growth utilised for the detection of phytohormones by thin layer chromatography (TLC). The results indicated the presence of plant growth regulators hormones auxins, gibberellins and cytokinins. Presence of photosynthetic pigments are also physiologically related with presence of phytohormones.

Key words: chromatography, deproteinised juice, gibberellins, *Musa,* nodules, tryptophan.

Introduction

The whey or deproteinised juice application optimized the process of nitrogen fixation by enhanced growth in the plants by root nodulation as well as induces the enzyme nitrate reductase. DPJ contains nitrogen content. Influence of Lucerne DPJ application to cowpea plants enhanced nitrogen, protein content and dry weights due to phytohormone presence. DPJ triggers the rhizobial growth as reported by Chanda et al, 1987. Substrates like casein for enzyme activity enhancement when was served to the DPJ medium during growth of fungi showed both positive and negative responses (Jadhav, 2019). Gibberellin in DPJ after exogenous application, induced enzyme protease during seedling growth and also retarded the domancy in many seeds (Jadhav et al, 2019).

Salicylic acid is biosynthesized from the amino acid phenylalanine. Amino acid tests already proved that DPJ contains the presence of phenylalanine positively. As the present objective to prove DPJ as protector from plant diseases, whether it contains salicylic acid was analysed. Salicylic acid is a phenolic phytohormone and is found in plants with roles in plant growth and development, photosynthesis, transpiration, ion uptake and transport. SA is involved in endogenous signaling, mediating in plant defense against pathogens. It plays a key role in the resistance to pathogens by inducing the production of pathogenesis-related proteins. DPJ found cosisting of few soluble amino acids precursor of hormones despite deproteinised. SA is involved in the systemic acquired resistance in which a pathogenic attack on one part of the plant induces resistance in other parts. The signal can also move to nearby plants by salicylic acid being converted to the volatile ester methyl salicylate. Salicylic acid (SA) is a major stress response signaling molecule that is increasingly characterized as a hormone. SA is synthesized from phenylalanine in a pathway that starts with conversion to *trans*-cinnamic acid by phenylalanine ammonia lyase followed by conversion to salicylic acid via a benzoate

intermediate. SA can be conjugated to glucose or aspartate, and is active in volatile form when methylated to form methyl salicylate (Abarka et al, 1998).

Indole-Lyase, an enzyme that catalyzes the conversion of L-tryptophan and water to indole, pyruvate, and ammonia. It is a pyridoxal -phosphate protein, requiring K+. It also catalyzes 2,3-elimination and beta-replacement reactions of some indole-substituted tryptophan analogs of L-cysteine, L-serine, and other 3-substituted amino acids. The amino acids tryptophan and methionine serve as precursors for IAA (indole-3-acetic acid) and ethylene, respectively (Bianco et al., 2018).

It was predicted that *Rhizobium* induce the phytohormones in the plants during nitrogen fixation and getting associated with cortical tissues of the roots providing the nourishment of nitrogen. It links with enzymes and helping to synthesize hormone like auxin and salicylic acid. Earlier researchers reported that DPJ contains auxins, gibberellins, cytokinins, abscissic acid and ethylene. It was estimated in DPJ of few members of brassicaceae. Later it was also investigated in *Colocasia esculenta* foliage DPJ (Parthiban et al., 2016).

Plants can synthesize IAA by several independent biosynthetic pathways. Four of them start from tryptophan, but there is also a biosynthetic pathway independent of tryptophan. Plants mainly produce IAA from tryptophan through indole-3-pyruvic acid. IAA is a derivative of indole, containing a carboxymethyl substituent.

Isoprenoids in DPJ

Deproteinised leaf extracts are the sources of hormones and lipids used for application for growth of plants and economically important microbes. During the juice extraction, when proteins are isolated, many nutrients and lipids are disposed in deproteinised juice. During this time tissues as well as cells gets ruptured and whatever hormones present passes to DPJ as well as LPC. Physiologically the isoprenoid pathway gives rise to five classes of plant hormones: cytokinins, brassinosteroids, gibberellins, abscisic acid, and strigolactones. Subsequently, jasmonic acid is synthesized from a lipid precursor. Polymeric isoprene derivatives are a large family of substances of functional and structural common ground such as steroids, carotenoids, gibberelic acid are just some of its members. The carotenoids belong to the isoprenoids and their basic structure is made up of eight isoprene units, resulting in a C_{40} backbone (Sun et al., 2018). Formally, two types of carotenoids can be discerned. Carotenes are pure hydrocarbons while xanthophylls are derivatives that contain one or more oxygen functions. The chlorophyll are synthesized by cytokinins and responsible to develop the chloroplasts (Cortleven and Schmülling, 2015). Sucrose induction of the anthocyanin synthesis pathway was repressed by the addition of gibberellic acid (GA) whereas jasmonate (JA) and abscisic acid (ABA) had a synergic effect with sucrose (Loreti et al., 2011). Flavonoids represent a large class of secondary plant metabolites, of which anthocyanins are the most conspicuous, owing to the wide range of chemical structures derived from their synthesis. In addition to providing pigmentation in leaves, anthocyanins can also be important as feeding deterrents and as a protection against ultraviolet irradiation damage (Winkel Shirley, 2001).

During present investigation, DPJ from *Cassia tora* utilized to grow *Rhizobium* and its culture filtrate was used to get tested with salicylic acid, the phenol, as it is the plant hormone helpful for functioning same as like other hormones like jasmonic acid, gibberellic acid and auxins. The salicylic acid is the bacterial growth inhibitor. Whether the DPJ is consisting the presence of the infection causing harmful bacteria inhibitor assessment was the objective. The intention of the research was also to enhance the growth of rhizobia.

DPJ from drumstick leaves and papaya leaves were also used to grow the *Rhizobium* bacteria. During present investigation, DPJ from two crops obtained to perform analysis of plant growth regulators.

Materials and methods :

Release of DPJ during leaf protein preparation

Fresh leafy vegetation of *Musa paradiasiaca* L. (banana), *Moringa oleifera* L. (drumstick), *Cassia tora* L. (sickle pod), *Carica papaya* L. (Papaya), green spinach *(Spnacia oleracia* L*)* and red spinach *(Amaranthus viridis* L*)* were taken to fractionate in mixie to obtain pulp. The pulp is squeezed to obtain the extract. This extract is heated to 90°C, so as to proteins in it get coagulate to form curd and gets precipitated at the bottom of the beaker. This becomes responsible to form supernatant. This supernatant is called deproteinised juice. The precipitate is called as leaf protein concentrate (LPC). This LPC contains vitamins and amino acids for nutrition.

Rhizobial growth

DPJ prepared from leaves of *Moringa oleifera*, papaya and *Cassia tora* consumed for the purpose to grow *Rhizobium* bacteria invitro. The roots of *Cassia tora* weed collected from field to obtain nodules to crush. Before crushing, the root nodules sterilised with 5% Nacl. These crushed nodules consisting of *Rhizobium* inoculated in 50 ml of DPJ. Prior to inoculation, the DPJ was sterilised in autoclave for 15 minutes. 2 g of fresh *Rhizobium* was taken into consideration for the proliferation in liquid deproteinised whey solution under laminar hood for inoculation. The inoculated *Rhizobium* in aseptic conditions incubated at room temperature for 9 days at 28°C in triplicate conical flasks to obtain mean for measurement of biomass in grams. After 9 days the bacteria filtered by whatman paper to collect biomass and oven dried to obtain the accuracy.

Plant hormone Salicylic acid (Phenol) test in Rhizobium culture filtrate of DPJ.

1 ml of ethanol and 1 ml of Ferric chloride was added in 2 ml of DPJ. Change in the colour viz., blue, green, red indicated presence of Salicylic acid.

Tryptophan test

The indole test is a biochemical test performed on DPJ from distinct species to determine the ability of the organism to convert tryptophan into indole. This division is performed by a chain of a number of different intracellular enzymes, a system generally referred to as "tryptophanase." The glyoxylic test was performed by taking 2 ml of acetic acid in test tube. The fresh DPJ 2 ml was added to it. Again 2 ml of Conc. H2 SO4 was added by the sides inside test tube. It gives violet colouration and formation of ring when tryptophan is present. DPJ made up of *Cassia tora* and *Moringa oleifera* were tested. Earlier reporters found the test posivie in fenugreek DPJ and in DPJ of few members of brassicaceae.

Thin layer chromatography for phytohormons seperation

Eluent : 9 ml of butanol was taken in 50 ml of beaker ,1 ml of ethyl acetate and 1 ml of water was added.

Spray : Bromophenol blue was added to 10 ml of water for very diluted solution and spray to develop blue spots. To avoid bump, in another beaker 1.5 ml of water and 3.5 ml of dil sulphuric acid was added.

Drops of Moringa DPJ was spotted as stationary phase for 10 times by drying every time. Solvent was considered for mobile phase on thick silica gel paper sheet.It was dried in oven. The spray on silica gel chromatography paper (Hosssu et al., 2009) indicated bands. RF value was calculated by distance travelled by solvent and solute as 1. blue, 2. greenish brown and 3. yellow spots colourations. Same procedure repeated for moringa and banana leaves DPJ.

Silica gel column Chromatography

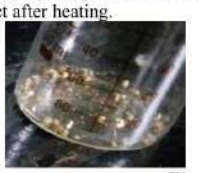
The column was prepared by silica gel powder and the chloroform. The eluent for mobile phase was prepared by acetone, methanol and n-hexane at 1:1:8 ratio. The samples of DPJ from Spinach *(Spinacia oleracia* L *)* and red spinach or slender amaranth *(Amaranthus viridis* L) was loaded at the ratio of 2:1 as stationary phase affter centrifugation at 1000 r.p.m. on the column as the source of photosynthetic pigments cnlorophyll A, chlorophyll B,

carotenoids, lycopene, anthocyanin and xanthophyll. The pigments detected to find isoprenoids to indicate the hormones gibberellins, cytokinins, ethylene, abscissic acid and jasmonic acid (Kagawa, 1963).

RESULTS AND DISCUSSIONS

Figure 1. Precipitation of leaf protein concentrate (LPC) by coagulation and formation of supernatant (Deproteinised Juice) of *Moringa* leaf extract after heating.

(A)



(B)

Figure 2. (A) Collection of *Cassia tora* vegetation from field for harvesting the root nodules and preparation of DPJ. (B) Collected root nodules of *Casia tora* weed.

Table 1. Rhizobial biomass obtained on the deproteinised leaf extract after 9 days.

No.	DPJ	Fresh weight (g)	Rhizobial dry Biomass (g)
1.	*Moringa oleifera* L.	3.396	0.890
2.	*Carica papaya*. L	5.312	1.56
3.	*Cassia tora*. L (control)	1.750	0.786

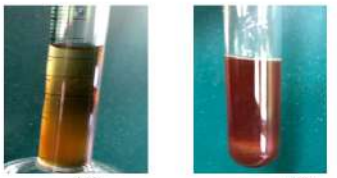
Both the DPJ of *Moringa* and papaya leaves enhanced the rhizobial biomass. The preparation of DPJ is shown in figure 1. Table 1. indicates that the DPJ form *Carica papaya* leaves found significant to thrive the biomass of *Rhizobium* as compared with leguminous *Moringa* leaves. Figure 2 shows the collection of root nodules from *Cassia tora* plants. The nodules obtained from Cassia tora itself showed increment in rhizobial biomass but it was found lower than that of grown on Papaya and *Moringa* DPJ. *Carica papaya* DPJ seems consisting of lower salicylic acid as the yield of *Rhizobium* was more comparatively. This reveals low tolerance by *Rhizobium*.

Figure 3. Salicylic acid test in culture filtrate of *Rhizobium* grown on *Cassia tora* DPJ.

The *Cassia tora* DPJ showed presence of positive salicylic acid, therefore the rhizobial yield was low. The salicylic acid (SA) phenolic test in culture filtrate of *Rhizobium* grown on *Cassia tora* DPJ found positive shown in figure 3. Indophenol produced would have imparted

a green or blue color to the upper layer of the solution. The phenol showed yellowish and reddish orange appearance. Indophenol indicates presence of auxins.

SA also plays major role during the early stages of Rhizobium legume symbiosis. Nod gene factors produced by rhizobia, in response to legume produced flavonoids, affect SA content of the host plant during the early stages of nodulation. On the other hand, SA inhibits bacterial growth and the production of Nod factors by rhizobia. Flavonoids secreted by the root of their host plant help *Rhizobia* in the infection stage of their symbiotic relationship with legumes.



(A) (B)

Figure 4. Auxin Indole test by glyoxylic tryptophan test to examine presence of phytohormone in the filtrate of rhizobia culture. (A) Ring formation in the culture filtrate of rhizobia grown on Moringa DPJ (B) Ring formation in the culture filtrate of rhizobia grown on Cassia tora DPJ.

After the rhizobium growth, Auxin Indole test was performed by glyoxylic tryptophan test to examine presence of phytohormone in the filtrate of rhizobia culture. There was ring formation in the culture filtrate of rhizobia grown on Moringa DPJ which indicates the hormone auxin enhancement. Ring was also formed in the culture filtrate of rhizobia grown on *Cassia tora* DPJ shown in figure 4. Therefore the results were clearly proved that DPJ is the source of plant growth regulators.

Table 2. RF values of thin layer chromatography performed in deproteinised whey to detect the phytohormones.

No	DPJ	Colour	RF value	Phytohormone
1.	*Musa paradisiaca*	Yellow	0.7	auxins
		Yellow green	0.7	gibberellins
		Greenish brown	0.5	gibberellins
		Blue	0.2	cytokinins
		Greenish blue	0.2	GA/cytokinins
2.	*Moringa oleifera*	yellow	0.75	auxins
		Yellow green	0.75	gibberellins
		Greenish brown	0.5	gibberellins
		Greenish blue	0.5	GA/cytokinins

In earlier reports, moringa DPJ was utilised for yeast fermentation in which it improved the single cell protein and its hydrolytic enzymes. During present investigation, Moringa DPJ was utilised to assess its phytohormone content which was responsible to enhance single cell protein. There was stiking influence in retarding the seed dormancy by the application of radish and colocasia leaves DPJ. These DPJ found consisting of phytohormes by examining

its protease and amylase activity. Gibberellin is the phytohormone which boosts the expression of these enzymes.

Therefore light yellow colour in chromatography indicates presence of auxins as illustrated in table 2. Both the DPJ from moringa and banana leaves contains more auxin content. Conspicous blue colour indicates presence of cytokinins. Hence it reveals that monocot *Musa* leaves bears more cytokinin and gibberellin as well.The RF value of blue colour was less i.e. 0.2 as compared with auxins and gibberellins. Greenish brown colour indicates presence of gibberellins. Gibberellins are also found more i.e the RF value is 0.5 in both *Musa* and moringa leaves deproteinised whey. In moringa, cytokinin hormone was found in low quantity as compared with auxins and gibberellins. Yellow green in both DPJ indicates presence of gibberellins. Greenish blue indicates presence of both gibberellins and cytokinins.

Table 3. Photosynthetic pigments related with phytohormones indication in DPJ of green and red spinach leaves by silica gel column chromatography.

No.	Pigment	Colour	Hormone
1	Chlorophyll A	greenish blue, red	gibberellins, cytokinins
2	Chlorophyll B	green	cytokinins
3	Xanthophyll	orange	Abscissic acid (ABA)
4	Carotenoids	yellow	ABA, gibberellins, cytokinins,JA
5	lycopene	red	ABA, gibberellins, cytokinins,JA
6	Anthocyanin	pink	gibberellins

Figure 5. Expression of the colour bands of photosynthetic pigments by silica gel column chromatography in the DPJ of green and red spinach leaves.

Figure 5 and table 3 illustrates the expression of photosynthetic coloured pigments of chlorophyll A, chlorophyll B, carotenoids, lycopenes, xanthophyll and anthocyanin. Presence of chlorophyll A and B indicates the activity of cytokinins, as this hormone synthesizes chlorophyll. Carotenoids are the members of the isoprenoid derivatives and they synthesizes the pathways of hormone gibberellins, cytokinins, abscissic acid (ABA) and jasmonic acid (JA). Gibberellins responsible for anthocyanin synthesis. The maximum colouration in figure 5 seems anthocynin pink colour which indicates higher gibberellins in both the DPJ from Spinach and *Amaranthus*. Anthocyanins belong to a parent class of molecules called flavonoids synthesized via the phenylpropanoid pathway. They occur in all tissues of higher plants, including leaves and stem.

Conclusion

Therefore the experiment showed the significant results in enhancing the rhizobial biomass on all DPJ used. Hence application of DPJ to leguminous crops can enhance its rhizobial growth to fix the soil nitrogen for plant growth as already earlier researchers reported. This process can also be attempted in case of monocotyledonous crops for proper nitrogen fixation. Earlier workers already reported the increase in nitrate reductase after the application to wheat, *Eleusine* and Jowar crops because of the application of DPJ from *Cassia tora* vegetation.As its already investigated that DPJ contains all phyohormones, but in present investigation it is evident that culture filtrate of *Rhizobium* grown on DPJ also contain the plant hormone salicylic acid as it was synthesized. Presence of salicylic acid in *Cassia tora* controlled the growth of *Rhizobium* bacteria as the earlier researchers reported. Therefore this positively proved that DPJ has the potentiality of reducing infectious microorganisms on plants and it can also be treated exogenously on leaves of the crops to control harmful microbial attack due to its SA presence. The positive tryptophan test indicates the auxin precursor amino acid presence in the DPJ, the stimulator of the root and shoot initiation in the plants for growth regulation.

Therefore the results reveals that, the DPJ obtained from monocot and dicot, contains same percentage or quantity of the three phytohormones auxins, gibberellins and cytokinins. It seems DPJ from monocots also to be consumed as far as phytohormones are concerned related with plant growth. Monocot seems contains more cytokinin which is inducer of cell division and cell enlargement during tissue development in plants. The presence of photosynthetic pigments anthocyanin, carotenoid, xanthophylls and chlorophyll reveals the presence of plant growth regulators.

Acknowledgements

The authors are thankful to Ruparel College, Mumbai, affiliated to University of Mumbai authorities to provide laboratory facilities to complete this project. The authors express deep sense of gratitude to Ex. Professor and Head A. M. Mungikar, Dr. BAMU, Aurangabad, India, for encouragement.

References

1. Chanda S, Matai S, Chakrabarti S (1987): Deproteinized leaf juice as a medium for growth of *Rhizobium*. Ind. J. Exp. Bio. 25:573-575.
2. Parthiban P, Shijila Rani A.S., Mahesh V., Ambikapathi V. (2016): Studies on biosynthesis of auxin in rhizobium and their impact on growth of *Vigna mungo* L.. *Pharmaceutical and Biological Evaluations,* 3 (3), 371-376.
3. C. Bianco, B. Senatore, S. Arbucci, G. Pieraccini, R. Defeza. (2014): Modulation of Endogenous Indole-3-Acetic Acid Biosynthesis in Bacteroids within *Medicago sativa* Nodules Applied and Environmental Microbiology 2014 Vol. 80 (14)p. 4286 – 4293 doi:10.1128/AEM.00597-14
4. F. Martínez-Abarca, J. A. Herrera-Cervera, P. Bueno, J. Sanjuan, T. Bisseling, and J. Olivares. (1998): Involvement of Salicylic Acid in the Establishment of the Rhizobium meliloti– Alfalfa Symbiosis. Molecular Plant-Microbe Interactions. Vol. 11, (2), 1998, pp. 153–155 DOI: 10.1094/MPMI.1998.11.2.153
5. Jadhav R. K., Mulam P., Khot V. (2019): Elucidation of the seed dormancy and phytohormones by germination after exogenous foliage whey application. Journal of Plant Stress Physiology. 5; 8-14.
6. Jadhav Rajesh K. (2019): Substrate serving for culture optimization and protease
1. productivity by *Penicillium notatum* strain on deproteinised foliage extract from
2. lucerne and beet. The Asia Journal of Applied Microbiology. 6 (1) 10-17.

7. Tsuneo Kagawa, Takashi Fukinbara & Yusuke Sumiki (1963): Thin Layer Chromatography of Gibberellins, Agricultural and Biological Chemistry, 27:8, 598-599, DOI: 10.1080/00021369.1963.10858149.
8. Huda Elgubbi. (2015): "New Spray Reagent for Detection of Some Plant Hormone on Thin-Layer Chromatography". EC Nutrition 3.1, 541-545.
9. Ana – Maria Hossu, Mihael – Flory Maria, Cristiana Radulescua, Mihael Iliec, Vasile Magearu. (2009): TLC Applications on separation and quantification of fat-soluble vitamins Romanian Biotechnological Letters Vol. 14, No. 5, pp. 4615-4619
10. Sun T., Yuan H., Cao H., Yazdani M., Tadmor Y., and Li L.(2018): Carotenoid Metabolism in Plants: The Role of Plastids. Mol. Plant.11, 58–74
11. Anne Cortleven, Thomas Schmülling. (2015): Regulation of chloroplast development and function by cytokinin, *Journal of Experimental Botany*, 66, (16) Pages 4999–5013, https://doi.org/10.1093/jxb/erv132
12. Harborne A. J. (1998): Phytochemical Methods A Guide to Modern Techniques of Plant Analysis . Springer Science & Business Media – 302 pages
13. Sherma, J., (2002): Chromatographic methods of analysis-Thin layer chromatography. Dekker Encycl., 1: 426-439.
14. Serpil Ünyayar, S. Fatih Topcuoglu , Ali Ünyayar. (1996): A modified method for extraction and identification of indole-3-acetic acid (IAA), gibberellic acid (GA3), abscisic acid (ABA) and zeatin produced by *Phanerochaete chrysosporium* me446 Bulg. J. Plant Physiol., 22 (3–4), 105–110
15. Winkel Shirley B. (2001): Flavonoid biosynthesis. A colourful model for genetics, biochemistry, cell biology, and biotechnology. *Plant Physiology* 126, ppp. 485– 493.
16. Elena Loreti, Giovanni Povero, Giacomo Novi , Cinzia Solfanelli , Amedeo Alpi, Pierdomenico Perata (2011): Gibberellins, jasmonate and abscisic acid modulate the sucrose induced expression of anthocyanin biosynthetic genes in *Arabidopsis* 193 (1) New Phytologist pp. 289-289. https://doi.org/10.1111/j.1469-8137.2008.02511.x

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY EDUCATIONAL RESEARCH
ISSN:2277-7881; IMPACT FACTOR :6.514(2020); IC VALUE:5.16; ISI VALUE:2.286
Peer Reviewed:VOLUME:9, ISSUE:4(1), APRIL :2020

BUTTERFLY AND BIRD DIVERSITY AND THEIR ASSOCIATED HABITATS IN DIFFERENT TERRAINS OF KEBALI VILLAGE-LOWER DIBANG VALLEY AND EAST KAMENG, NORTH EAST, ARUNACHAL PRADESH, INDIA

Manisha N. Kulkarni
Associate Professor of Zoology
Institute of Science, Mumbai

Abstract

The present study is conducted to provide the sustainable development and conservation to the biodiversity of Kebali village- Lower Dibang valley and East Kameng in view of rapid depletion of forest resources and associated habitats. This research concern to the present environmental degradation and biodiversity depletion caused by anthropogenic activities in the form of mismanaged mountain farming and deforestation. Lower Dibang Valley District is located on the eastern part of Arunachal Pradesh in between 27° 30‘ N to 28° 33‘ N latitudes and 95° 15‘ E to 96° 30‘ E longitudes. The tribal people of this area are largely depending on available bio-resources for meeting various needs of livelihood. This has led to large scale exploitation of the plant species in the mountain range.

The study area covers the Kebali, Lower Dibang valley and East Kameng which is the home for numerous Butterfly and Bird species. These areas are covered by upper hilly and mountainous region which is thickly vegetated while dense patches of evergreen forests found in lower terrains.The study was conducted from May 2018 to November 2018 at different terrains. A total 52 species of birds and more than 65 species of Butterfly were recorded from Lower Dibang valley.The North East region of India is home to a rich diversity of butterflies and providing a profusion of habitats for butterfly and many other insects which features diverse biota with a high level of endemism.

The present study is an assessment of birds and butterfly diversity because their species richness is an essential for evaluating the status of ecosystems. Line transect method were used to record species diversity and abundance of butterflies and birds in their associated habitats.

Keywords: Butterfly, Bird, Diversity, Species.

Introduction

Kebali village and Lower Dibang valleyare the parts of Indo-Burmese Biodiversity Hotspot. Arunachal Pradesh has 80.39% of its land area forested (Forest Survey of India 2013) supporting unusually high species diversity and many prominent endemic species, making this a globally important biodiversity

area. The state of Arunachal Pradesh is the largest amongst the seven 'sister' states of north eastern India. Historically this area was called the North-East Frontier Agency (NEFA) and till 1972 it remained constitutionally a part of the state of Assam. In 1972, NEFA became the Union Territory of Arunachal Pradesh, and it became a full-fledged state in 1987. Arunachal Pradesh has 26 major tribes, mostly inhabiting the hill forests of the state. In spite of its tremendous biodiversity importance, Kebali village and Lower Dibang valley, have a sparse record of published butterfly inventories.

In recent surveys in western Arunachal Pradesh, 165 butterfly species were reported primarily from Eaglenest and Pakke during the Eaglenest Biodiversity Project (Athreya 2006b). This checklist was the outcome of surveys conducted by R. Athreya and S. Kartikeyan at Pakke in 1995 and at Eaglenest in October 2004 (2 weeks) and May 2005 (1 week). Checklists of butterflies from DihangDibang Biosphere Reserve (Borang et. al 2008) and Mishmi Hills (Gogoi 2013a) in eastern Arunachal Pradesh have also been published.

Present study was undertaken to evaluate species diversity and also to assess species at threatened categories in Kebali village and Lower Dibang valley. In this paper, we summarized the species diversity of butterflies and birds.

Materials and methods

Study area

The present study was carried out in Kebali village and Lower Dibang valley at 28º26' to 29º21' N and 94º21' to 96º31' E, the biosphere reserve in Arunachal Pradesh.

Survey methods

We followed the protocol of line transects method to survey the butterfly and bird diversity (Burnham et al., 1980 and Javed and Kaul, 2002). We walked the transects along forest trail used by the local people (Borang, 2004). We walked the transect during peak bird activity period between 07.00 hr in the morning and to 13.00 hr in the afternoon, covering 10-15 km a day (Javed and Kaul, 2002). Birds were observed with 16X40 DPSI Olympus binocular and photographic documentation of encountered birds was done using Canon EOS 60D with 300mm zoom lens.

Identification of Birds and Butterflies

Birds were identified using various Field guide on birds and butterflies (Ali and Ripley, 1987, Isaac Kehimkar, Dr.KrushnameghKunte , Ali, 2002, Grewal et al., 2002, Kazmierzak et al., 2003 and Grimmet et al., 2009).

In the present study, survey is undertaken to find out the avian butterfly species in the Kebali village and Lower Dibang valley as avifaunal diversity is remained relatively less explored due to remote location, rugged mountainous terrain and poor road communication (Borang, 2004, Sinha et al., 2005, Borges, 2005, Mishra and Datta, 2007, Borang et al., 2008 and Choudhury, 2010). This study was an effort to estimate the number of birds and Butterfly species in Kebali village and Lower Dibang valley done in various region of India by other workers (Devi et al., 2012, Donar et al., 2012, Mize and Tsomu, 2012, Chopra et al., 2013, Motup and Sahi, 2013, Patil and Hiragond, 2013 and Gupta, 2013). During survey about 52 species of birds and more than 65 species of butterflies were recorded from Kebali village and Lower Dibang valley.

Results and Conclusion

During study it is been observed that species of butterflies and birds are declining from study area due to high anthropogenic pressure like habitat destruction, habitat degradation, habitat fragmentation and over harvesting or over exploitation (Mishra and Datta, 2007; Aiyadurai et al., 2010 and Solanki; 2013). It is an indication that bird and butterflies might restrict their activities in disturbed parts of study area.

Because of these human threats, birds and butterflies are one of the worst affected groups of wildlife in the state. These study leads to record of 65 butterflies and 52 bird species fromKebali village and Lower Dibang valley. The present study is an important effort to determine species existed in Kebali village and Lower Dibang valley and also to understand species fluctuation of birds and Butterflies.

References

1. Journal of Threatened Taxa | www.threatenedtaxa.org | 13 August 2016 | 8(8): 9053–9124 DOI: http://dx.doi.org/10.11609/jott.2984.8.8.9053-9124 |
2. Species diversity of birds in Dihang- Dibang Biosphere Reserve, Arunachal Pradesh, Daniel Mize and Hirendranath Sharma, June 2014.
3. Butterflies (Lepidoptera) of the Kameng Protected Area Complex, western Arunachal Pradesh, India, Sanjay Sondhi and KrushnameghKunthe, August 2016.
4. Antram, C.B. (1924). Butterflies of India. Thacker, Spink& Co., Calcutta (Kolkata), 226pp.
5. Arora, G.S. & D.K. Mondal (1981). On the Papilioninae (Papilionidae: Lepidoptera) from Arunachal Pradesh and Adjoining areas of Assam in north-eastern India. Records of the Zoological Survey of India, Occasional Paper 29: 65pp+7pls.
6. **Gogoi, M.J. (2013).** A preliminary checklist of butterflies recorded from Jeypore-Dehing forest, eastern Assam, India. Journal of Threatened Taxa 5(2): 3684–3696; http://dx.doi.org/10.11609/JoTT.o3022.3684-9
7. **Gogoi, M.J. (2013).** Notes on some skipper butterflies (Lepidoptera: Hesperiidae) from Panbari Forest and its adjoining areas, Kaziranga-KarbiAnglong, upper Assam, India. Journal of Threatened Taxa 5(13): 4759–4768; http://dx.doi.org/10.11609/JoTT.o3340.4759-68
8. **Singh, I.J, & M. Gogoi (2013).** A new range record for the Bath White Butterfly Pontiadaplidicefor north-east India. Bionotes15(2): 59.
9. **Smith, C. (1994).** Butterflies of Nepal. Revised Edition, Tecpress Service L.P., Bangkok, Thailand, 368pp.
10. **Smith, C. (2006).** Illustrated Checklist of Nepal's Butterflies. New Revised and Updated Edition. Walden Book House, Kathmandu, Nepal, 129pp.
11. **Varshney, R.K. (2008–09).** First Bibliography of the Butterflies of the Indian Region. Bionotes. A Biologists Confrerie10(2–3) & 11(1-2).
12. **Wynter-Blyth, M.A. (1957).** Butterflies of The Indian Region. Bombay Natural History Society, Bombay, xx+523pp+72pl.

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY EDUCATIONAL RESEARCH
ISSN:2277-7881; IMPACT FACTOR :6.514(2020); IC VALUE:5.16; ISI VALUE:2.286
Peer Reviewed:VOLUME:9, ISSUE:4(1), APRIL :2020

POETIC FORM – A TOOL FOR ENHANCING TEACHING LEARNING EXPERIENCE OF PHYSIOLOGY TOPICS FOR HIGHER SECONDARY STUDENTS

Shilpa K. Patil-Bhonde
Sahyadri College Bhandup, Mumbai (w)

Abstract
Plant physiology is study of wide range of processes and functions that plants use to live and survive e.g. respiration, photosynthesis, transpiration, plant hormones, and environmental response & transport processes. These topics are taught to higher secondary students in their Biology syllabus. Students find difficulty in learning these topics due to their complexity. Systematic application of tool of 'Poetic forms' for these topics is significant, as it will bring focused learning, understanding and provide a hook for recall of biochemical reactions.
The present paper aims at putting forward tool of 'Poetic form' for learning Kreb's cycle (plant physiology – aerobic respiration topic). As a Biology teacher advantage of employing this technique is, it acts as learning tool for students which facilitate memorization of complex biochemical reactions. The same tool is also used for teaching learning of Calvin cycle, HSK path way, Glycolysis, Life cycles of - Fern, Cycus, China rose, Jowar, Cockroach circulatory system and Human heart and its working.

Keywords: Poetic form, Tool of memorization, Kreb's cycle

Introduction
Some topics in Biology can be difficult to learn for higher secondary students e.g. plant water relation, protein synthesis, respiration and photosynthesis, gaseous exchange, mitosis and meiosis, organs, circulation, excretion, hormonal regulation, genetics, genetic engineering, and the central nervous system. This was also supported by Tekkaya et al. (2001). Experiencing difficulties in so many topics in biology negatively affects students' motivation & achievement (Özcan, 2003) as well interest of subject and learning confidence.
Difficulties in learning biology faced by students have been reported by various researchers (Johnstone and Mahmoud, 1980; Finley et al., 1982; Tolman, 1982; Anderson et al., 1990; Seymour and Longdon, 1991; Lazarowitz and Penso, 1992; Bahar et al., 1999).
Plant physiology is one such difficult topic which contains a significant number of biochemical pathways that are fundamental to a deeper understanding of the discipline, and which hare generally conveyed through didactic teaching

methods (Meyer & Land, 2003). Thus students struggle to engage in learning metabolism and have difficulty finding an enduring relevance (Wood, 1990).
According to Cimer(2012) teachers should make biology lessons interesting and attractive for students to learn more effectively. Forsyth and McMillan (1991) emphasize that variety in teaching activities revitalizes students' involvement in the course and their motivation.
In present study author has selected topic of Kreb's cycle to simplify and arouse interest among students. Learning of The Kreb's Cycle requires implicit or procedural knowledge (not explicit or declarative knowledge). The students have to remember the reactions and their correct order in which the reactions take place. So as simplify the learning author has constructed poetic form tool.
Active learning takes place when constructivism links are established between new and existing knowledge by the student. According to Petty (2009) if students get involve recent, vivid, engrossing, multisensory experience their constructivism links are stronger.
Music was very important part of education system in Ancient Greece. Its power and importance was highlighted by many philosophers of that time. One of them was Plato pointed that "Music is the best tool for education than any other" (Hebermayer, 2001).
As different parts of cerebral cortex are activated during music stimulations, people can learn and keep information easier when they connect them with music. Wallace (1994) concluded that music does, indeed, contribute more than just rhythmical information to aid recall of information.
The links are stronger if they involve recent vivid engrossing, multisensory experience (Petty, 2009). Musical activities train the brain in aesthetic literacy and the students' perceptual, imaginative and visual abilities (Sinatra, 1986).
By using this poetic form students can remember the facts and right order of metabolites of the Kreb's Cycle correctly. As well enables students to apply the technique of the poetic form to answer questions and label a diagram of the Kreb's Cycle.

Materials and methods

- In cyclic representation ofKreb's cycle numbers are given to the metabolites e.g.1 to 13.
- These numbers are indicating metabolite (reactant) number 1 undergoes specific reaction and its product is metabolite number 2.
- For next reaction metabolite number 2 will become reactant and metabolite 3 is its product. Same process will continue till reaction number 13.
- Below cyclic representation in a separate box, reaction numbers and their type is mentioned.

- Author has put these 13 reactions in poetic form and taught to students along with explanation of oxidation, reduction and decarboxylation.

At the beginning of every lecture students uses to recall poetic form of Kreb's cycle (initially referencing through class note book, latter without referencing note book). Due to this students were encouraged to use their learning sensory organs.

While developing answer, first they are expected to draw cyclic representation. First point of answer could be reaction of metabolite number 1. Its reaction type must be noted from box below the cyclic representation. Second point of answer should be reaction of metabolite 2 and so on till reaction number 13. e.g. Pyruvic acid [3c] (1 st metabolite) undergo oxidative decarboxylation (1,8,9 Decarboxylation and 1,7,9,11,13 oxidation mentioned in box) and get converted to acetyl [2C].

Initialy Krebs's cycle was taught without using poetic form technique to the group of 42 students followed by test on same. Later same topic was taught by using poetic form technique followed by test.

Self-administered questionnaire was given to experimental group of 42 students to find out beneficiary capacity of kreb cycle poetic form with yes/no type answer.

Results and Discussion

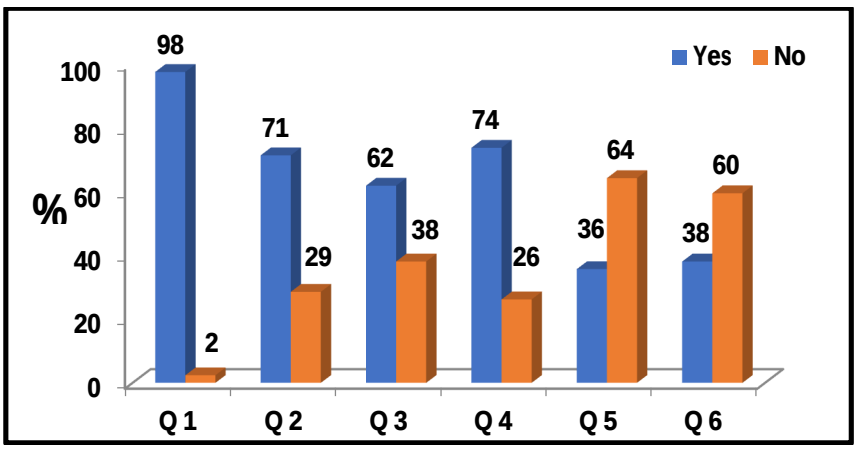


Fig. 1 Percent graphical representation of answers of questionnaire

98% students have reported that poetic form of kreb cycle was helpful for learning (Q1). 62% have recorded that they were able to produce answer by using poetic form (Q3) whereas 64% have recorded, they were unable to understand topic of kreb cycle taught without poetic form (Q5). 60% students were unable to produce answer of kreb cycle without poetic form (Q6). 71%

students found this poetic form interesting (Q2) and 74% feels joyful (Q4) after singing in beginning of every biology lecture. In special comments students have mention that they could save the time of learning and did smart work happily.

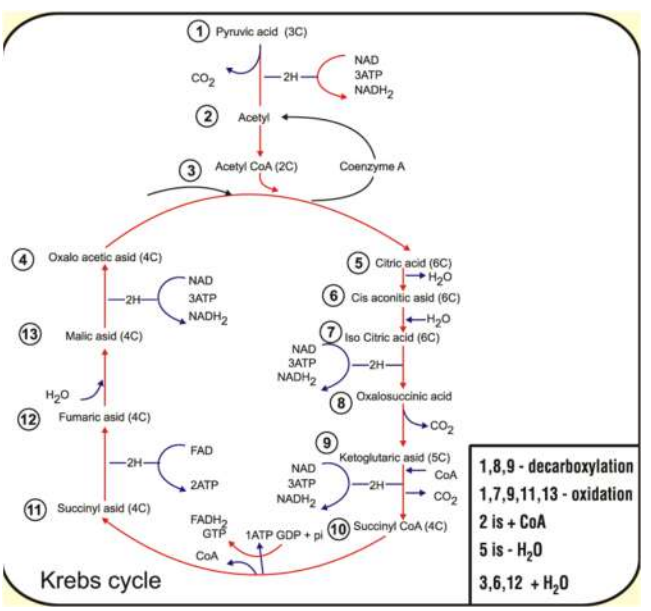
The pre-test mean score for the sample of 42 students was 1.2143 [SD = 0.5196]. The mean score for the post-test increased to 3.3571 [SD = 0.9324]. Paired samples t-test showed a significant improvement in post-test scores [t = 13.23, p = 2.021, df =41]. (The absolute value of the calculated exceeds the critical value , so the means are significantly different).

Poetic form had made remembering easier by making the process of conversion of short term memory into long term memory more efficiently (Yeoh M.**2013**). Author has used modelling of social learning theory of Bandura too (Bandura, 1977). Poetic form provided the vivid, engrossing, multisensory condition by which new knowledge was linked to existing knowledge and facilitated constructivism.

It also helps in balanced use of left and right brain and trains the brain in aesthetic literacy.

After teaching poetic form author had asked students to construct poetic forms on some other topics of biology. Students have constructed poetic forms on structure of antibody and V.S. kidney. By implying this we could encourage our students to acquire life skill of creative thinking.

H_2O



Conclusions

It has reduced complexity of biochemistry part and made it interesting. This poetic form produces highly focused learning state. Vocabulary and reading material is absorbed by students at great rate. It provides hook for recall. It achieves better teaching learning effect. It also reduces stress and mental exhaustion of learning difficult topics and makes biology enjoyable. It is tool not only for understanding but also cultivating potentials, wisdom, and personality along with good grades in exam.

References

1. Anderson CW, Sheldon TH, Dubay J (1990). The effects of instruction on collage non-majors' concepts of respiration and photosynthesis. J. Res. Sci. Teach., 27(8): 761 - 776.
2. Bahar M, Johnstone AH, Hansell MH (1999). Revisiting learning difficulties in biology. J. Biol. Educ., 33(2): 84-86.
3. Bandura, A. (1977). Social Learning Theory. New York: General Learning Press.
4. Cimer(2012), What makes biology learning difficult and effective: Students' views, Educational Research and Reviews Vol. 7(3), pp. 61-71,
5. Finley F, Steward L, Yaroch L (1982). Teachers' perception of important and difficult science content. Sci. Educ., 66(4): 531-538.
6. Forsyth DR, McMillan JH (1991). Practical proposals for motivating students, in RJ Menges, MD Svinicki (eds) (1991) New Directions in Teaching and Learning College Teaching: From Theoryto Practice, No. 45. San Francisco: Jossey-Bass.
7. Hebermayer, S. (2001). Pravamuzikazavašedete (preveo: MilošĐerić). Čačak: Gradex Trade
8. Johnstone AH, Mahmoud NA (1980). Isolating topics of high perceived difficulty in school biology. J. Biol. Educ., 14(2): 163 - 166.
9. Lazarowitz R, Penso S, (1992). High school students' difficulties in learning biology concepts. J.Biol. Educ., 26(3): 215-224.
10. Meyer, J. & Land, R. (2003) Threshold Concepts and Troublesome knowledge: Linkages to ways of thinking and practicing within the disciplines. Enhancing Teaching-Learning Environments in Undergraduate Courses. Occasional Report. 4, May.
11. Özcan N (2003). A Group of Students' and Teachers' Perceptions with Respect to Biology Education at High School Level, MA Dissertation, Middle East Technical University, Ankara, Turkey.
12. Petty, G. (2009). Evidence Based Teaching, 2nd Edition. Nelson Thornes: Cheltenham.

13. Seymour J, Longdon B (1991). Respiration-That's breathing isn't it? J. Biol. Educ., 23(3): 177-184
14. Sinatra, R. (1986) The Biology of Music Making: Proceedings of the 1984 Denver conference.
15. Tekkaya C, Özkan Ö, Sungur S (2001). Biology concepts perceived as difficult by Turkish high school students. Hacettepe Univ. J. Educ., 21: 145-150.
16. Tolman RR (1982). Difficulties in genetics problem solving. Am. Biol. Teach., 44: 525-527
17. Wallace, W. T. (1994). Memory for music: Effect of melody on recall of text. Journalof Experimental Psychology: Learning, Memory, & Cognition, 20, 1471-1485
18. Wood, E. J. (1990) Biochemistry is a difficult subject for both student and teacher. Biochemical Education, 18(4) 170-172.
19. Yeoh, M. (2013). musical mnemonics to facilitate learning of matriculation biology: the calvin cycle Paper presented at the National Convention of Teacher Education Division ('MembudayakanKecemerlangan Guru MelaluiAmalanTerbaik'), Ministry of Education, Malaysia

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY EDUCATIONAL RESEARCH
ISSN:2277-7881; IMPACT FACTOR :6.514(2020); IC VALUE:5.16; ISI VALUE:2.286
Peer Reviewed:VOLUME:9, ISSUE:4(1), APRIL :2020

AFTERMATHS OF SAND DREDGING ACTIVITY ON BENTHIC FAUNA OF VAITARNA RIVER, MAHARASHTRA, INDIA

Shilpa K. Patil – Bhonde
B.N. Bandodkar College
Thane, Maharashtra, India

R. P.Athalye
B.N. Bandodkar College
Thane, Maharashtra, India

Abstract
A study of the benthos from sand dredged environment in the Vaitarna River Vada, Maharashtra ,India included Physico -Chemical analysis of water and sediment at the Undredged (UD) and Dredged (D)sites of Vaitarna River. It showed that the water parameters were within permissible limits given by WHO except hardness. Continuous Sand dredging activity probably leads to leaching of salts which increased hardness of water at 'D' site and thus pH at 'D' site. Average pH was alkaline at both, UD and D site. Difference in average turbidity at D and UD sites was not statistically significant. High silicates were recorded at both sites. Sediment texture at UD and D site was sandy.Higher densities of meiobenthos and macrobenthos were noted at UD site suggesting adverse effect of dredging on faunna.Although Sand is required for thedevelopment of Human being, the threats to the environment posed due to sand dredgingcan't be ignored. Hence alternate solution needs to be found out by taking decisive steps so as to conserve Vaitarna River ecosystem.

Keywords: Sand Dredging**,** Meiobenthos, Macrobenthos,Vaitarna River, Physico-Chemical parameters

Introduction
There is world-wide concern about the effects of bottom-dredging on benthic communitiestrawling, dredging and digging usually remove bio-genic structures on the surface that are not easily replaced, such as mussel beds or banks of tube-dwellingpolychaetes, even when such elementsare not thetarget of the fisheries (Reise 1982; Roberts 1997; Service &Magorrian 1997; Hall 1999).Benthos cannot move around like fish so they are less able to escape the effects of sediment and other pollutants that diminish water quality. Therefore, benthos can give us reliable information on prevailing river water quality. This was also supported by Pearson & Rosenberg (1978), Paolo (2003), (Gray etal., 1992).The present paper discusses effect of sand dredging ondensity and diversity of Meiobenthos and Macrobenthos.

Materials &Methods

The present study was carried out during Oct 07 to Sep 09 at two sites of Vaitarna River –1) Dredged site (D) (Lat- 19°37'40.07"N Long- 73° 0'24.01"E) – where sand dredging was dominant activity. In rainy season the site was flooded with water but the flow reduced in dry period and water found accumulated in a large pit formed (due to dredging) having depth of approx. 12 feet. 2) Undredged site (UD)(Lat- 19°37'38.08''N Long- 73° 0'23.02''E). – Approximately 150 meters downstream to D site. It had rocky substratum and relatively shallow depth of approx. 5 feet. In dry period water level reduced significantlyleading to cutoff of UD site from D site.

Water& sediment samples were collected once in every month and analysis was performed as per the standard methods prescribed in standard methods (APHA,1985); Trivedi and Goel (1984) and Kodarkar (1992).Along with this biological analysis was done to study Meiobenthos and Macrobenthos. Surface soil samples (10 cm depth) were collected by using Metal scoop of 10 cm x 10 cm. The samples were collected and fixed in 1: 500 rose bengal formalin and preserved in a plastic container. In the laboratory the samples were passed through 2 sieves, first through 0.5 mm followed by 0.06mm sieve to separate the macrobenthos and collect the meiobenthos. The organisms collected were preserved in 10 % formalin (10ml of 40% formaldehyde made to 100 ml using filtered river water) and studied under microscope. Surface (10 cm depth) soil sample for macrobenthos were collected from the substratum with the help of 10 cm x 10 cm metal scoop. 5 scoops were randomly collected and pooled together. 10 % $MgCl_2$ was used to narcotize the macrofauna in the soil samples to prevent fragmentation. The sediment was then drained through a sieve of mesh size 0.5 mm. The fauna collected on the sieve was preserved in 10 % formalin prepared in river water.

Results and Discussion

ThePhysico chemical analysis showed Dredged site had lower values of salinity, BOD, PO_4-P, SiO_3-Si as compared to UD site whereas the water parameters like Temperature, $P^{H,}$ Light penetration, Total solids,Dissolved solids, Suspended solids,Turbidity and Hardness had higher values than UD site. The amount of dissolved oxygen at both the sites was within the optimum limit. Sedimentological studies showed sediment texture of river to be sandy with high percentage of sand and low percentage of silt + clay. Dredged site had more accumulation of sand which is highly demanded for construction purpose. Due to sandy nature of the sediment as well as low silt & clay, sediment organic carbon was low and sediments were not anoxic. Organic carbon showed positive correlation with turbidity, total solids and dissolved solids at both sites.

Table 1.Physico -Chemical analysis of water and sediment at the two sites of Vaitarna River.

Water	Undredged (UD)				Dredged (D)			
Parameters	**Min**	**Max**	**Avg**	**Sd**	**Min**	**Max**	**Avg**	**Sd**
Temperature 0 C	21	34	28.25	3.54989	23	34	29.46	3.050599
Light Penetration	21	100	63.4565	21.4242	15	114.5	66.7609	27.2208
Total Solids (mg/l)	40	3520	440.8	777.7	60	12660	831.8	2665
Dissolved solids (mg/l)	20	2060	295.4	486.6	20	9300	621.8	1965
Suspended solids (mg/l)	20	1460	145.41	309.86	20	3360	210	706.1
Turbidity (NTU)	0.0012	0.0564	0.0122	0.0124	0.002	0.065	0.012	0.013
P^H	6.15	9.36	8.03	0.8797	6.31	9.24	8.164	0.788
Salinity PPT	0.0346	0.1699	0.08571	0.0319	0.0346	0.1314	0.07992	0.0198
Dissolved Oxygen mg/L	5.2	10	7.426	1.295	5.6	9	7.469	1.033
BOD (mg/l)	0.8	13.6	6.0455	3.318	0.4	9.6	5.218	2.884
Hardness mg/L	70	142	107.56	15.19	76	180	122.2	26.84
Po 4-P mg/L	0.004	0.117	0.0291	0.0279	0.004	0.069	0.026	0.019
SiO3-Si mg/L	0.7	40.2	13.965	9.0355	4	31.8	12.85	10.13
NO3-N mg/L	0.017	0.555	0.1195	0.1394	0.017	0.6	0.129	7.77
Coarse Sand	71.6	100	88	9.8	53.44	99.93	83.19	16.21
Fine Sand	0	25.3	9.8	8.6	0.07	45.5	14.88	15.22
Silt+ Clay	0	7.9	2.1	2.1	0	9.815	2.28	2.76
Sediment Organic Carbon	0.05	1.27	0.37	0.43	0.06	1.43	0.40	0.46

Total meiobenthos density was 5102450 No/m^2 and 1676087 No/m^2 at UD & D site respectively. The range shown by meiobenthos was 9025 - 1679000Avg 231930± 360854at UD site and 2000-405000Avg 76185.8 ±108454 at D site. Total macrobenthos density was 1338000 No/m^2 and 698000No/m^2 at UD & D sites respectively. The range shown by Macrobenthos was 6000–342000 No/m^2Avg 60818 ± 75798.4 at UD site and 6000-208000 No/m^2Avg 31727.3±43675.4at D site.

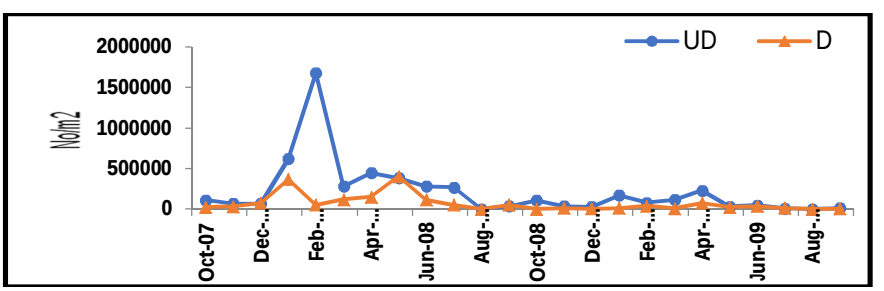


Fig.1 : Total Meiobenthos density at study sites UD and D

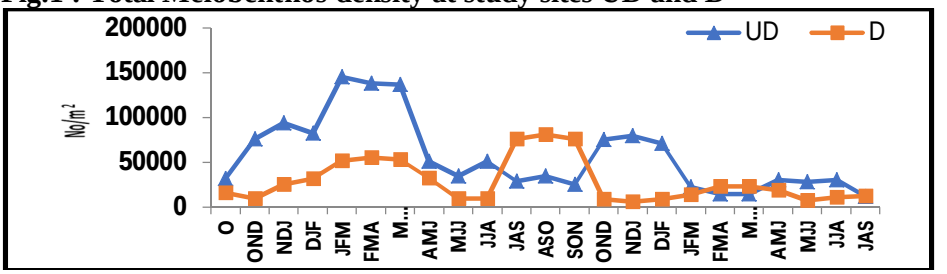


Fig 2 : Total Macrobenthos density at study sites UD and D (graph with the stabilized fluctuations by time series average of months)

In present study the higher density of Meiobenthos as well of Macrobenthos was noted at UD site as compared to D site. At D site the densities were comparatively low for the entire study period probably because of stress of sand dredging.There was decrease in the density of Meiobenthos as well of Macrobenthos in monsoon and post monsoon season. The populationdensity was the highest in summer season due to shallow waters and eutrophication. In case of Macrobenthos,D site showed high density in post monsoon season of 2008. During the other seasons density was low as sand dredging might have caused disturbance in their habitat.Difference between the average Meiobenthos densities at UD and D site was statistically significant at 5% level of significance but difference between density of macrobenthos at 'UD' and 'D' sites was statistically insignificant.

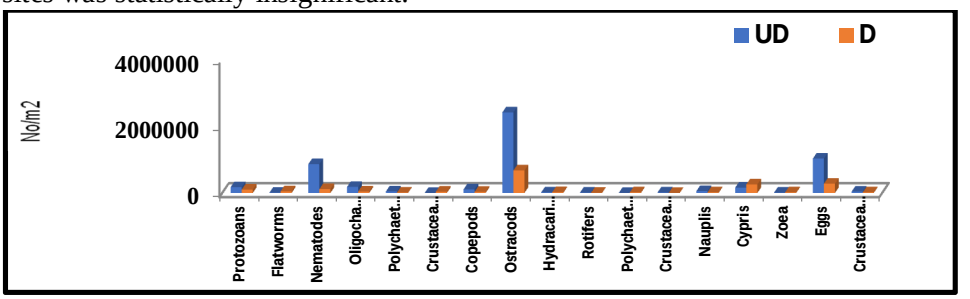


Fig 3 : Distribution of various types of Meiobenthos at UD and D site.

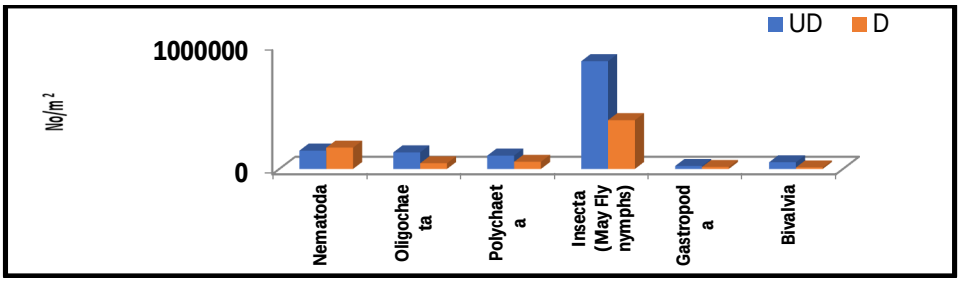


Fig 4: Distribution of various types of Macrobenthos at UD and D site.

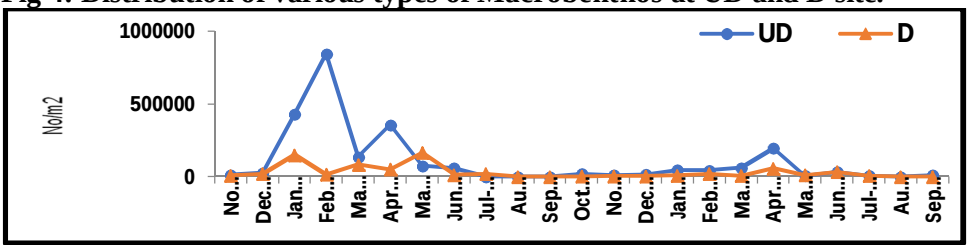


Fig. 5: Ostracod density at study sites UD and D

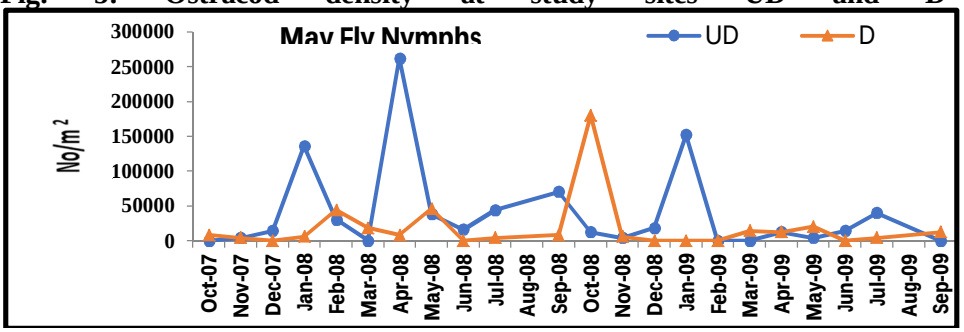


Fig.6: Monthwise May Fly Nymphs density at study sites UD and D

During present studies 165000 No/m^2 Ostracods were recorded at the D site whereas 844000 No/m^2 at UD site which were approximately five times higher than that of D site. Low density at D site was because of destruction in their habitat caused by sand dredging activity. This corroborates with the observations by Forshage and Carter (1974), Martin and Hess (1986), Nandan (2005), Brown et al., (1998); Roell(1999); Basavarajappaet al., (2014), Howard (1995).

Meiobenthos showed positive correlation with hardness (r = 0.688), salinity(r = 0.636) and light penetration (r = 0.451) at 'D' site where as they did not show any significant correlation at 'UD' site.During present studies the number of May fly nymphs ranged between 0 - 262000No/m^2 Avg 39545± 64707 at UD site and 0 - 180000No/m^2 Avg17909 ± 38369 at D site thus approximately

double density at UD site as compared to D site.The less number of may fly nymphsat UD site was probably due to disturbance caused by dredging leading to destruction of the habitat. Nematodes ranged between 0 - 24000No/m^2 Avg 6727 ± 7497 at UD site and 0 - 36000No/m^2 Avg 7818 ± 7853 at D site. The Nematode density was higher at D site as compared to UD site. They dominated D site during summer season probably due to following three main factors -- (1) The burrowing capacity in combination with their small and slender shape, allowing the occupation of interstitial spaces in coarse grained sediments as well as the invasion of soft sediments. (2) Their tolerance, as a taxon, to a variety of environmental stresses. (3) The diversification in buccal structures, enabling nematodes to exploit a broad range of food items present in the benthos.
The Oligochaetes followed the nematodes in abundance and were ranged between 0 - 48000 No/m^2 Avg 6090 ± 11169 at UD site and 0 - 10000 No/m^2 Avg 2090 ± 2723 at D site. The maximum density of oligochaetes was recorded in the month of Apr 08 at UD site. Macrobenthosshowed positive correlation with temperature (r = 0.461) and P^H(r = 0.466) at 'D' sitewhere as they did not show any significant correlation at 'UD' site.

Table 2 Indications of different Indices

H	Λ	N1	N2	R1	R2	R3
1<H<3 = Moderate pollution	Number (λ) increses,	Numb er of	Number of	Number (R1) increses,	Number (R2) increses,	Number of species
H<1= severe pollution	Diversity decreses	Abun dant	most abundan t	Diversity increses	Diversity increses	Per
H>3 = Clean water	and vice versa	Specie s	species			Thousand Organisms

According to Fig 7, Indices for Meiobenthos showed that R3 (UD 0.004-0.222 ± 0.068, D 0.016-0.5±0.138) were more at D site whereas N1(UD 0.253- 5.153 ± 1.4395628, D 1-7.696±1.8885503), N2(UD 1.358- 4.794± 0.9319341, D 1-5.312± 1.358557461), H(UD 0.522- 1.64± 0.3515331, D 0-2.041± 0.617428454), λ(UD 0.209- 0.737± 0.1525663, D 0.188-1± 0.2739554), R1(UD 0.22- 1.694± 0.4843913, D 0-2.176± 0.6611101), R2(UD 0.004- 0.039± 0.0096754, D 0.007-0.048± 0.0108843) indicated more diversity at UD site. Thus all indices did not indicate UD site to be more diverse for Meiobenthos as compared to D site. However except R3 the other indices did not have significant difference in the two sites UD and D.

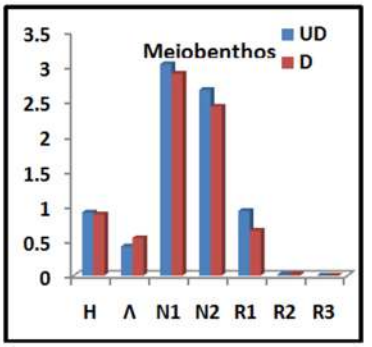


Fig 7 Diversity indices of Meiobenthos at UD andD site

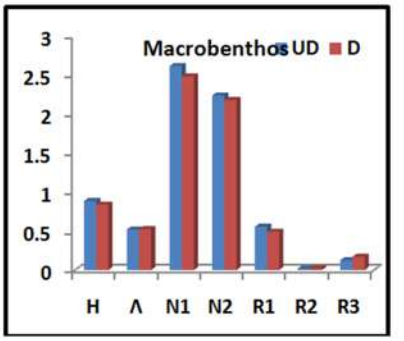


Fig 8 Diversity indices of Macrobenthos at UD and D site

R2 (UD 0.004- 0.04± 0.0094149, D 0.009-0.034± 0.0061053) and R3 (UD 0.009- 0.333± 0.0944007, D 0.019-0.375± 0.0792402) indicated more diversity at D site for Macrobenthos. The other indices N1 (UD 1- 4.456± 1.0004782, D 1-4.779± 4.779), N2 (UD 1- 4.001± 0.879199, D 1-4.592± 0.82363156), H (UD 0- 1.494± 0.4060003, D 0-1.564± 0.392896142), λ (UD 0.25- 1± 0.2067694, D 0.218-1± 0.2056541), R1 (UD 0- 0.951± 0.2591959, D 0-0.893± 0.257436)showed more diversity of Macrobenthos at UD site. However comparative differences between the indices at UD site and D site were not statistically significant suggesting both the sites not significantly different from each other.

Conclusions

The effects of long term dredging range from minimal disturbance to significant changes in community structure, persisting over many years. Some recent evidence from the United Kingdom, part of the North Sea, suggests that recovery periods can be prolonged i.e. >7 years especially where sites have been dredged repeatedly at high intensities (Cooper et al., 2005). Thus regular dredging activity at D site must have adversely affected the benthic fauna. Sediment texture of Vaitarna River at UD and D site was sandy.Both sites showed low percentage of silt and clay. Organic carbon percentage was low due to the presence of larger fraction of sand with less silt and clay.Vaitarna River showed healthy status with reference to sediment organ carbon contents. Though dredging had some deteriorating effect on water parameters, they remained within permissible limits.Higher density of meiobenthos & macrobenthos was noted at UD.Ostracods andthe May fly nymph dominated at both UD and D sites.Presence of May fly nymph indicated the UD and D sites having good quality water.D site showed less number of may fly nymph as

compare to UD site due to destruction of habitat during sand dredging activity. Sand dredging activity adversely affected meiobenthos& macrobenthos density and diversity.The results showed that the impact of sand dredging was confined to the dredged site.Cut off of UD site from D site during summer due to pit formation at D site is alarming sign for riverine ecosystem.For restoration of this ecosystem there should be some alternatives like crusher sand and adulterated sands. Adulterated sand is a mixture of sand from river and estuary can be freely used for the construction. Also "crusher dust" produce by Crushing rock provides a potential alternative to river sand.

References

1. APHA, AWWA, WPCF, (1981) International standard methods for the examination of water and waste water. 15th edition Washington DC. 874 pp
2. APHA: (1985) Standard Methods for the examination of water and waste water , 15th edition. APHA, New York, USA.
3. Basavarajappa H.T, Manjunatha M.C, Jeevan I (2014)Sand mining, management and its environmental impact in Cauvery and Kabini river basins of Mysore district, Karnataka, India using geomatics techniques, International Journal of Civil Engineering and Technology (ijciet), issn 0976 – 6308 (print), ISSN 0976 – 6316(online), volume 5, issue 9, pp. 169-180
4. Brown, A.V., Lyttle M.M., and Brown K.B. (1998), Impacts of gravel mining on gravel bed streams. Transactions of the American Fisheries Society 127:979–994.
5. Forshage, A., and N. E. Carter.(1974), Effects of gravel dredging on the Brazos River. Proceedings of the Annual Conference Southeastern Association of Game and Fish Commissioners 27(1973):695–709.
6. Gray, J. S., Mclntyre, A. D. and Stirn, J., 1992. Manual of methods in aquatic environment research.Part 11.Biological assessment of marine pollution with particular reference to benthos.FAO Fisheries Technical Paper., 324: pA9.
7. Hall, S.J. (1999) The Effects of Fishing on Marine Ecosystems and Communities. Blackwell Science, Oxford, UK.
8. Howard, H. (1995), Bouie River Study, Hattiesburg, MS. US EPA, Science and Ecosystem Support Division, Athens, Georgia.
9. Kodarkar M. S. (1992) Methodology for water analysis.Physico-chemical, biological and microbiological.I.A.A.B.Publication.Hyderabad Publication 2.pp: 50.
10. Martin, C. R., and T. B. Hess. 1986. The impacts of sand and gravel dredging on trout and trout habitat in the Chattahoochee River, Georgia.

Georgia Department of Natural Resources, Game and Fish Division, Project F- 26–13, Atlanta.
11. Nandan, S.B. (2005) River ecology and its bioresources, Proceedings of workshop-cumtrainingon River Management, Centre for Earth Science Studies, Thinivananthapuram.
12. Paolo Magni. 2003. Biological benthic tool as indicator of coastal marine ecosystemhealth. Chemistry and Ecology.,19(5): 363-372.
13. Reise, K. (1982) Long-term changes in the macrobenthic invertebrate fauna of the Wadden Sea: are polychaetes about to take over? Netherlands Journal of Sea Research, 16, 29-36.
14. Roberts, C.M. (1997) Ecological advice for the global fisheries crisis. Trends in Ecology and Evolution, 12, 35-38.
15. Roell, M.J. 1999. Sand and gravel mining in Missouri stream systems: aquatic resource effects and management alternatives. Executive Summary. Missouri Department of Conservation,Columbia.
16. Rosenberg D.M, Resh V.H. (eds.) (1993).Freshwater Biomonitoring and Benthic Macroinvertebrates. Chapman & Hall, New York. ISBN: 0-412-02251-6. x, 488pp.
17. Service, M. &Magorrian, B.H. (1997) The extent and tempo-ral variation of disturbance to epibenthic communities in Strangford Lough, Northern Ireland. Journal of the Marine Biological Association of the United Kingdom, 77, 1151- 1164.
18. Trivedy, R. K. and Goel, P.K. (1984) Chemical and Biological methods for water pollution studies.Environmental Publ., Karad, India, pp; 122.

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY EDUCATIONAL RESEARCH
ISSN:2277-7881; IMPACT FACTOR :6.514(2020); IC VALUE:5.16; ISI VALUE:2.286
Peer Reviewed:VOLUME:9, ISSUE:4(1), APRIL :2020

MICROWAVE DIELECTRIC PROPERTIES OF AQUEOUS SOLUTION OF POLYMERS USING TIME DOMAIN TECHNIQUE

M.B. Swami
Department of Physics and
Electronics, M. U. Mahavidyalaya
Udgir, Udgir, (MS), India

P.G. Hudge
Department of Physics
S.I.C. E.S. Degree College
Ambarnath (W) (MS), India

A.C. Kumbharkhane
School of Physical Sciences
S.R.T. M. University, Nanded (MS), India

Abstract
The time domain reflectometry technique was used to evaluate Microwave dielectric properties of polymers (2,3-butanediol, 1,2,4-butanetriol, 1,2,5-pentanetriol, 1,2,6-hexanetriol) in the frequency range of 10 MHz to 30 GHz at different temperature. The complex permittivity spectra for 1,2,4-butanetriol, 1,2,5-pentanetriol, 1,2,6-hexanetriol were fitted in Cole-Davidson model using non - linear least square fit method. The dielectric parameter such as, static dielectric constant and relaxation time has been determined for 2,3-butanediol, 1,2,4-butanetriol, 1,2,5-pentanetriol, 1,2,6-hexanetriol. The hydrogen bonding interactions for the aqueous solution of 1,2,6-hexanetriol have been discussed through the determination of Kirkwood Correlation factor.

Keywords: Complex permittivity; Dielectric relaxation; Kirkwood Correlation factor, Time domain reflectometry.

Introduction

The microwave dielectric properties of a material such as dielectric constant, dielectric loss, relaxation time have provided an insight into the structure of the molecules of the system. The molecular interaction through hydrogen bonds in molecular complex liquids results in different dynamical properties. In liquids, the molecule has rotational freedom and its dispersion occurs at high frequency. Hence studying the dielectric properties at high frequency will reveal the dielectric relaxation of polar molecules and polymers and its variation with respect to the interaction with the neighbouring molecules.

The time domain reflectometry (TDR) is one of the major dielectric measurement technique and provides constructive information regarding the molecular complex formation in solution [1]. The hydrogen bounded water molecule has permanent dipole moment and dielectric relaxation of pure water

is of the Debye type [2]. Therefore the dielectric relaxation spectroscopy (DRS) is normally applied to the systems in which hydrogen bonds play an important role such as aqueous solutions [3].

Alcohols are compounds in which hydroxyl (-OH) group is attached to waterlogged hydrogen atom. The hydroxyl groups are classified as monohydric, dihydric, trihydric and polyhydric alcohols. Polyhydric alcohols are the hydrogen bonding liquids, where each molecule having two or more –OH groups. The O-H bond in alcohol is highly polar, because oxygen is highly electronegative. The polarity of O-H bond gives rise to attraction of partially positive hydrogen atoms of other molecules. Due to this, hydrogen bonding requires a great agreement of energy in the form of heat to overcome these attractive forces. In general, polyhydric alcohols exhibit the glass transition at temperature (Tg) relatively higher than those of usual molecular liquids with similar molecular size [4].

2,3-butanediol, 1,2,4-butanetriol, 1,2,5-pentanetriol and 1,2,6-hexanetriol are the polyhydric alcohols, which consists of linear chain with OH groups attached to every carbon atoms with aliphatic form. The molecular structure of 2,3-butanediol, 1,2,4-butanetriol, 1,2,5-pentanetriol and 1,2,6-hexanetriol is as shown in Fig. 1(a, b, c & d)

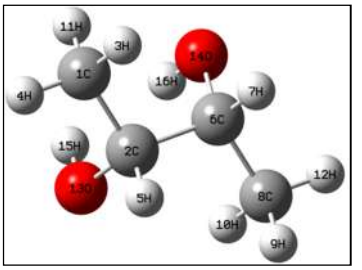


Fig. 1a The molecular structure of 2,3-butanediol

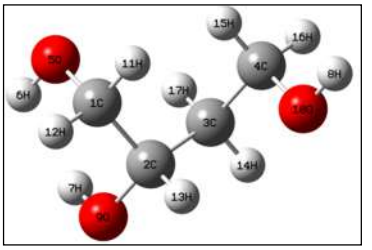


Fig. 1b The molecular structure of 1,2,4-butanetriol

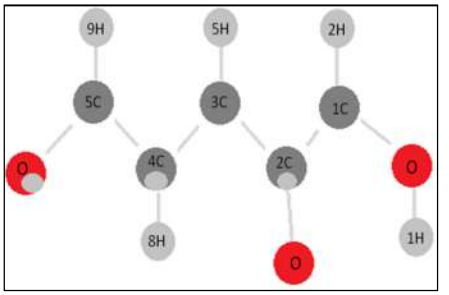


Fig. 1c The molecular structure of 1,2,5-pentanetriol

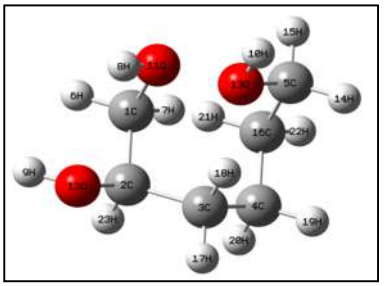


Fig. 1d The molecular structure of 1,2,6-hexanetriol

In the study of dynamics of hydrogen bonding polyhydric alcohols, dielectric relaxation spectroscopy is one of the commanding techniques [4, 5]. The dielectric properties of polyhydric alcohols have attracted the attention of many workers [4–6].

The objective of this work is to study dielectric relaxation behavior of the 2,3-butanediol, 1,2,4-butanetriol, 1,2,5-pentanetriol and 1,2,6-hexanetriol. Also to investigate the orientation of dipoles in the binary mixture of 1,2,6-hexanetriol-water mixtures over the frequency range of 10 MHz to 30 GHz using the TDR technique.

Experimental method

The 2,3-butanediol, 1,2,4-butanetriol, 1,2,5-pentanetriol and 1,2,6-hexanetriol was obtained commercially from Merk Chemical Limited and was used without further purification. Temperature of the sample was controlled electronically within ±1°C. The water used in the preparations of mixtures was obtained by double distillation procedure.

Tektronix model no. DSA8200 Digital Serial Analyzer sampling mainframe along with the sampling module 80E08 has been used for the TDR. A repetitive fast rising voltage pulse with 18ps incident rise time was fed through coaxial

line system of impedance 50 ohm. All measurements are carried out in open load condition. Sampling oscilloscope monitors changes in step pulse after reflection from the end of line. Reflected pulse without sample $R_1(t)$ and with sample Rx(t) were recorded in time window of 5ns and digitized in 2000 points. The nature of the reflected pulses with and without sample for 1,2,4-butanetriol, 1,2,5-pentanetriol and 1,2,6-hexantriol are as shown in Fig. 2(a, b and c).

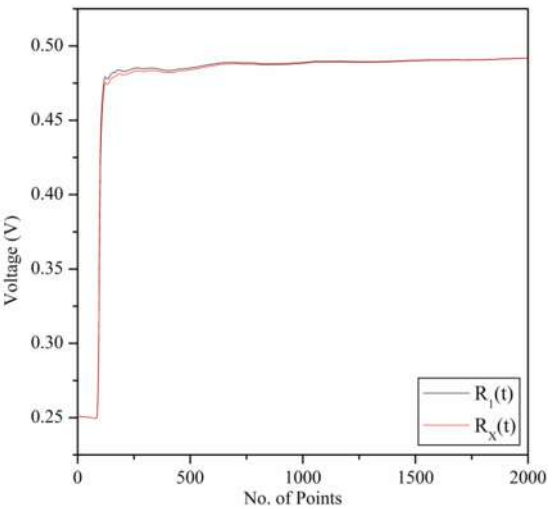


Fig. 2a Reflected pulses without sample [$R_1(t)$] and with sample [$R_X(t)$] of 1,2,4-butanetriol

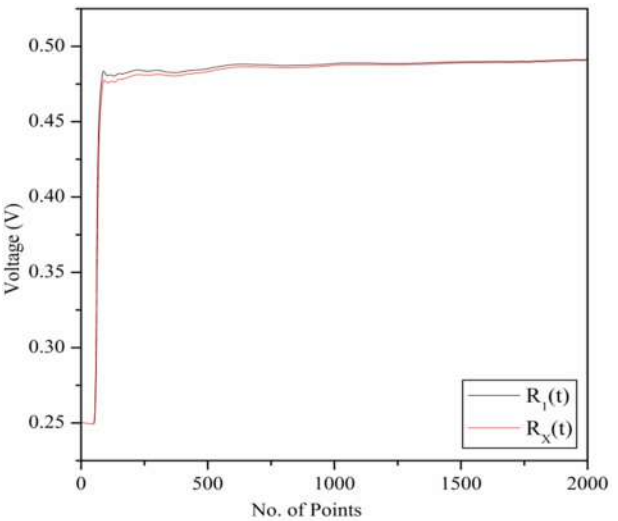


Fig. 2b Reflected pulses without sample [$R_1(t)$] and with sample [$R_X(t)$] of 1,2,5-pentanetriol

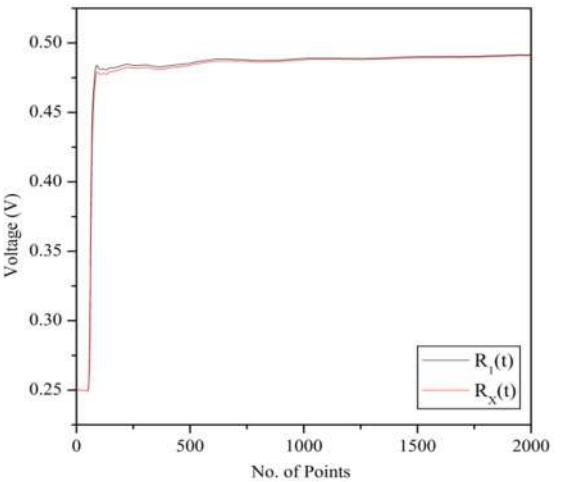


Fig. 2b Reflected pulses without sample [$R_1(t)$] and with sample [$R_X(t)$] of 1,2,6-hexanetriol

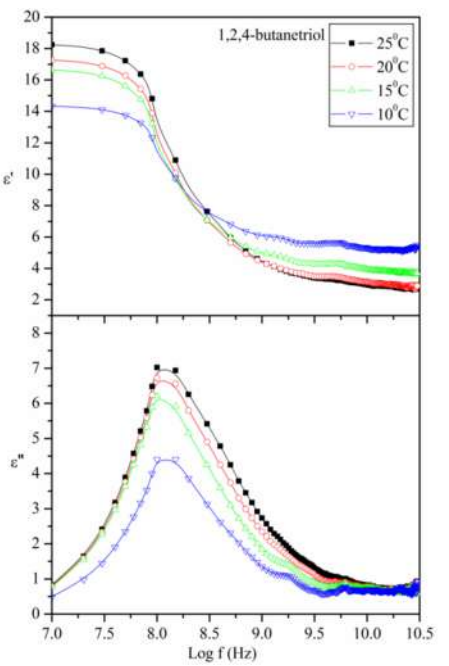


Fig. 3a Temperature dependant Complex permittivity spectra (ε′ & ε″) of 1,2,4-butanetriol

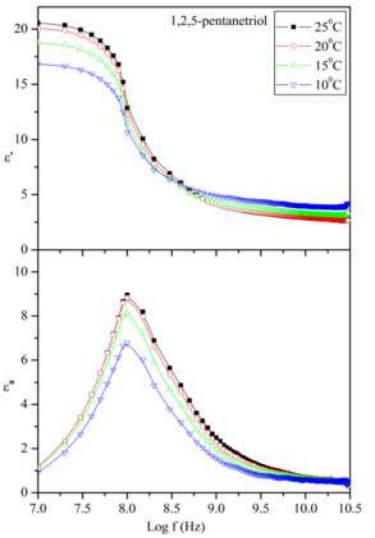


Fig. 3b Temperature dependant Complex permittivity spectra (ε′ & ε′′) of 1,2,5-pentanetriol

The recorded pulses are added [$q(t) = R_1(t) + R_X(t)$] & subtracted [$p(t) = R_1(t) - R_X(t)$]. Further, the Fourier transformation of p(t) & q(t) was obtained by Summation and Samulon [7-8] methods respectively, for the frequency range 10 MHz to 30 GHz.

The complex reflection spectra were determined as follows,

$$\rho^*(\omega) = \left(\frac{c}{j\omega d}\right)\left[\frac{p(\omega)}{q(\omega)}\right]$$

where $p(\omega)$ & $q(\omega)$ are Fourier transforms of p(t) and q(t) respectively, c is the speed of light, ω is the angular frequency, d is the effective pin length and j= $\sqrt{-1}$.

The Complex permittivity spectra $\varepsilon^*(\omega)$ was obtained from reflection coefficient $\rho^*(\omega)$ by applying calibration method as described earlier [9].

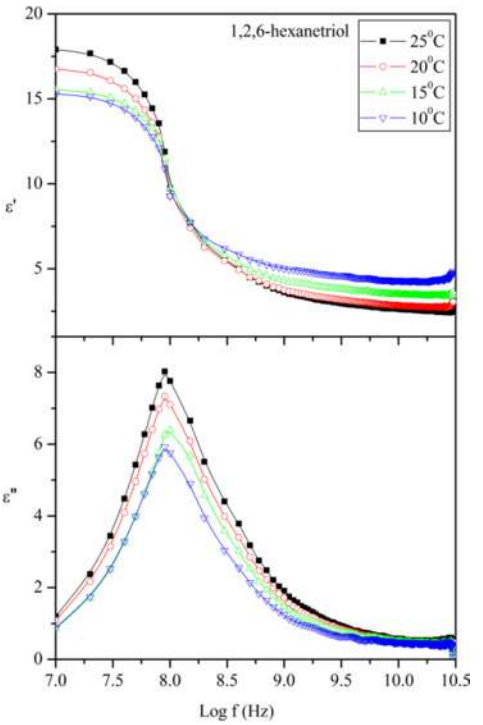


Fig. 3c Temperature dependant complex permittivity spectra (ε′ & ε′′) of 1,2,6-hexanetriol

Result and discussion

The temperature dependant complex permittivity spectra of 1,2,4-butanetriol, 1,2,5-pentanetriol and 1,2,6-hexanteriol is as shown in Fig. 3(a, b and c). It is observed that at the relaxation frequency of the real part ε′(ω) of complex permittivity spectrum of triols decreases with increase in the frequency. It is due to the less effect of applied field which has been cancelled by the dipoles.

The value of dielectric loss (ε''_{max}) peak goes lower with decreasing temperature. The complex permittivity spectra were fitted in Havriliak-Negami(HN) equation using non-linear least squares fit method to extract dielectric relaxation parameters with the following expression [10].

$$\varepsilon^*(\omega) = \varepsilon_\infty + \frac{\varepsilon_0 - \varepsilon_\infty}{[1+(j\omega\tau)^{1-\alpha}]^\beta} \quad (2)$$

where ε_0 is the static dielectric constant, ε_∞ is the permittivity at high frequency, τ is the relaxation time in pico-second. The exponents α and β describes the

irregularity and broadness of the corresponding spectra, α and β are empirical parameters for distribution of relaxation times with values between 0 and 1. Havriliak–Negami relaxation is an empirical modification of the Debye relaxation model, accounting for the irregular and broadness of the dielectric dispersion curve. The model was used to describe the dielectric relaxation of some polymers [10] by adding two exponential parameters to the Debye equation.

The HN equation includes three relaxation models.

i) The Debye model [11, 14] ($\alpha = 0$ and $\beta = 1$) shows the single relaxation whereas,

ii) The Cole–Cole [12] ($0 \leq \alpha \leq 1$ and $\beta = 1$) model assumes a continuous probability distribution for the time constant of relaxation. The time constant of relaxation represents the period of the frequency where the highest relaxation occurs.

iii) The Cole–Davidson [13] ($\alpha = 0$ and $0 \leq \beta \leq 1$) models which suggests the symmetric and asymmetric distribution of relaxation times.

In this study the complex permittivity spectra of triols shows Cole–Davidson behaviour. Therefore the complex permittivity spectra $\varepsilon^*(\omega)$ were fitted in CD model using non-linear least squares fit method to determine the dielectric relaxation parameters. Here α is kept to be zero and β is varied upon such that $0 \leq \beta \leq 1$.

The values of dielectric parameters (ε_0, ε_∞, τ and β) at 25^0C for 2,3-butanediol, 1,2,4-butanetriol, 1,2,5-pentanetriol and 1,2,6-hexanetriol have been reported in Table 1a. The dielectric relaxation parameters for 1,2,6-hexanetriol-water mixtures also reported in Table 1b. From Fig. 2(a, b, and c) it is interesting to note that the relaxation time (τ) of triols increases with decreasing temperature. This is due to the size of the molecular chain and structure of hydrogen bonding. The temperature dependant study of 1,2,4-butanetriol, 1,2,5-pentanetriol and 1,2,6-hexanetriol indicates that the polymeric form in triols is more dominant and the hydrogen bonding is also stronger than the other alcohols.

Table 1a. The dielectric relaxation parameters for 2,3-butanediol, 1,2,4-butanetriol, 1,2,5-pentanetriol and 1,2,6-hexanetriol at 25^0C.

Polymers	□₀	□(ps)	□□	**β**
2,3-butanediol	21.26(10)	583.62(8)	2.21(1)	0.988(5)
1,2,4-butanetriol	18.24(14)[a]	957.88(20)	2.86(1)	0.836(6)[b]
1,2,5-pentanetriol	21.97(18)	1221.88(20)	2.85(2)	0.881(7)
1,2,6-hexanetriol	19.30(19)	1470.54(34)	2.58(2)	0.884(8)

Numbers in bracket denotes uncertainties in the last significant digits obtained by the least square fit method.

e.g. [a]18.24(14) means 18.24±0.14 and [b]0.836(6) means 0.836±0.006

Table 1b. Dielectric relaxation parameters: a) Dielectric constant (ε_0), b) high frequency permittivity (ε_∞), b) relaxation time (τ), for 1,2,6-hexantriol+water mixture at 25^0C.

V_w	ε_0	ε_∞	τ(ps)
0.000	19.22(5)	2.50(1)	1360.05(12)
0.060	23.15(10)	2.37(2)	1173.96(23)
0.130	29.51(17)	2.46(3)	566.21(14)
0.258	38.42(15)	2.35(2)	201.34(12)
0.372	45.36(16)	2.47(3)	107.83(10)
0.570	52.83(7)	1.74(3)	31.50(12)
0.742	66.19(1)	2.05(1)	17.92(19)
1.000	78.32(2)	1.98(2)	8.21(17)

Kirkwood correlation factor

In general, static dielectric constant decreases with increase in the number of carbon atoms. To understand the significance of association effect due to the hydrogen bonding, it is useful to compute the values of Kirkwood correlation g in these systems using the following expression [14, 15].

(3)
$$\frac{(\varepsilon_0 - \varepsilon_\infty)(2\varepsilon_0 + \varepsilon_\infty)}{\varepsilon_0(\varepsilon_\infty + 2)^2} = g\mu^2 \frac{4\pi N\rho}{9\kappa TM}$$

where μ, ρ and M correspond to the dipole moment in gas phase, density and molecular weight, respectively, k is the Boltzmann constant and N the Avogadro's number. The Kirkwood correlation factor 'g' explains the short-

range interaction between electric dipoles and gives information regarding orientation of electric dipoles in polar liquids.

In pure liquid state, the values of Kirkwood correlation factor g are greater than unity which shows that there are large multimers with parallel dipole moment. For the polyhydric alcohols, the dipole moment of the whole molecule is not applicable because each OH group can rotate individually. Therefore, the dipole moment of an OH group (rather than the whole molecule) is chosen as μ [4]. In this study μ = 1.69D is used for the dipole moment of an OH group [16]. The values of ε_∞ are taken from the fitting data.

The Kirkwood correlation factor for 2,3-butanediol, 1,2,4-butanetriol, 1,2,5-pentanetriol and 1,2,6-hexanetriol at 10^0C 15^0C 20^0C and 25^0C are reported in Table 2. It can be seen that the values of g decreases with decreasing temperature. These results indicate that the hydrogen-bond formation becomes probable with decreasing temperature. The results observed are agreed with Shirgire et.al. [17]. The Kirkwood correlation factors for 1,2,6-hexanetriol-water mixtures at 25^0C are reported in Table 3. The observed values of g are greater than one for 1,2,6-hexanetriol-water mixtures which leads to the conclusion that the molecules associate to form a multimers and also confirms the net change in dipolar ordering of the mixture constituents due to H-bond complexation.

Table 2. Kirkwood correlation factor for 2,3-butanediol, 1,2,4-butanetriol, 1,2,5-pentanetriol and 1,2,6-hexanetriol

System	g			
	25^0 C	20^0 C	15^0 C	10^0C
2,3-butanediol	2.78(17)	2.33(34)	2.23(19)	1.99(10)
1,2,4-butanetriol	2.36(14)	2.18(13)	2.06(12)	1.78(11)
1,2,5-pentanetriol	2.87(17)	2.75(16)	2.52(15)	2.34(14)
1,2,6-hexanetriol	2.50(15)	2.29(14)	2.18(13)	1.99(12)

Table 3. Kirkwood correlation factor for 1,2,6-hexanetriol-water mixtures at 25^0C.

Vol. frac. of Solute	g
0.00	2.82
0.06	2.45
0.13	2.13
0.26	2.07

0.37	1.80
0.57	1.74
0.74	1.61
1.00	1.64

Conclusions

The dielectric complex permittivity spectra 1,2,4-butanetriol, 1,2,5-pentanetriol and 1,2,6-hexanetriol have been studied in the microwave frequency range(10MHz to 30GHz) using time domain reflectometry technique. Using Havriliak-Negami equation, microwave dielectric properties of 2,3-butanediol, 1,2,4-butanetriol, 1,2,5-pentanetriol, 1,2,6-hexanetriol and for 1,26-hexanetriol-water mixtures have been carried out. The temperature dependant Kirkwood correlation factor is greater than unity and shows that in 1,2,6-hexanetriol-water mixture forms multimers with a parallel ordering of their dipole moment. The work has provided extensive dielectric data for the systems considered and a through qualitative and quantitative analysis is carried out. This has created new understanding in aqueous solution of polymers. For future works, a variety of polymers (such as polyhydric alcohols, biopolymers) could be examined to test the generality of the results presented here.

Acknowledgement

The Department of Science and Technology (DST), New Delhi, is thankfully acknowledged (Project No. SR/S2/LOP-25/2007). We are thankful to Prof. S.C Mehrotra, Department of Computer Science, Dr. B.A.M. University, Aurangabad for fruitful discussion. Authors are also thankful to School of Physical Sciences, Swami Ramanand Teerth Marathwada University, Nanded, for availing the laboratory facility.

References

[1] Hudge P. G., Kumbharkhane A. C. (2012): SRTMU's Res. J. Sci., Picosecond Time Domain Reflectometry Technique for Dielectric Relaxation Study, 42..

[2] Kanse K. S., Chavan S. D., Kumbharkhane A. C., Mehrotra S. C. (2006): J. Indian Chem. Soc., Dielectric relaxation of dioxane-water mixtures using time domain technique, 168.

[3] Sato T., Buchner R. (2005): J. Mol. Liq., Cooperative and molecular dynamics of alcohol/water mixtures: The view of dielectric spectroscopy, 23.

[4] Masahiro N and Ryusuke N (2010): J. Phys. Rev., 041501.

[5] Lunkenheimer P, Pimenov A, Dressel M, Goncharov Yu G, Böhmer R and Loidl A (1996): Phys. Rev. Lett., 318.
[6] Zhuravlev V I, Lifanova N V and Usacheva T M (2005): J. Mol. Liq., 107.
[7] Shannon C E (1949): Proc. IRE., 10.
[8] Samulon H A (1951): Proc.IRE. 175.
[9] Cole R H, Berberian J G, Mashimo S, Chryssikos G, Burns A and Tombari E, (1989): J. Appl. Phys., 793.
[10] Havriliak S and Negami S (1966): J. Polymer Sci. C, 99.
[11] Debye P (1929): Polar Molecules: The Chemical Catalogue Company. New York.
[12] Cole K S and Cole R H, (1941): J. Chem. Phys. 341.
[13] Davidson D W and Cole R H (1995): J. Chem. Phys., 1484.
[14] Kirkwood J G (1939), J. Chem. Phys., 911.
[15] Kumbharkhane A C, Helambe S N, Doraiswmay S and Mehrotra S C (1993): J. Chem. Phys., 99, 2405.
[16] Maruzen I Y (2004): Handbook of Chemistry: Pure Chemistry 5th ed., Tokyo.
[17] Shirgire S D, Hudge P G and Kumbharkhane A C (2012): Phy. Chem. of Liq., 50, 316.

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY EDUCATIONAL RESEARCH
ISSN:2277-7881; IMPACT FACTOR :6.514(2020); IC VALUE:5.16; ISI VALUE:2.286
Peer Reviewed:VOLUME:9, ISSUE:4(1), APRIL :2020

NOVEL METHOD FOR SYNTHESIS OF NON-STEROIDAL ANTI-INFLAMMATORY DRUG- A GREEN APPROACH

Rathod Kalpana R
Associate Professor
Department of Chemistry Satish Pradhan Dnyanasadhana College
University of Mumbai, Mumbai

Banerjee Shivani P
Associate Professor
Department of Chemistry Satish Pradhan Dnyanasadhana College
University of Mumbai, Mumbai

Mayur Bhamare
Department of Chemistry
Satish Pradhan Dnyanasadhana College
University of Mumbai, Mumbai

Abstract
Worldwide demand for environmentally friendly chemical processes and products requires the development of novel and cost-effective approaches to pollution prevention. Organic synthesis under solvent free condition has been evinced in the past two or three decades. Microwave assisted reactions are more efficient in terms of time and purity. Aspirin is one of the most commonly used non-steroidal anti-inflammatory drug. An attempt is made to carry microwave assisted synthesis of aspirin. Yields obtained are compaired with the conventional methods. Purity were further confirmed by TLC, melting point and spectral data analysis

Key Words: Microwave, Greener synthesis, Yields, Environmentally benign process and Aspirin

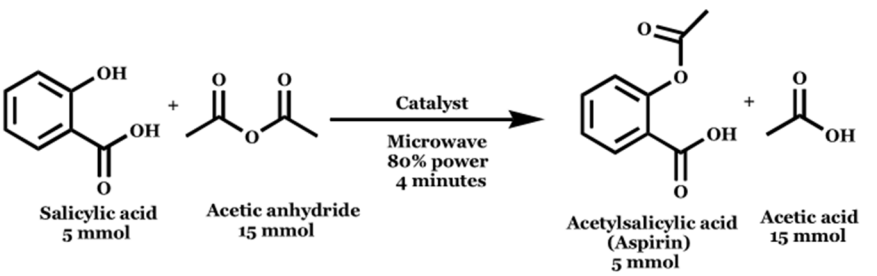
Introduction
Aspirin is one of the most commonly used drugs for treating mild to moderate pain, migraines, and fever.Common uses include headaches, period pains, colds and flu, sprains and strains, and long-term conditions, such as arthritis. For mild tomoderate pain, it is used alone. For moderate to severe pain, it is often used along with other opioid analgesic and NSAIDs. Aspirin's popularity grew over the first half of the twentieth century leading to fierce competition with the proliferation of aspirin brands and products.Now we used the aspirin which is less irritating to stomach than salicylic acid. It is most widely used drug in world today. It is non-steroidal anti-inflammatory drug (NSAID).It inhibits platelet aggregation and prolongs bleeding time. The melting point range of pure aspirin is 138-140^{0}C and the melting point range of the salicylic acid is 158-161^{0}C. Present work is carried out onmicrowave assisted synthesis of

aspirin. Yields obtained are compaired with the conventional methods. Purity were further confirmed by TLC, melting point A microwave oven is an electric appliance with magnetron component. However this household appliance have been successfully used in organic chemistry synthesis as means carrying out reactions more efficiently in terms of reaction time and purity.

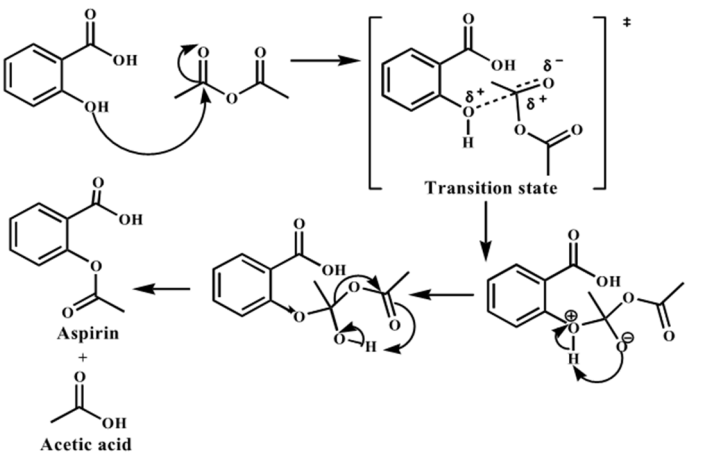
In this synthesis the microwave is used as energy source. To study the effect of microwaves on the catalysis of aspirin synthesis in term of reaction time, purity, yield. The effect of microwave are observed in reactions that are solvent-free. These reactions are carried out due to ecological and economical reasons.

The reaction mechanism for synthesis of aspirin under microwave condition **without catalyst**.

Reaction:-



Mechanism :-



Material and methods

Salicylic Acid, Acetic Anhydride, 85% Phosphoric Acid, Calcium Carbonate,Acetyl chloride, Vacuum filter apparatus, 110-mm Filter paper, 10

ml Ethanol, 400 ml beaker, Silica gel coated TLC plate, Spotting pipettes, 18 ml Ethyl acetate, 2 ml methylene chloride.

Preparation of Aspirin(Traditional Method):-Experiment No:1

- **By using phosphoric acid as catalyst**

- Weight of the product : 1.80 gm
- Weight of the pure crystal : 0.82 gm
- Melting point : 135^0C
- Theoretical yield : 2.70 gm
- % yield : 30.37%
- Rf value : $\frac{2.30}{5.20}$ = 0.442
- Solvent System : Pet ether + Ethyl acetate [7+3]
- Weight of the product : 3.95 gm
- Weight of the pure crystal : 2.30 gm
- Melting point :138^0C
- Theoretical yield : 5.41 gm
- % yield : 42.51%
- Rf value : 0.480
- Solvent System : Pet ether + Ethyl acetate [7+3]

By using Calcium Carbonate as a catalyst

- Weight of the product : 1.68 gm
- Weight of the pure crystal : 0.80 gm
- Melting point : 155.6^0C
- Theoretical yield : 2.70 gm
- % yield : 29.62%
- Rf value : 0.879 cm
- Solvent System : Pet ether + Ethyl acetate [7+3]

Experiment No. 2 :

- Weight of the product : 2.78 gm
- Weight of the pure crystal : 1.60 gm
- Melting point : 156.5^0C
- Theoretical yield :5.41 gm
- % yield : 29.57%
- Rf value :$\frac{2.7}{3.3}$ = 0.818 cm
- Solvent System : Pet ether + Ethyl acetate [7+3]
- **Preparation of aspirin (Green Method):-**

By using Microwave Irradiation

Table I: Synthesis of aspirin with conventional heating.

Catalyst	Reaction time	Polymer formation	Melting point (^{0}C)	% yield
None	-	-	-	No Reaction
H_2SO_4	5 min.	Positive	130-133	39%
H_3PO_4	5 min.	Positive	133-135	35%
$AlCl_3$	15 min.	Negative	133-135	12%
$CaCO_3$	-	-	-	No Reaction

Table II: Synthesis of aspirin with microwave irradiation.

Catalyst	Reaction time	Polymer formation	Melting point (^{0}C)	% yield
None	12 min.	Negative	135	80%
H_2SO_4	5 min.	Positive	134	41%
H_3PO_4	5 min.	Positive	135	40%
$AlCl_3$	8 min.	Negative	137	65%
$CaCO_3$	5 min.	Negative	138	77%

Result and discussion

The actual weight of aspirin was 0.82 g & 2.30 g. Given that 2 g & 4 g of aspirin was used, the theoretical yield was 2.70 g & 5.41. The percent yield was 30.37% & 42.51%. Because the percent yield was low, a lot of the product was lost. The melting point of it is 135^{0}C & 138^{0}C respectively. The Rf values of recrystallized product were 0.442 cm and 0.480 cm respectively. The solvent system used for both TLC is pet ether : ethyl acetate [7:3] are the best solvent system.

Similarly, The actual yield of aspirin was 0.80 g & 1.60 g. Given that 2 g & 4 g of aspirin was used, the theoretical yield was 2.70 g & 5.41. The percent yield was 29.62% & 29.57%. Because the percent yield was low, a lot of the product was lost. The melting point of it is 155.6^{0}C & 156.5^{0}C respectively. The Rf values of recrystallized product were 0.897 cm and 0.818 cm respectively. The solvent system used for both TLC is pet ether : ethyl acetate [7:3] are the best solvent system.

Salicylic acid contains two acidic functional groups, a phenol group and a carboxylic acid. The phenol group causes stomach irritation. An ester is formed from phenol group and carboxylic acid on the acetic acid. Process do away from one of these because the acid cause irritation. By reducing one of the acid groups, strenghth is reduced of acid making it easy to digest.

The crude aspirin is dissolved in the mixture of hot water and ethanol. Aspirin has the solubility of 10 mg/ml in water and a solubility of ethanol is 50 mg/ml,

it has polarity 5.2 and water has 9. Additionally, aspirin should not be recrystallized solely from hot water, because yields impurities and crude product allows to get hydrolyzed. The crude aspirin was not clean from recrystallization because it was exposed to the environment.

In pure acetic anhydride, the synthesis of aspirin is slow, so a catalyst was used to hasten the reaction. Catalyst is present in the beginning and end of the reaction. Since it is water soluble it is easily removed by washing the crystals with cold distilled water. The phosphoric acid also ensured that side reaction that could take place and increase the present yield were avoided.

This experiment was initially designed to study the effect of the catalysts on the synthesis of aspirin. For this laboratory experience the results proved that the best catalysts, in terms of reaction time, were the Brønsted acids, similar to the results reported previously. Subsequently, a procedure for the acid-catalyzed synthesis of aspirin using microwave irradiation was reported. Based on this finding, it was understood that the original experiment might be modified and extended by applying microwave irradiation, in a research-like approach producing the results in Table 1.

Analysis of these results reveals the effect of microwave irradiation in relation to the reaction time, polymer formation, product purity and yield. Table 1 shows that under microwave irradiation, the results are similar to those traditionally reported for acid catalysis, in terms of polymer formation and reaction time. The results under basic catalysis, however, are completely different from those obtained from aspirin synthesis without microwave irradiation, in terms of reaction time, polymer formation, and yield. For example, the reaction using calcium carbonate ($CaCO_3$) did not work with conventional heating (without microwave irradiation), but was completed in five minutes and a 77% yield was obtained under microwave irradiation.

As can be observed from Table 1, the use of sulfuric and phosphoric acid as catalysts produced low yields owing to the formation of polymers. The polymers must be removed using a saturated solution of sodium bicarbonate, which is later acidified to recover the aspirin. In addition, it can be observed from the experimental results that Lewis acids can also be used as catalysts. In the case of $AlCl_3$ the yields were good and no polymer formation was observed.

Conclusion

This study was carried out to evaluate the synthesis of Aspirin using both conventional and non-conventional method.It was proved that the solvent free synthesis and energy from microwave radiation is a fast, cheap and clean method**To develop the green reaction, high atom efficiency is needed to preventenvironmental pollution.**80% yield can be obtained using microwave

radiation without the use of catalyst**.** It can be concluded that this methodis the best methodfor **synthesis of Aspirin.**

References

1. Ogbru, Omudhome. MedicineNet. Acetylsali-cylicAcid.http ://www. Medic inenet.com/acetylsalicylic_acid/article.htm (accessed Feb 23, 2014).
2. Snelling. Volstate.edu. Synthesis of Aspirin. http://www 2.volstat e.edu/c hem/1110/Synthesis_of_Aspirin.htm (accessed Feb 23, 2014).
3. Williamson, K.; Masters, K. Macroscale and Microscale Organic Experiments, 6 ed.; Cen-thgage Learning: Belmont, 2011.
4. Esobel. UPLB College Student. Synthesis of Aspirin. http://theupl bcolle gest udent.blogspot.com/2011/05/full-report-synthesis-of-aspirin.html (accessed Feb 23, 2014)
5. Lewis. Aspirin: A Curriculum Resource for Post-16 Chemistry Courses. 2 ed.; Royal Socie-ndty of Chemistry: London, 2003.
6. CALIFORNIA STATE SCIENCE FAIR 2009 PROJECT SUMMARYAp2/09 Name(s):- Melissa J. MacEwen
   Project Number :-S0513 Project Title:- Synthesis and Decomposition of Aspirin.
7. Vogel's text book of Practical Organic Chemistry, Page No. 1290 no 522.
8. Practical organic chemistry by Frederick George Mann and Bernard Charles Saunders Published by Longan Inc., Fourth Edition; Page No. 110
9. https://labmonk.com Synthesis of Aspirin from Salicylic Acid.
10. www.lahc.edu>arias>exp5 – aspirinf11, Synthesis of Aspirin.
11. https://pdfs.semanticscholar.org>pdf, The Synthesis and Analysis of Aspirin – Semantic Scholar.
12. Olmsted, J., III. J. Chem. Educ.1998,75,1261–1263.
13. Eaton, D. C. Laboratory Investigations in Organic Chemistry,1st ed.; McGraw-Hill: New York, 1989; pp 299–309.
14. Williamson, K. L. Macroscale and Microscale Organic Experi-ments, 1st ed.; D. C. Heath and Company: Toronto, 1989;pp 296–301.
15. Strauss, C. R.; Trainor, R. W.Aust. J. Chem.1995,48,1665-1692.
16. Lidström, P.; Tierney J.; Wathey, B.; Westman, J. Tetrahedron2001,57,9225–9283.
17. Bose, A. K.; Banik, B. K.; Lavlinskaia, N.; Jayaraman, M.; Manhas, M. S.CHEMTECH 1997,18–24.
18. Bose, A. K.; Manhas, M. S.; Ghosh, M.; Raju, V. S.; Tabei,K.; Urbanczyk-Lipkowska, Z. Heterocycles1990,30,741–769.
19. Bose, A. K.; Manhas, M. S.; Banik, B. K.; Robb, E. W. Res. Chem. Intermed.1994,20,1–11.

20. Badami, S.; Mathew, A. M.; Thomas, S.; Purushotham, V.;Mathew, G.; Sharma, S. V.; Suresh, B. Pharm. Chemistry2003,37,4.htt p://www.ijpe. org/Oct 2003/Article07Page01.html(ac-cessed Jan 2005).
21. Loupy, A. Microwaves in Organic Synthesis, 1st ed.; Wiley-VCHVerlag GmbH & Company KGaA: Weinheim, Germany,2002; pp 61–143.
22. Tanaka, K. Solvent–Free Organic Synthesis,1st ed.; Wiley-VCHVerlag GmbH & Company KGaA: Weinheim, Germany,2002; pp 301–319.

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY EDUCATIONAL RESEARCH
ISSN:2277-7881; IMPACT FACTOR :6.514(2020); IC VALUE:5.16; ISI VALUE:2.286
Peer Reviewed:VOLUME:9, ISSUE:4(1), APRIL :2020

NOVEL METHOD OF SYNTHESIS OF SCHIFF BASES: AN ALTERNATIVE GREEN APPROACH

Banerjee Shivani. P
Associate Professor
Department of Chemistry
Satish Pradhan Dnyanasadhana College, University of Mumbai
Mumbai

Rathod Kalpana R
Associate Professor,
Department of Chemistry
Satish Pradhan Dnyanasadhana College, University of Mumbai,
Mumbai

Gholap Vrushali
Department of Chemistry
Satish Pradhan Dnyanasadhana College
University of Mumbai, Mumbai

Abstract
Development of non-hazardous synthetic methodologies for organic synthesis is one of the latest challenges .The growing need is for the development of eco-friendly and economic processes. Organic reactions under solvent free conditions have gained in popularity in recent years. Synthesis of schiff base by green method need shorter time, simpler reactions, resulting more efficient work up procedures, easier separations and purifications than conventional methods .In our present study; some Schiff base derivatives were synthesized by green approach. The synthesized Schiff base derivatives were further screened for several biological activities such as antioxidant and antimicrobial evaluation studies. The synthesized Schiff bases were further confirmed by TLC, melting point and spectral data analysis

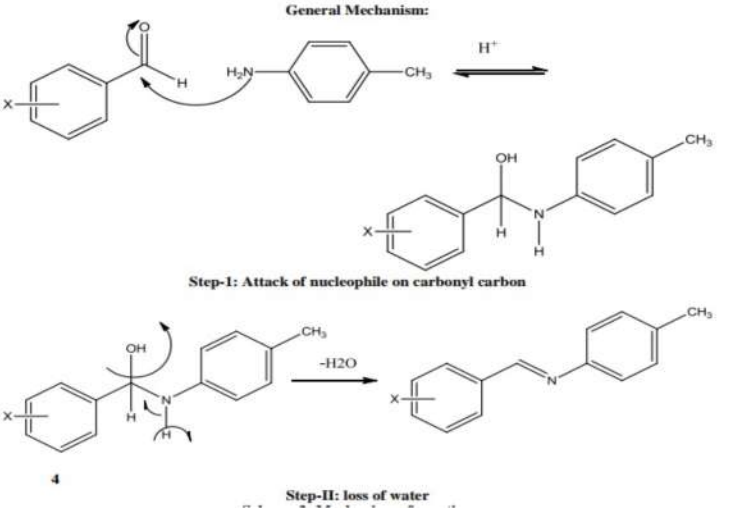
Key words: Synthetic methodologies, greena pproach, Schiff bases, antioxidant and biological activities

Introduction
Development of non hazardous synthetic methodologies for organic synthesis is one of the latest challenges to organic chemist. The growing concern for the environment demands the development of eco-friendly and economic processes where in even less hazardous byproducts are not desirable. Organic reactions under solvent free conditions have gained in popularity in recent years [1].Hence synthesis of Schiff base by green method need shorter time, simplerreactions, resulting more efficient work up procedures and easier separations and purifications than conventional solvents [2, 3]. The formation of carbon -nitrogen double bond plays an importantrole in organic synthesis. This

can be achieved by the reaction ofaldehyde and amines in acidic medium which leads to synthesis of Schiff base(imines).Schiff base can be synthesized by condensation of aldehyde or ketone with primary amine using a suitable solvent or catalyst.Schiffbase is first discovered by the scientist Hugo schiff in 1864.It is sub class of imines in which carbonyl group is replaced by imine or azomethine group. General structure of schiff base is R2C=NR' (R' ≠ H)Schiff base have been attracted considerable attention of organic chemist due to their significant biological activities like anticancer[4],antitumor[5],antiinflammatoryagents[6],insectcidal[7],antibacterial[8]antituberculosis[9],antimicrobial activity[10]. In this review,we present a green approach for synthesis of Schiff base.

Theoretical

If we look into the mechanism of transformation of aldehyde and amine into Schiff base, in step-I first the nucleophilic nitrogen of primary amine attack on carbonyl carbon forming carbinol amine which by losing water gives Schiff base as shown in step-II. Usually this reaction is carried out in presence of acid catalyst because H+ makes the carbonyl carbon more electron deficient by getting attached with oxygen atom of carbonyl functional group, hence the attack of the nucleophile on carbonyl carbon becomes easier.



Materials and methods

All reagents were obtained from sigma Aldrich and were chemically pureand analytical grade reagents.The liquid aldehydes were purified by distillation and purity of solid compounds were checked by TLC. The purity confirmation and reaction monitoring was done by TLC on silica gel plates prepared on glass

slides spots were visualized by using a UV lamp. In the present method, we describe a mild, efficient, high yielding efficient process for the condensation reaction of various aromatic aldehydes and 1,2-diamino benzene in water at room temperature Using this methodology these reactions were completed in shorter reaction times (5–15 min) with excellent yields (94–98%). It is noteworthy to mention that the green route method requires simple work-up procedures, i.e. simple filtration to isolate the products as they are insoluble in water and the desired products were obtained with satisfactory yields without any further purification. Considering the reaction time with water as solvent and yield of products this process was selected as green, environmental benign, clean, and safe to promote the synthesis at room temperature of various Schiff's bases

Synthesis of schiff base -I

A mixture of ethylenediamine and anisaldehyde (4 -methoxybenzaldehyde) and orange juice was stirred in mortar at roomtemperature for 10-15 min.The reaction mixture was poured in coldwater and filter on suction pump.Recrystallise from 50% alcohol,dried and then melting point was determined.Purity of product was checked by TLC.

Synthesis of schiff base II

A mixture of salicylaldehyde(2-hydroxy benzaldehyde) and ophenylenediamine(1, 2-diamino benzene) and orange juice was stirred inmortar at room temperature for 10-15 min.Thereaction mixture waspoured in cold water and filter on suction pump.Recrystallise from 50 %alcohol,dried and then melting point was determined. Purity of product
was checked by TLC.

Synthesis of schiff base III

A mixture of p-anisidine(4-methoxy aniline),vanilin (4-Hydroxy-3-methoxy benzaldehyde) and orange juice was stirred in a mortar at room temperature for 5-10 mins.The reaction mixture was poured in cold distilled water and filter through suction.Recrystallise from 50%alcohol,dried,determine itsmelting point.Purity of product was checked by TLC.

Biological and antioxidant activity

Evaluation was carried out for the in vitro antimicrobial activity by cup plate method. For this, S. aureus, P. aeruginosa, B. subtilis, and C. albicans were employed. Penicillin G and amphotericin B were taken as standard drugs;their antoxidant activity has been evaluated by DPPH(1,1-diphenyl-2-picrilhydrazyl) radical scavenging.

Result and discussion

It is noticed that Schiff base is formed by condensation of carbonylcompounds and primary amines .The reactions occur smoothly due togood electrophilic nature of carbonyl compounds and nucleophiliccharacteristics of amine.The H+ ions in orange juice makes the carbonyl group more electrondeficient and result in the formation of schiff base within 5-15min.Synthesis of Schiff base by green method need shorter time, simplerreactions, resulting more efficient work up procedures and easierseparations and purifications.All the prepared Schiff bases have shown a promising biological activity. The biological potency of these Schiff bases increased on chelation/complexation.This was also reported by Bhagat et al [11] in their study of the antibacterial activity of synthesised Schiff bases from salicydehyde.The role of antioxidant is to remove free radical. One important mechanism through which this is achieved is by donating hydrogen to free radicals in its reduction to an unreactive species. Addition of hydrogen would remove the odd electron feature which is responsible for radical reactivity. The hydrogen-donating activity, measured using DPPH (1,1-diphenyl-2-picrilhydrazyl) radicals as hydrogen acceptor, showed that a significant association could be found between the concentration of novel molecule and percentage of inhibition.Tadele K.T.[12] also reported the same finding in his study on Antioxidant Activity of Schiff Bases and their Metal Complexes.

Conclusion

From the above study of Schiff bases it can be concluded that the prepared Schiff bases can be used as pharmacophore due to their antimicrobial properties in the preparation of biological moieties.

References

[1] J.O.Metzger, Angew. Chem. Int. Ed., 1998, 37, 2975; (b) C. J.Li, T. H. Chan,Tetrahedron, 1999, 55,11149.

[2] G.W.V.Cave, C. L. Raston, J. L. Scott, Recent advances in solventless organic reactions: towards benign synthesis with remarkable versatility; Chem. Community., 2001, 2159.

[3] S. Zangade, A. Shinde, S. Chavan, Y. Vibhute, Solvent-free, environmentally benign syntheses of some imines and antioxidant activity, J .Chem. 7 (2015) 208-214

[4] S.K. Sridhar, A.J. Ramesh, Synthesis and pharmacological activities of Schiff bases and hydrazones of isatin derivatives, Biol. Pharm. Bull. 24 (2001) 1149- 1152.

[5] Z.H. Chohan, A. Munawar, C.T. Supuran;**Transition metal ion complexes of Schiff bases: synthesis, characterization and antibacterial properties**Met. Based Drugs, 8 (2001), pp. 137-143.
[6]D. J. Hadjipavlou-litina, A. A. Geronikaki, Drug Des. Discov.,1996, 15,199.
[7] S. S. Murthy, A. Kaur, B. Sreenivasalu, R.N. Sarma, Indian J.Exp. Biol., 1998, 36, 724
[8]K.N. Venugopala, V.A.Jayashree, Indian J. Pharm. Sci., 2008, 70,88
[9]N. Solak, S. Rollas, Arkivoc, 2006, xii, 173
[10] S.J. Wadher, M.P. Puranik, N.A.Karande, P.G.Yeole, Int. J.Pharm. Tech. Res., 2009, 1, 22.
[11]SunitaBhagat, Nutan Sharma, and Tejpal Singh Chundawat;Synthesis of Some Salicylaldehyde-Based Schiff Bases in Aqueous Media;Journal of ChemistryVolume 2013, Article ID 909217, 4 pages
[12] K.T. Tadele;Antioxidant Activity of Schiff Bases and Their Metal Complexes: A Recent Review J. Pharm. Med. Res. - Volume 3 Issue 1 (2017) 73–77.
[13]M.S. Karthikeyan, D.J. Prasad, B. Poojary, K.S. Bhat, B.S. Holla, N.S. Kum ariSynthesis and biological activity of Schiff and Mannich bases bearing 2,4-dichloro-5-fluorophenyl moiety;Bioorg. Med. Chem., 14 (2006), pp. 7482-7489
[14] A. Xavier, N. Srividhya; Synthesis and Study of Schiff base Ligands; IOSR Journal of Applied Chemistry (IOSR-JAC) e-ISSN: 2278-5736.Volume 7, Issue 11 Ver. I. (Nov. 2014), PP 06-15
15]Armarego W.L.F., Perrin D.D., Purification of laboratory chemicals (4th Ed.). Butterworth, Henemann, Oxford, 1997.