



# LAWS OF CONSUMER RIGHTS

*From Cheating to Ethical Markets*

A. Ranga Reddy  
T. Lakshamma

**Serials**

# Contents

|                             |             |
|-----------------------------|-------------|
| <i>Foreword</i>             | <i>ix</i>   |
| <i>Acknowledgements</i>     | <i>xi</i>   |
| <i>List of Contributors</i> | <i>xiii</i> |

## SECTION I CONSUMER MOVEMENT WEST TO EAST

|   |       |
|---|-------|
| 1. Laws and Implementation of Consumer Rights:<br>Learning from West        | 3-13  |
| 2. Global Food Safety and Consumer: Issues and<br>Concerns                  | 14-29 |
| 3. Global Consumer Movement: Causes, Consequences<br>and Cures              | 30-44 |
| 4. Consumer Protection Act in India: The Case of<br>Nestle's Maggi Noodles  | 45-52 |
| 5. Spread of Consumer Movement from West to East:<br>Origin and Development | 53-67 |
| 6. Global Antibiotic Resistance   | 68-72 |
| 7. Women Breast Milk Standards in West and in India                         | 73-80 |

## SECTION II CONSUMER RIGHTS AN EVALUATION

|   |        |
|---|--------|
| 8. Consumer Protection Law in India: Spectrum of<br>Laws and Implications | 83-91  |
| 9. Consumer Protection Laws: Methods to Overcome<br>Constraints           | 92-111 |

vi **Laws of Consumer Rights: From Cheating to Ethical Markets**

|   |         |
|---|---------|
| 10. Consumer Rights: Effective Implementation:<br>A Pipe Dream                                  | 102-114 |
| 11. Consumer Protection – Looking for Good<br>Governance  | 115-132 |
| 12. Consumer Rights Awareness – A Perspective   | 133-140 |
| 13. Consumer Awareness and Legal Rights   | 141-146 |
| 14. Constitutional and Legal Role of Strengthening<br>Village Parliament in Consumer Protection | 147-163 |
| 15. Consumer Protection in India: An Inside Story   | 164-174 |
| 16. Nature, Awareness and Protection of Consumer<br>Rights                                      | 175-185 |
| 17. Consumer Protection Act 1986: An Organisational<br>View                                     | 186-191 |
| 18. Empower Consumer Through Education  | 192-199 |
| 19. Violations of Traders in Market: Role of Civil Society                                      | 200-210 |

**SECTION III**

**CASE STUDIES ON CONSUMER RIGHTS**

|  |         |
|--|---------|
| 20. The People vs The State: A Case Study of the<br>Violation of Consumer Rights in Kurnool District | 213-218 |
| 21. Consumer Rights : Judicial Perspective –<br>Case Studies   | 219-229 |
| 22. Recent Trends in Consumer Protection Act –<br>Some Cases   | 230-242 |
| 23. Nurses on Consumer Rights in Selected Hospitals<br>in Hyderabad                                  | 243-249 |
| 24. Consumer Protection and Medical Sector   | 250-260 |
| 25. Consumer Protection Act: Medical Negligence  | 261-271 |
| 26. Consumer Laws: Medical Negligence Misbehaviour   | 272-279 |
| 27. Food Safety – Consumer Rights  | 280-288 |
| 28. Consumer Rights Among Rural Women –<br>A Study in Kadapa District                                | 289-293 |

29. Impact of Consumer Protection Act on  
Nellore District, A.P 294-304

#### SECTION IV DIGITALISATION AND CONSUMER RIGHTS

30. Goods and Service Tax: A Reform for Consumer  
Welfare with One Indirect Tax, One Country,  
One Market 307-316
31. E-Commerce – An Emerging Market and Sellers  
Behavior Still on Frauds 317-326
32. Consumer Empowerment : Centre and Confonet 327-338
33. E-Commerce : Consumer Awareness 339-344
34. E-Commerce and Sustainable Consumption 345-352
- Index* 353-365

## Impact of Consumer Protection Act on Nellore District, A.P

*Dr. K. Suneetha\**

The objective paper is to study the awareness about Act in Nellore District Consumers of Andhra Pradesh.

Consumer protection is a group of laws and organizations designed to ensure the rights of consumers as well as fair trade, competition and accurate information in the marketplace. Consumer protection is linked to the idea of consumer rights and to the formation of consumer organizations which help consumers make better choices in the marketplace and get redressal for their complaints. The consumer movement in India is in its infancy, most of the people are not even aware of consumerism as a movement closely connected with the protection of their interest. Constitutional and legislative provisions have been made by government to protect the rights of consumers. In India the consumer protection act 1986 is governing consumer protection. Still many are not aware about these until and unless the consumers are aware about it and avail these provisions, the protection of consumer becomes inevitable. There is a great need to make them aware of their rights and responsibilities.

The present paper is focused to understand the key aspects of consumer awareness such as level of consumer awareness among the

\* Assistant Professor, Department of Social Work, Vikrama Simhapuri University, Kakatur, Nellore-524 320. Email: [suneetha.rsu@gmail.com](mailto:suneetha.rsu@gmail.com)

## 5. CONCLUSION

The study revealed that majority of the respondents are aware about the consumer protection measure and their attitude and practice significantly differ among different educational and income levels. Knowledge is not enough for effective implementation of CPA, there is a need to bring change in consumer behaviour. Through workshops and discussions, electronic media like Television, Radio, short messages in Mobiles, success stories in print media will facilitate effective behavior in public regarding consumer protection act.

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# CONTENTS

| S. NO.     | PARTICULARS   | PAGE. NO. |
|------------|---|-----------|
| Paper – 01 | “The Changing Traditional Family Structure and Challenges for Elderly in Chittoor District”<br>I. V. Lalitha Kumari   | 01        |
| Paper – 02 | “Skills Development of Youth in the Changing Society”<br>Prof. M. C. Reddeppa Reddy   | 14        |
| Paper – 03 | “Special Entrepreneurship Drive for Disabled Persons-Urgent Need for Protective Welfare”<br>Prof. G. Stanley Jaya Kumar <sup>1</sup> Dr. P. Sobha <sup>2</sup> & G. Sanman Rocky <sup>3</sup> | 22        |
| Paper – 04 | “Problems of Elderly Widows: Need of Social Work Intervention”<br>Dr. K. Suneetha <sup>1</sup> R. Prasad <sup>2</sup> & Ch. Durga Bhavani <sup>3</sup>  | 31        |
| Paper – 05 | “An Approach Paper to 12 <sup>th</sup> Five Year Plan: Inclusive Development in Residual Andhra Pradesh”<br>Y. Sreenivasulu   | 42        |
| Paper – 06 | “Women Employment and Economic Empowerment”<br>Dr. K. Mahadevamma   | 52        |
| Paper – 07 | “The Impact of Micro Finance on Provision of Employment and Income Generation for Self Help Groups in Ananthapuramu District of A.P.”<br>Dr. D. Sreenivasa Reddy                              | 60        |
| Paper – 08 | “Aged Folks”<br>Dr. G. Sanjeevayya <sup>1</sup> & Ch. Nagaraju <sup>2</sup>   | 67        |
| Paper – 09 | “Performance of Mgnregs in LWE Affected Districts of Chhattisgarh and Orissa”<br>V. Suresh Babu <sup>1</sup> & K. Hanumantha Rao <sup>2</sup>   | 78        |
| Paper – 10 | “Challenges in Indian Higher Education System”<br>Dr. Chaganti Rami Reddy <sup>1</sup> Dr. R. Neelaiah <sup>2</sup> & A. Sasikala <sup>3</sup>  | 88        |
| Paper – 11 | “Multiple Disadvantages of Women Domestic Workers: the Existing Perspectives”<br>Pradeep K. D.  | 95        |
| Paper – 12 | “Food Consumption Patterns in School Going Children”<br>Dr. G. Sireesha <sup>1</sup> and Prof D. L. Kusuma <sup>2</sup>   | 105       |
| Paper – 13 | “Impact of Relaxation and Meditation in Reducing the Intensity of Neuroticism in Older Adults”<br>Gayathri A. <sup>1</sup> Hemalatha A. <sup>2</sup> & Usha Rani M. <sup>3</sup>              | 118       |
| Paper – 14 | “Worries and Anxieties in Late Adult Years”<br>Suresh. K. <sup>1</sup> Hemalatha A. <sup>2</sup> & Jamuna D. <sup>3</sup>   | 125       |
| Paper – 15 | “Deserted Women and Coping Mechanism”<br>Banashankarayya M. <sup>1</sup> & Dr. K. S. Malipatil <sup>2</sup>   | 133       |
| Paper – 16 | “IMR, CMR, MMR and Millennium Development Goals: What Went Wrong?”<br>Dr. G. Ravi Sankar Reddy  | 139       |



## “Problems of Elderly Widows: Need of Social Work Intervention”

Dr. K. Suncetha<sup>1</sup> R. Prasad<sup>2</sup> & Ch. Durga Bhavani<sup>3</sup>

<sup>1</sup>Assistant Professor & Project Director, ICSSR-MRP, Department of Social Work, Vikrama Simhapuri University, Nellore

<sup>2</sup>Research Assistants, ICSSR-MRP, Department of Social Work, Vikrama Simhapuri University, Nellore

<sup>3</sup>Research Assistants, ICSSR-MRP, Department of Social Work, Vikrama Simhapuri University, Nellore

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*Abstract – Widowhood brings about economic and emotional setbacks. In India, widows have a really hard time because of the traditional prejudices prevalent against them. Older widows are facing emotional, psychological, financial problems and also physiological problems. They are also neglected, abused, and exploited. According to 2011 census, 37.5 percent of elderly women in India are widows; every fourth household in India has a widow. Loss of spouse is equally painful for both husband and wife but widows face more problems and hardships under the pressure of gender bias and changing values. The nature of family life and relationship is changing due to increasing consumerism, globalization and growing individual thinking in all walks of life. After widowhood life style affects her dress, food, make-up, participation in various social and religious functions.*

*Against this backdrop, a research has been conducted to know the problems of aging women widows. The main objectives of the study are to know the various social, psychological, economic and health problems of the aging women. An empirical study is made in Nellore district with a sample of 120 randomly selected respondents. A structured interview schedule along with a Problem Inventory for Older People (Ramamurti P.V 1969) and Inventory to assess health status (Ramamurti, 1996) was used for data collection. Data thus collected is analyzed, and conclusions are drawn and also suggest measures for tackling the problems.*

*Following are the major conclusions emerging from the present study. Most of the respondents are in the age group of 60-70 years and are able to read and write. Further the study revealed that most of the respondents are from Hindu religion and belong to S.C community. Regarding family details half of the respondents are staying in joint families and own concrete roof houses with Laverty and bath room facilities. They have enough recreational recourse and all moderately satisfied with living arrangements. It is also observed from study that three fourths of the respondents are having moderate health status. The study also stated that the respondents are getting family support "occasionally" and most of the respondents i.e. 93 percent are experience elderly abuse. It can be concluded that the economic and health status of respondents influence their frequency of problems.*

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# COMMUNITY BASED REHABILITATION FOR CHILDREN WITH MENTAL RETARDATION



**Dr. R. Madhumathi**

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## CONTENTS

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|          |                                |                  |
|----------|--------------------------------|------------------|
| <b>1</b> | <b>INTRODUCTION</b>            | <b>1 - 36</b>    |
| <b>2</b> | <b>REVIEW OF LITERATURE</b>    | <b>37-67</b>     |
| <b>3</b> | <b>METHODOLOGY</b>             | <b>68 - 85</b>   |
| <b>4</b> | <b>RESULTS OF THE STUDY</b>    | <b>86 - 220</b>  |
| <b>5</b> | <b>DISCUSSION</b>              | <b>221 - 243</b> |
| <b>6</b> | <b>SUMMARY AND CONCLUSIONS</b> | <b>244 - 266</b> |
|          | <b>Appendices</b>              | <b>267 - 338</b> |
|          | <b>References</b>              | <b>339 - 361</b> |
|          | <b>Index</b>                   | <b>362</b>       |

# COMMUNITY BASED REHABILITATION FOR CHILDREN WITH MENTAL RETARDATION



## About the Author

**Dr. R. Madhumathi**, MSW, M.Sc. (Psy), M.Ed. Spl.Edn (M.R), B.Ed.Spl.(M.R.), DMR, Ph.D started her career as principal in RASS College of Special Education , Tirupati. In 2012 she joined as Assistant Professor, Department of Social Work, **Vikrama Simhapuri University, Nellore, Andhra Pradesh**. She has two decades of Professional standing in the field of rehabilitation both at U.G and P.G levels. She has published 20 articles in professional journals and books and presented 12 papers in International conferences and 46 papers in National conferences. She has organized 1National seminar 4 National workshops, 5 CRE programmes and 6 orientation programmes for parents of Special Needs children. She has undertaken a ICSSR major research project. She is one of the Course Writers for B.Ed.Spl. Ed(M.R) and M.Ed.Spl. Ed (M.R.) courses of Dr.B.R.Ambedkar Open University, Hyderabad. She gave several invited talks and chaired sessions in various National events. She is a life member of several professional and academic bodies.

## About the Book

This book "COMMUNITY BASED REHABILITATION FOR CHILDREN WITH MENTAL RETARDATION" is a dedicated hard work of the author in the field of Medical and Psychiatric Social Work. This research work discloses the importance of Community Based Rehabilitation (CBR) towards inclusion of Children with Mental Retardation in mainstream society.

This book will help the Social work and rehabilitative professionals and practitioners to acquire knowledge about the impact of Community Based Rehabilitation Programme on children with mental retardation across various age groups (birth to 18 years), their families and communities, in providing skill development in children with Mental Retardation, capacity building among families, and in creating awareness among community members, and their involvement in rehabilitation of children with mental retardation. It also discuss about functions and problems of CBR workers, in rendering rehabilitation services to disabled children.



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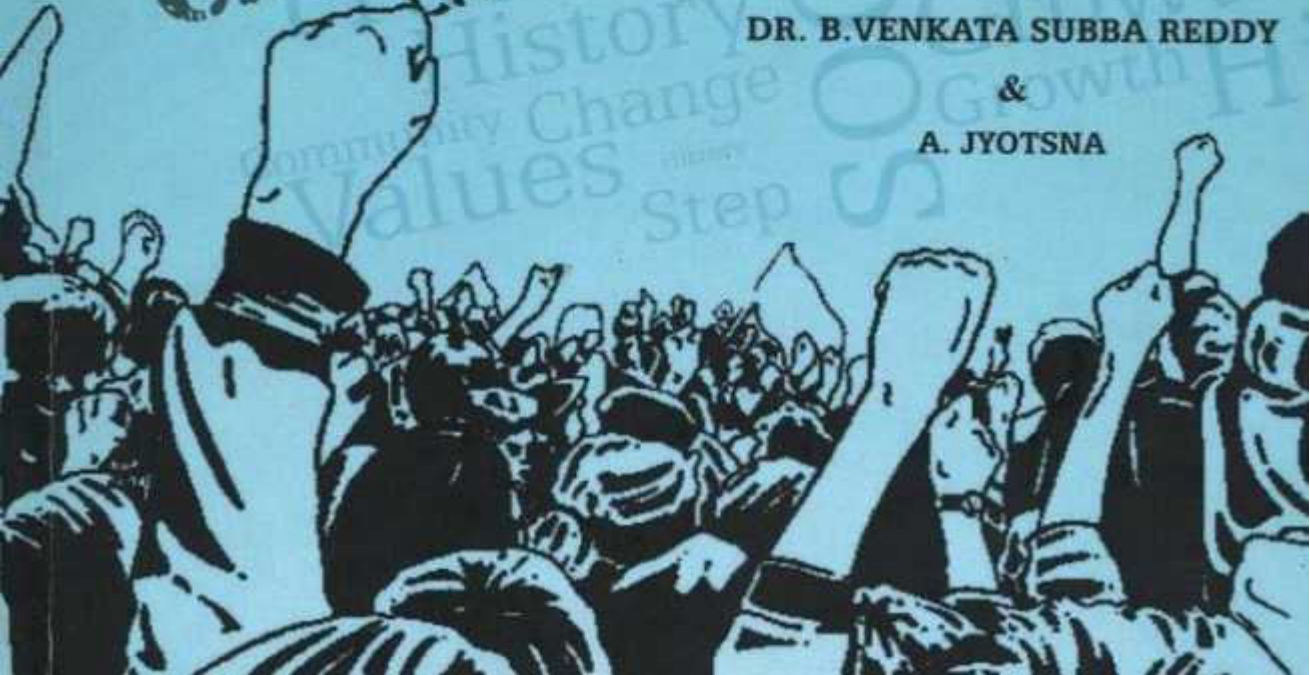
**CHANGING SOCIETY-**  
CHALLENGES AND STRATEGIES

Edited by -

DR. B. VENKATA SUBBA REDDY

&

A. JYOTSNA



Dr. R. Madhupathi  
Assistant professor.

# CHANGING SOCIETY

## CHALLENGES AND STRATEGIES

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# List of Contributors

01. **Jamuna D.**, Centre for Research on Aging, Department of Psychology, S.V. University, Tirupati  
**Ramamurti P.V.**, Centre for Research on Aging, Department of Psychology, S.V. University, Tirupati  
**Gayathri A.**, Centre for Research on Aging, Department of Psychology, S.V. University, Tirupati
02. **Dr. C. Dheeraja**, Associate Professor, Centre for Wage Employment and Poverty Alleviation, National Institute of Rural Development, Rajendranagar.  
**A. Jyotsna**, Research Associate, Centre for Wage Employment and Poverty Alleviation, National Institute of Rural Development, Rajendranagar.
03. **Dr. P.Subbarama Raju**, Assistant Professor, Department of Social Work, Vikrama Simhapuri University, Nellore.
04. **Divya K.**, Faculty Member, Department of Social Work, Central University of Karnataka, Aland Road, Kadaganchi.
05. **Dr. T. Chandrika**, Department of Anthropology SVUniversity Tirupathi.  
**Dr. T. Adilakshmi**, Department of Home Science SVUniversity Tirupati.
06. **G. Malleswariamma**, Assistant Professor, Dept. of Social Work, SPM University, Tirupati
07. **Dr. R. Madhumathi**, Assistant Professor, Department of Social Work, Vikrama Simhapuri University, Nellore
08. **Dr. Silpa Somavarapu**, Academic Consultant, Department of Food Technology, Vikrama Simhapuri University, Nellore, A.P
09. **Dr. B. Venkata Subba Reddy**, Academic Consultant, Department of Social Work, Vikrama Simhapuri University Nellore (A.P.)  
**A. Jyotsna**, Research Scholar, Department of Social Work, Shri Venkateswara University, Tirupati (A.P.)
10. **Dr. T. Konaiah**, P.G.Dept of Law, Former Scholar, Sri Venkateswara University, Tirupati - Andhra Pradesh.  
**Dr. K. Nagendra Reddy**, Former Lecturer & Asst. Director CSSEIP (UGC Sponsored Scheme) Sri Krishnadevaraya University, Annapuramu

77-93

# CONTENT

Foreword

Preface

Acknowledgement

| S. No. | Paper Topic   | Page No. |
|--------|---|----------|
| 01.    | "Health in the Older Year – A Life-Span Perspective"  | 01       |
| 02.    | "Factors Influencing Demand for MGNREGS – Challenges Faced"                                   | 05       |
| 03.    | "Disability and Socioeconomic Status"   | 39       |
| 04.    | "Gender and Policing: Policewomen as Agents of Social Change"                                 | 46       |
| 05.    | "Nutritional Status of Girl Child - A Study on Tribe of Sugalis in Chittore District"         | 55       |
| 06.    | "Quality Of Life among Patients Affected With TB: Study in Nehrunagar, Tirupathi"             | 66       |
| 07.    | "Community Based Rehabilitation Approach – Strategies – Role of Social Worker"                | 77       |
| 08.    | "Healthy Nutrition to Build a Healthy Nation"   | 94       |
| 09.    | "Policy Advocacy on Women's Issues in India: Exploring Challenges to Social Work"             | 107      |
| 10.    | "Historical Perspective of Human Rights: It's Adaption in Indian Constitution – A Study"      | 114      |
| 11.    | "Reproductive Health Status of Tribal Women A Study in Anantapuramu District, Andhra Pradesh" | 120      |
| 12.    | "Legalize Manifestos Atleast for 2019 Elections"  | 124      |

3

## “Community Based Rehabilitation Approach – Strategies – Role of Social Worker”

Dr. R. Madhumathi<sup>1</sup>

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*Abstract – World Health Organization (WHO) recommends community- based rehabilitation (CBR) as the chosen approach for meeting the needs of differently abled otherwise called as persons with Disabilities (PWD) in developing countries. Over the decades, CBR has undergone many shifts and changes in definition and methods of implementation. The major change has been a shift in focus from the disabled person alone, to include the context in which he is located. This meant a change in the attitudes of others in the community to accept people with disabilities and promote their social integration, provision of equal opportunities, protection of their rights, and encouragement of community control and ownership of CBR programmes. CBR has also moved away from being merely a delivery of service to a method of community development which promotes ‘community participation’ and ownership in programmes, with the active involvement of disabled persons and their families in all issues of concern to them instead of being passive recipients. Participation of local community, in terms of management and ownership of programmes by disabled persons, in accordance with community development principles is central tenet of CBR. Community Organization (C.O) is one of the methods of social work, which is also work for the community development, is more suitable to promote CBR programmes for differently abled persons. Both CBR and C.O are working for the welfare of the whole community. This paper reviews about different strategies, which help for successful sustainability of CBR programmes, and also it discuss about role of social worker or community organizer in implementing Community Based Rehabilitation Programmes.*

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### What is CBR?

World Health Organization (WHO) recommends community- based rehabilitation (CBR) as the chosen approach for meeting the needs of differently abled otherwise called as persons with Disabilities (PWD) in developing countries. According to International centre for the advancement of community based rehabilitation (ICACBR) Community based rehabilitation (CBR) is a response, in both developed and developing countries, to the need for adequate and appropriate rehabilitation services, to be available to a greater proportion of the disabled population. Its aims are to rehabilitate and train disabled individuals, as well as to find ways to integrate them into the communities.

In CBR, the disable person, the family, the community, and health professionals collaborate to provide needed services in a non- institutional setting, and in an environment or community where services for disabled persons are seriously limited or totally absent. Its essential feature is its focus on partnership and community participation. Approaches to the implementation of CBR are many and are determined by a variety of social and demographic factors. Introducing rehabilitation

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<sup>1</sup> Assistant Professor, Department of Social Work, Vikrama Simhapuri University, Nellore-524003, email.i.d.-reddim.madhumathi@gmail.com

services at a local or community level removes many obstacles to care which are associated with institutions. The difficulty of travel and its expense are eliminated or reduced to a minimum. The individual is not isolated from the community; family members and community volunteers are part of the rehabilitative process. All participants can see what the disabled person has achieved. This can help integrate the person into the community, a community which values the unique contribution which the person is able to make. In developed countries, the CBR model responds to the shift away from institutional care to home-based care, and to health-care restructuring in the light of reduced funding.

In the developing world, CBR provides the focus for training a new corps of health and social personnel. In conflict and post-conflict regions, CBR is being implemented to provide essential rehabilitation services to population ravaged by War.

#### **Need for CBR in India:-**

India is the largest country in the Asian region with the second largest population in the world with 1000 million populations and a changing economic system governed by a democracy. 20% percent of the population lives in metropolises while the other 80% lives in rural areas. Rural areas of the country are often inaccessible, have little health and rehabilitation services and the population in these areas are mostly illiterate. Indian society is divided into classes and castes (a system of segregation based on parentage and social roles). Wealth and power are concentrated in the hands of a minority. Most people in India still view government as the only welfare organisation that has the responsibility to safeguard their future. Development in the country is very uneven, with great differences between the different states on indicators of health, education, employment and per capita income. [M. Thomas & M.J. Thomas, 2002]. People with disabilities are heterogeneous group made up of people born with disability, those who acquire a disability because of diet or disease and those disabled in accident or disasters. [Janet seeley, 2001]. Among disability groups physical disabilities constitute the largest groups of disabled persons, followed by communication disabilities and visual disabilities. [M.Thomas & M.J. Thomas, 2002] Mental retardation is diagnosed in 0.5-1% of all children [Bijumon K. Mathew, Suman K.Murthy, Sheeba Mathew, 2003]

Global estimate indicates that 10 % of the world populations (no less than 50 million or more) are found to be suffering from disability of one form or another. Of whom around four hundred or more millions are estimated to be in developing countries. (Helander 1993) To provide rehabilitation facilities to these populations is a big question? For this **CBR is a Global Solution.**

#### **Definition of CBR:-**

CBR may be defined, according to three United Nation Agencies, ILO, UNESCO, and the WHO, as a "strategy within community development for the rehabilitation, equalization of opportunities, and social integration of all people with disabilities. CBR is implemented through the combined efforts of disabled people themselves, their families and communities, and the appropriate health, education, vocational and social services" (WHO, 1994)

Community Based Rehabilitation is defined as a process where in knowledge about disability and skills in rehabilitation and to the members of the communities, effecting significant attitudinal change, and creating a more positive environment for an overall holistic improvement in the life of persons with disability.

The joint position paper of United Nations agencies defines the main objectives of CBR, "to ensure that people with disabilities are empowered to maximize their physical and mental abilities, have access to regular services and opportunities and become active, contributing members of their communities and their societies.

Thus, CBR promotes the human rights of people with disabilities from all types of impairments, including difficulty hearing, speaking, moving, learning or behaving. CBR also includes all age groups: children, youth. Adults and older people". (ILO.UNESCO, UNICEF, &WHO 2002).

#### Disability Groups to which CBR is applied:

CBR appears to be most commonly utilized to assist people with sensory impairments, such as visual and hearing impairments; motor impairments, such as cerebral palsy; and mobility impairments, such as amputation and paraplegia. Despite this, the CBR approach has also been applied more broadly and is being used to assist community members with a variety of disabilities. For example, CBR programmes have been instigated, to assist people with 'general mental health needs' (Ginsberg, 1993, Hanumanth Rao, Venkatesan & Vepuri, 1993; Myezwa, 1995), to assist people with serious psychiatric illnesses (Thara, 1992), as a strategy for working with people with intellectual disabilities or people with mental retardation (Brouillette, 1994; Myezwa, 1995), and as an approach to working with people with leprosy within their communities (Gershon & Srinivasan, 1992; MC Dougall, 1995). Despite debate regarding efficacy of CBR with some populations - such as people with intellectual disabilities (Myezwa, 1995), it would appear to have been applied relatively broadly across the disability sector.

#### CBR as a Strategy:-

"Community-based rehabilitation (CBR) is a strategy for enhancing the quality of life of disabled people by improving service delivery, by providing more equitable opportunities and by promoting and protecting their human rights. It calls for the full and co-ordinated involvement of all levels of society: **community, intermediate and national**. It seeks the integration of the interventions of all relevant sectors - educational, health, legislative, social and vocational - and aims at the full representation and empowerment of disabled people. It also aims at promoting such interventions in the general systems of society, as well as adaptations of the physical and psychological environment that will facilitate the social integration and the self-actualisation of disabled people. Its goal is to bring about a change; to develop a system capable of reaching all disabled people in need and to educate and involve governments and the public. CBR should be sustained in each country by using a level of resources that is realistic and maintainable.

At the **community level**, CBR is seen as a component of an integrated community development programme. It should be based on decisions taken by its members. It will rely as much as possible on the mobilisation of local resources. The family of the disabled person is the most important resource. Its skills and knowledge should be promoted by adequate training and supervision, using a technology closely related to local experience. The community should support the basic necessities of life and help the families who carry out rehabilitation at home. It should further open up all local opportunities for education, functional and vocational training, jobs, etc. The community needs to protect its disabled members to ensure that they are not deprived of their human rights. Disabled community members and their families should be involved in all discussions and decisions regarding services and opportunities provided for them. The community will need to select one or more of its members to undergo training in order to implement the programme. A community structure (committee) should be set up to provide the local management.

At the **intermediate level**, a network of professional support services should be provided by the government. Its personnel should be involved in the training and technical supervision of

community personnel, should provide services and managerial support, and should liaise with referral services.

Referral services are needed to receive those disabled people who need more specialized interventions than the community can provide. The CBR system should seek to draw on the resources available both in the governmental and non-governmental sectors.

At the national level, CBR seeks the involvement of the government in the leading managerial role. This concerns planning, implementing, co-ordinating, and evaluating the CBR system. This should be done in co-operation with the communities, the intermediate level and the non-governmental sector, including organisations of disabled people. (E.Helander, p.8).

### Principles of CBR:-

The basic principles of CBR strategy include

- Active participation of disabled persons, their families and communities in all aspects of CBR with utilization of available resources in the community.
- Transfer of knowledge about disabilities and skills in rehabilitation, to people with disabilities, families and communities.
- Community involvement in planning, decision making, and evaluation.
- Utilization and strengthening of referral services that are able to perform skilled assessments with increasing sophistication, at district, state and national levels and make rehabilitation plans, participate in training, and supervision.
- Utilization of a coordinated, multisectoral approach.(Helander et. al.1989, Manoj sharma,2003)

### Strategies for promoting CBR:—

#### Skilling Community members:

Within CBR intermediate level workers with limited training are typically the major resource. Latter provision of training for community level workers. Training typically involves building skills in screening and identification of disabilities. (Hanumantha Rao *et. al.*, 1993; MC Allister, 1989), Training and subsequent support of community level workers is facilitated through the use of general manuals (Helander *et. al.*, 1989; Werner, 1987), Newly emerging strategies emphasise the skills of community members, such as teachers (O' Toole, 1991 a), training family members (D. Krefting 1996a), and the application of existing indigenous knowledge in meeting the rehabilitation needs of people with disabilities ( Eric Zhang Guozhong,2006, Tracy Bury ,2005; S.Miles,1996;Helander; 1993a).

#### Equipping and Supporting families and family members:

The Provision of assistance for people with disabilities in immediate social relationships is a major focus of C.B.R. Programme. D. Krefting (1996a) stated that "Families have the primary

responsibility for caring for all of their members. They are the first line of support and assistance for people with disabilities at the local level.

#### **Building community capacity and facilitating the formation of DPOs:**

The emphasis which in CBR on generic strategies such as community development, to facilitate integration and provide greater local options for people with disabilities (Enders, 1993); provides a context and impetus for community level action extending beyond disability issues (Christie, 1996). This is reflected in CBR programmes which are “directed towards the whole community as well as the individual members who happen to have a disability (Tjandrakusuma, 1996 P.2)

#### **Structural initiatives facilitate community level involvement of persons with Disabilities (PWD):**

CBR strategies at this level may be seen to be comprised of approaches which influence and interact with formal systems of service delivery and legislative bodies. Here are few examples of CBR activities in this level are

- ◆ Initiatives which seek to build organisational links through networking and dissemination of information between local and national Disabled person’s organisations [S. Miles 1996].
- ◆ Recognition of the need to promote a legislative frame work to ensure the sustainability of CBR programmes [M. Thomas, 1997].
- ◆ Facilitation and provision of support for the development of self -help organisations at the community level (D. Krefting, 1996 a).
- ◆ Enhancing multi - sectoral collaboration, and specifically the coordination of agencies to promote integrated education for children with disabilities (Julie Monk.et.al.; 2008, S. Miles, 1996).
- ◆ Facilitating the involvement with people with disabilities at an organisational level through networking between existing community and service organisations (Gershon & Srinivasan, 1992) etc.

#### **Community attitudinal change based on participation of PWD:**

CBR projects may be seen to demonstrate a focus on attempts to change community attitudes [ILSMH, 1994]. A principle of CBR is that “The best way to overcome the fear and misunderstandings that lead to social discrimination is to have the community members work with people with disabilities. In this process of working together, people start to understand each other and to learn about each others’ needs. (D. Krefting, 1996b, P.50).

In this capacity, CBR initiatives have sought to assist people with disabilities to become influential role models and community level advocates (RI, 1995). CBR strategies at this level may consist of activities directed towards overcoming social discrimination and ensuring equalisation of opportunities for people with disabilities (Prasad, 1997). Such change is typically facilitated

through the involvement of people with disabilities and community members in the process of programme design and implementation, and through transferring knowledge about disability issues to community members. (D. Krefling, 1996a). It has been stated that the goal of a CBR programme is not to normalise disabled people to fit into a restrictive, unfair and in many ways disempowering society. Rather it is to join the struggle of other marginalised people to transform our social order into one that treats everyone weak and strong, rich and poor, disabled and non-disabled with equal opportunity and respect (Werner, 1993, P.230).

#### **CBR structure and sustainability through involvement of local community in project:**

There is little uniformity of structures across CBR programmes (Asindua, 1995). The recognition that the frame work for each project should be influenced by community, social, cultural, demographic and resource factors. (Helander, 1993a; peat 1991 a) and cultural values, traditional beliefs and religious factors (Sami .S.et.al, 2003) appears to have resulted in a multiplicity of structural approaches. While historically, CBR structures in developing countries may have reflected hierarchical non government organisation (NGO) structures, devolution to greater community influence is evident (S. Miles, 1996). It has been recommended that CBR project should be autonomous community based and community run unites (S. Miles, 1996; M. Thomas, 1993), with a strong referral system to relevant professionals and agencies (Carraro, 1997; Helander, 1993a).

It would appear that many structural components of CBR programmes are drawn from the local community (including leadership of the programme, volunteers, physical space, funding, involvement of business, etc.,) (L. Krefling, 1995). CBR authors have acknowledged that for community based initiatives to remain significant, the structure should exhibit a degree of co-ordination so that training, technical resources, skills, financial resources, research and advocacy efforts can be pooled (M. Thomas, 1993). It has been recommended that CBR structures should draw support from government and relevant health, education or social welfare service structures (Helander, 1993a; O' Toole, 1991b), as well as mainstream development activities (D. Krefling, 1996b).

#### **SUSTAINABILITY:**

A concern to develop services for and with disabilities, which are sustainable with in a local community, is evident in CBR publications. As a result, it would appear that CBR programmes are more socially and economically sustainable than other models of service delivery (RI, 1995). CBR authors have noted that sustainability is facilitated through the following strategies.

- ◆ Emphasising the need for accountability of a programme, not just to people with disabilities, but also to the community, other agencies and government (Myezwa.H.et.al.2003,Narayan, 1993)
- ◆ Utilising a democratic management style which facilitates a greater degree of empowerment for participants (M. Thomas, 1993; winkley, 1990).
- ◆ Ensuring a high level of consumer and community involvement in all aspects of the programme (Lysacks Kaufert, 1994; Pandey & Advani, 1995).



- ◆ Ensuring clarity of goals and objectives, high degree of skill transfer, and community involvement (Myczwa .H.et.al. 2003, Narayan, 1993).

One of the initial authors of CBR stated that CBR approach was designed in such a way as to be technically, administratively and economically maintainable using local and national resources (Helander, 1993b). Structural elements such as management skills, infrastructure, monitoring and evaluation procedures (RI, 1995), as well as programme and national policies (Yeadon, 1990), have also been seen as factors influencing sustainability of a CBR project.

In developing countries, community participation and 'bottom-up' management styles can only be brought about by deliberately pre-planned strategies; and can result better community involvement and sustainability of the programme in the long run. (M. Thomas & M.J. Thomas, 2001).

#### Community Organization in CBR programmes:-

Community Involvement is vital in CBR programmes, which means community must accept differently abled persons or PWD's as members of their communities. The community must include their handicapped members in their societies. The aim of CBR programme is to provide rehabilitative services to the PWD's according to their needs in their own communities, where they are living. Thus, it is clear that, community must prepare themselves to provide opportunities for psycho-social and economic rehabilitation to their handicapped counterparts.

Community Organization as one of the methods of social work can be used for successful implementation of CBR programmes. In the context of social work, Community Organization (C.O) is a process by which a community identifies its needs or objectives, develops confidence and works towards these needs of objectives, takes action in respect of identified needs and in doing so extends and develops cooperative and collaborative attitude and practice in the community.

The process in community organization pertains to the conscious or unconscious, voluntary or involuntary movement from identification of a problem or objective, to solution of the problem or attaining of the objectives in the community. The task of the social worker in community organization is to help, initiate, nourish and develop this process. (Sushma Batra, et.al.2008). The professional social worker or community organizer is expected to play an important role in CBR programmes.

#### THE ROLE OF SOCIAL WORKER IN C.B.R.PROGRAMMES:-

1. By using Community Organization (C.O) as a method, Social worker can assist in identifying the common needs and problems in community, but does not determine the contents. In CBR programme the community must identify their PWD's problems by involving and interacting with them. Here the community organizer, with his expertise, understands the existence of disability as an area of concern, and make his community to identify its PWD's and understands their needs and problems. Community Organizer creates the situation and makes community to interact and involve with its disabled counterparts. Here he acts like guide and facilitate community people to identify disability, and to understand its causes and prevalence. He can then proceed to help people to rank disability prevention, management and rehabilitation as a priority area for community action.
2. The community organizer should have sound knowledge about various disabilities existence in community like Children/persons with disabilities (impairments including

difficulty in hearing, speaking, moving, learning or behaving), and should know **detailed assessment** of their **specific needs, problems and potentialities**.

3. Community organizer groups the PWD's/family members of children with disabilities and makes them to **ventilate their feelings, emotions and problems**. The professional worker is expected to function in a way that his efforts support the efforts of the clientele group to **come together** and to **organize**, in order to deal with the **issues/problems** in a more **united manner**. Community Organizer must work patiently with individuals and groups of clients.
4. Community organizer **educates** the community about misconceptions of disability. For example some families' view that disability is due to their karma or previous birth or punishment of God or marriage can solve the problem.
5. The community Organizer **discovers** existing **resources** and **mobilizes** them. The community Organization process will involve skills in identifying sources which can be harnessed for funding or for services to be provided to the disabled. Mobilization of requisite resources like financial, physical (space and materials), and technical resources (services offered by agencies and experts), and manpower resources (volunteers).
6. The social worker is expected to create an overall **awareness** of the various governmental and nongovernmental schemes/programmes for the disabled, as also the concessions and other benefits available to them as well as community in general. Apart from this, he also brings the knowledge of the resource agencies providing differential services to the community consciousness. (Sushma Batra et.al.2008). Involve Anganwadi workers, primary Health Workers, local level leaders, priests etc in disability developmental programmes and these persons can be trained to become information repositories for CBR.
7. Encourage **Inclusive Education** for children with disabilities may require special training to the teachers at primary level. Community organizer creates more awareness among staff of general schools, special schools and general public regarding inclusive education, which leads inclusive communities.
8. In CBR programmes, the **sustainability** of the programme should be ensured by the community. Community organizer as a facilitator makes the community to handle each component of the programme systematically. Skill development initiatives being undertaken at the community level could be made accommodative to the needs of the disabled or specific training modules appropriate to the requirements of this special group could be initiated.
9. **Advocacy** in pressing the rights of the disabled through community participation also forms an important component of Community Based Rehabilitation. Community Organizer evokes community sentiments and makes the community to initiates to fight for better livelihood and employment options for the PWD's.
10. Community organizer require to evolve **networking** with various governmental and nongovernmental organizations, advocacy groups and support services existing in the area (community), which could be then utilized for the rehabilitation of the disabled.
11. It has been realized that community acceptance and sensitivity to the disabled goes a long way in facilitating psycho-social and economic rehabilitation of the persons with disabilities. The community organizer is expected to work with diverse community groups to facilitate an **empathetic understanding** of disability and the accordance of

equal rights to the disabled persons. This is indeed a very important component of the CBR approach.

Community organizer by using different strategies of CBR and social worker makes community to own its CBR programme. The author tries to explain real experiences of CBR programme run by Rashtriya Seva Samithi (RASS) a leading Non Governmental Organization in South India, which is working in the states of Tamil nadu, Orissa and Karnataka for the welfare of women and child, disabled and destitute etc.

#### A field study of CBR Programme of RASS:-

CBR has a special appeal to Rashtriya Seva Samithi (RASS) because the community involvement that it envisages is very much in line autonomous village units in which the village committees have to plan and execute programmes for their own welfare.

RASS has started CBR programme in 7 mandals/blocks of chittoor district. They are Narayana vanam, Veduru kuppam, Karveti Nagaram, puttur, Vadamala peta, Kamma Kandriga and Nagari in the year 2003-2004 with the support of government of India. They have taken 955 villages and with door to door survey they identified different types of disabilities. The target area profile is as follows:-

#### Breakup of persons with Disabilities (PWD, s)

|                    |           |                               |       |
|--------------------|-----------|-------------------------------|-------|
| Project started    | 2003-2004 | Orthopedically challenged     | 2,552 |
| Total No. of areas | 955       | Speech and Hearing challenged | 644   |
| Total population   | 3,61,975  | Mentally challenged           | 713   |
| Total families     | 47,836    | Visually challenged           | 383   |
| Target families    | 4,423     | Dwarf                         | 007   |
| Target groups      | 4,802     | Mental illness/others         | 28    |
|                    |           | Leprosy cured                 | 179   |
|                    |           | Multiple disabled             | 96    |

RASS has started CBR programme in these areas due to the high prevalence rate of disability .PWD's and families of PWD's were not aware of their child's condition. Most of the families believe on superstitious beliefs, and used to go to faith healers for magical cure of their wards. Moreover the community people including the family members have negative attitudes towards persons with disabilities. And they do not believe the abilities of disabled persons. They underestimate their disabled children. The people in the community including family members have lack awareness about facilities and concessions provided by the government for disabled children and legislations supporting the disabled persons. Most of the PWD's and families were suffering with financial problems.

In this scenario, RASS started CBR programme in above mentioned areas. Initially RASS went to the villages and met elder person or village head in the village and explain about their purpose of their visit. In the same way RASS staff had contacted different groups in the community viz; PWD.s, parents, family members, Anganwadi workers, school teachers, faith healers, Dwakra groups, Velugu groups etc. RASS staff had conducted small meetings with different groups in their convenient time and create awareness about what is CBR programme, what are the problems faced by the persons/children with disabilities and community. The staff makes the PWD's and families of PWD's and communities to respond about their problems. RASS identified and appointed Rural Rehabilitation Volunteers (RRV's) within the village, with the help of community

members. The families of PWD's are rich sources for training of their wards in Activities of Daily Living (ADL), Communication and Social skills. Most of the RRV's are family members of disabled children/parents or PWD by themselves.

RASS appointed Mandal Committee Members (MCM) for sustainability of CBR programme, with the help of community members (PWD's, family members of disabled, community members). The Mandal committee members appointed Mandal Rehabilitation Workers (MRW). The Mandal Rehabilitation worker act as liaison between Mandal committee members and RRV's. Each MRW planned the programmes with the help of MCM and RRV's. The Mandal committee's will function at the Apex level of the CBR programme in the years to come. The project coordinator monitors the programme.

RASS created more awareness about identification of disabilities, characteristics, prevention and management of persons with disabilities and referral services, through mother's meetings and awareness programmes. Many disabilities are caused because of low awareness of health. The main objective of mother's meeting was to educate the mothers regarding causes of disability, its prevention and rehabilitation. They were also made aware of the importance of health and nutrition and child care and also to create awareness among the community regarding CBR towards rehabilitation of disabled and other general issues. In awareness programmes of general public, the main focus was on identification, prevention and referral services.

CBR project formed 174 Self Help Groups (SHGs) in 7 mandals/blocks in collaboration of PWD's, their families

and non handicapped members of community. The project has put a lot of efforts in strengthening the vocational training and Income Generation Programmes with the help of Jan Shikshan Sansthan (JSS) and RASS Mahila Pragathi (RMP).

#### Impact of CBR project:-

- The community, the local leaders understood the importance of community based rehabilitation (CBR) in their mandals/blocks. They were able to identify PWD's at the earliest and refer these PWD's to concerned resource centers. Parents of PWD were able to manage their own children and also helped other newly identified which they come across.
- Increased participation of the community through donation and in cash and distribute the prizes to PWD's on the occasion of World Disability Day celebrations. Community arranged for local resources for the success of the programmes. The youth members participated in the awareness programme especially in the street plays, singing songs and participated in all national festivals in the target mandals by hoisting the flag and distributing sweets.
- Due to the meetings and specialist camps the community has got substantial amount of knowledge regarding services available for PWDs(referral services) and how to give the home bound intervention to Differently Abled persons (DAP's) or disabled persons.
- Due to the training programmes on financial management to the self help groups, women with low literacy levels were able to partially manage their finances now. They were able to take decisions, administer loans and strictly monitor repayments with assistance of CBR staff.
- Mothers were capable to advising other mothers in their areas mainly on prevention and

management. Mothers were stopped to go to faith healers for magical cure. They were able to identify PWD's and refer them to concerned institutions.

- The community referred 96 cases to concerned hospitals. If they have any doubt they send a representative to CBR personnel for clarification and advise. Bus passes and train concessions have been got by them for their PWD's. Some parents are making their own efforts to avail Prime Minister Rojgar Yojana (MRY), self employment loans provided by the Government. They are refraining from consanguineous marriages.
- Parents are very cooperative and learnt skill of management of their PWD's (due regular specialist training programmes were conducted in CBR target mandals). There is lot of improvement in their children. They accompany RRV's, and MRW's, vocational instructors and Social workers to other villages to share their experiences. They demonstrate therapy techniques and advise other parents to adopt them for their children.
- The target areas of the project belong to lower socio economic status. Most of the parents are laborers who work for daily wages. They consider their PWD's as peculiar and as a result kept them idle. The project had helped adult PWD.s and parents through its economic programme. Some of the PWD's were trained in vocational trades like Hand Embroidery, Tailoring, candle making, Agarbathi making, Handlooms and Agricultural activitied and some PWD's were placed in jobs whereas still others in some small scale business through SHG's.
- RASS CBR project conducted Early Identification camps and physiotherapy programmes, child to child programmes, Homeo Medical camps and other therapy camps. The details of camps and number beneficiaries, and distribution of aids and appliances are explained in the following tables:-

**Programme details:-**

| Sl. No | Activity  | No. of programmes | Beneficiaries |
|--------|---|-------------------|---------------|
| 1.     | Homeo Medical camps                                     | 2                 | 2165          |
| 2.     | Pulse Polio Immunization camps                          | 2                 | 967           |
| 3.     | Psychiatric Assessment & Counseling Camps               | 12                | 1150          |
| 4.     | Speech Therapy Camps                                    | 12                | 814           |
| 5.     | Eye Screening Camps                                     | 10                | 967           |
| 6.     | Awareness on HIV/AIDS                                   | 29                | 2325          |
| 7.     | Early identification camps and physiotherapy programmes | 07                | 650           |
| 8.     | Child to child programmes                               | 21                | 2960          |

**Details of Aids and Appliances:**

| S. No. | Name of the Aids/Appliances | No. Units Distributed |
|--------|-----------------------------|-----------------------|
| 1.     | Tri-cycles                  | 15                    |
| 2.     | Hearing Aids                | 24                    |
| 3.     | Calipers                    | 3                     |
| 4.     | Spectacles                  | -                     |
| 5.     | White canes                 | 9                     |
| 6.     | Artificial Legs             | -                     |
| 7.     | Wheel Chairs                | 6                     |

In CBR programme PWD's are educated to the maximum through special education centres, homebound training and vocational activities. Parents are trained in the management of PWD's. The community identified the importance of education to their PWD's. Their participation has improved considerably and this has been noticed by the way they have cooperated in follow-up activities of the child. As a result, improvements have been excellent. 12 PWDs were integrated in the current year. 55% of the parents, village committee members and community members got training in different disability aspects.

#### **Monitoring and Evaluation:-**

- Monitoring was conducted through monthly, half yearly and also by field visits. This is done to know the performance of the planned activities. Regular records of Awareness activities, medical and health activities, home bound intervention activities were maintained by the field staff on a monthly basis. This is submitted to the Mandal MRW's. The Mandal MRW's consolidated these reports and submits to the project coordinator.
- The project coordinator reviews the report and discusses with field staff and evaluates the programmes.
- Finally the project coordinator review the activities with the committee leaders and community leaders and feedback were given whenever necessary. This process will be continued every month.

#### **Problems encountered in CBR programme:-**

- Most of the villages are faraway places and reaching in time proves to be very difficult. Buses do not ply certain areas after heavy showers of rain as the roads ruined badly.
- It has not always been easy for the staff to get an equal number of participation of men and women when programmes are organized in the mid-day, evening or at night. Women do hesitation to come either because of household chores or not allowed by their husbands.

With the real experiences of RASS it was envisaged that CBR programmes are best programmes to meet the needs of persons with disabilities, their families and communities in unreached areas. CBR programmes are cost effective and helpful to the development of community, not only persons with disabilities and also the non-handicapped persons. So, it is the responsibility of the community organizer (Project coordinator) to make CBR programmes more successful and sustainable.

#### **CONCLUSION :-**

Community is the term with powerful positive characteristics, but also with the potential to divert attention from significant problems in society (William Boyce et. al 2000). Community diversity needs identification and mobilization strategies have represented considerable challenges to the development of community participation. Sustainability and community participation are linked strongly by the literature. In CBR, project ownership, political support, and / or the maintenance of delivery systems are crucial to meeting the multifaceted needs of the person with disability (Myezwa et.al.2003). It is proposed that planners and implementers of CBR need to develop a comprehensive model of CBR by using the above mentioned strategies and involve the PWD, their families, and communities in CBR Programmes. With the above discussion clearly explains the need of community organizer /professional social worker in implementation of CBR.

programmes.

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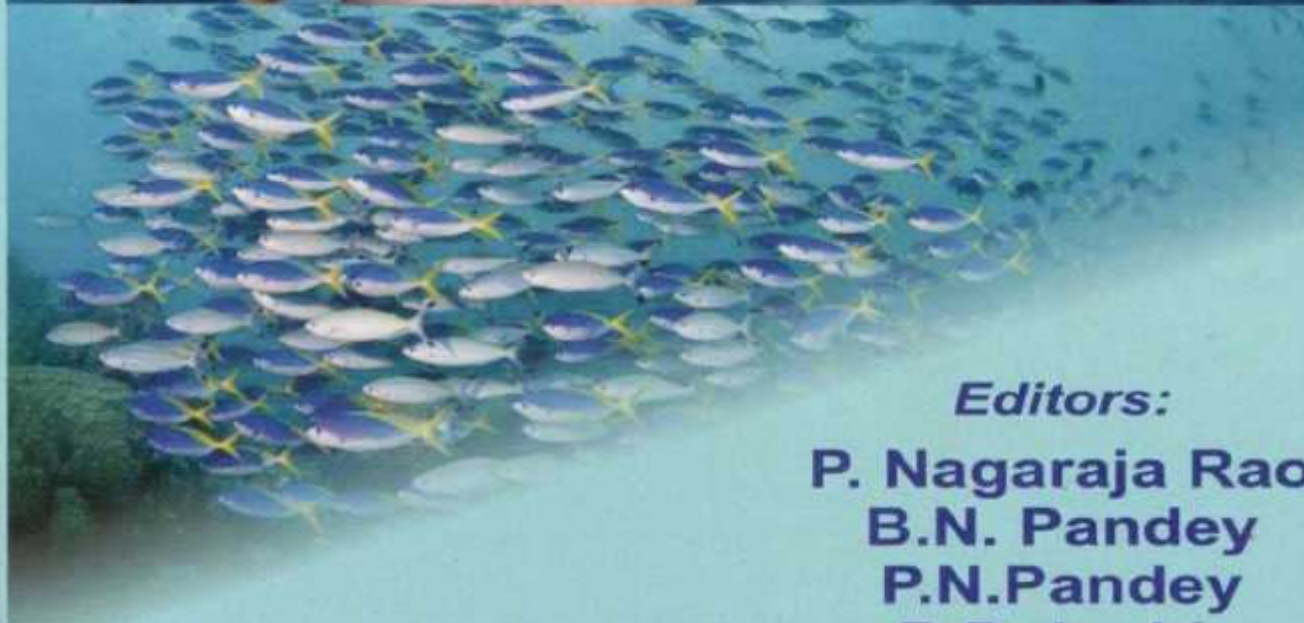
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# CONTEMPORAY TRENDS IN FISHERIES AND AQUACULTURE



*Editors:*

**P. Nagaraja Rao  
B.N. Pandey  
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## Contents

- 1 **Aquaculture organism of the world**  
*Manik Chandra Mahata* 1-18
- 2 **Judgemental Destinatin of Marine Fisheries in A.P**  
*M.Jayakumar Jacob and P. Brahmaji Rao* 19-22
- 3 **Value addition of fermented fish product using  
Tetragenococcus as bioflavouring agent**  
*Pappu Deb, Paramita Bhattachajree, M.K.Bhattacharya* 23-27
- 4 **Habitat Ecology of burrowing crab *Barytelphusa  
cunicularis* in Godavari river basin**  
*Sharda N padghane and Shivaji P Chavan* 29-34
- 5 **Effect of *Withania somnifera* root Extract Enriched  
Aquafeed on *Oreochromis Mossambicus***  
*Jasmine Anand* 35-47
- 6 **Isolation, Idectification and optinization of Protease  
Producing Microorganism *Aspergillus terreus*  
From Aquaculture**  
*ShriKanya Rao KVL M.Adelina Jaya Harsha* 49-60
- 7 **Studies of Zooplankton Abundance and Physico-  
chemical Parameters around Sagar Island, Indian  
Sundarban Delta**  
*Sanghamitra Basu Chitraj and Subarna Bhattacharya* 61-63
- 8 **Structural and Enzymatic Changes in the Ovary of  
Freshwater Crab, *Barytelphusa cunicularis* (West-  
wood) Exposed to Heavy Metal**  
*Atul R. Chourpagar Rumana S.Shaik and G.K Kulkarni* 65-73
- 9 **A comparitive study of the Heart Structure of  
*Channa striatus* and *Labeo rohita***  
*A.A.Onkar* 75-81

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# ISOLATION, IDENTIFICATION AND OPTIMIZATION OF PROTEASE PRODUCING MICROORGANISM *ASPERGILLUS* *TERREUS* FROM AQUACULTURE PONDS

**Shrikanya Rao KVL** , M. Adelina Jaya Harsha and R. Pavani

Department of Biotechnology, *Vikrama Simhapuri University*, Kakatur,  
Nellore – 524 320, Andhra pradesh

E-mail: [shrikanya.rao@gmail.com](mailto:shrikanya.rao@gmail.com)

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## ABSTRACT

Fungi from marine habitats have received much attention in recent years for production of useful secondary metabolites. Marine fungi belonging to genus *Aspergillus* are one of the major groups contributed to the antimicrobial metabolites of fungal origin. They recognized as potential source of novel and biologically potent metabolites. Protease constitutes one of the important groups of industrially important enzyme. In the present study, *Aspergillus terreus* was isolated from aquaculture ponds of Nellore, identified with the help of literature and the isolates were screened for the protease activity. The isolation, purification and characterization of proteases from fungi are optimized for alkaline protease product and reveal significant result. 2gm/ml of sucrose concentration had given the maximum protease activity after incubation of 72 Hrs. The nitrogen source ( $\text{NaNO}_3$ ) at concentration 0.05 gm/ml had given the maximum protease activity after incubation of 72 Hrs at 37°C and minimum protease activity was obtained in 1.5 gm/ml after incubation for 24 Hrs. Maximum protease activities was observed at pH 7 and temperature 37°C respectively.

**KEYWORDS:** *Aspergillus terreus*, protease, sucrose,  $\text{NaNO}_3$

## INTRODUCTION

Enzymes are the focal point of biotechnological process since they are involved in all aspects of biochemical conversion, from the simple fermentation conversion to the complex techniques in genetic engineering and molecular biology. They are used as cost-effective and ecofriendly substitution for chemical processing in several industries, including pharmaceutical, food and beverages, starch, laundry detergents, in the processing of textiles, leather, wood, pulp and paper; in the production of fine and special chemical, in organic synthesis and transformation of compounds, bioremediation and waste treatment (Chellappan, 2005; Adrio and Demain, 2014). The world market for industrial enzymes is worth \$1000 million with an average growth rate of 10 percent per annum (Biospectrum, 2005). Fungi are well known sources of extra cellular enzymes and proteases from the genus *Aspergillus* have been studied extensively (Ganesh Kumar and Takagi, 1999). Fungi associated with marine organisms, due to their unusual niche, may be a new source to isolate proteases. Marine fungi proved to be rich source of new biologically active natural products (Cuomo *et al.*, 1995; Jensen and Fenical, 2000). Proteases are robust enzymes having wide industrial applications in detergents, leather processing, healthcare, food processing etc (Koh *et al.*, 2000; Gonzalez *et al.*, 2004). Proteases constitute one of the largest groups of industrially important enzymes, which hydrolysis the peptide bonds in other proteins, constitute a very large and complex group of enzymes, and differ in properties such as substrate specificity, active site, catalytic mechanism, pH and temperature of activity and stability profile (Wards, 1985). Proteases are also important for cell differentiation, translation, modulation of gene expression, and enzyme modification and secretion (Roberts *et al.*, 1977). They convert inactive enzymes and other biologically inactive protein molecule into active form and during extracellular enzyme secretion the hydrophobic peptide extension which facilitates the passage of the enzyme through the cell membrane is cleaved by proteolytic action (Smeeckens, 1993). The marine derived fungi were screened for protease activity and found to be significant for production of proteases (Kamat *et al.*, 2008), isolates are a good sources of hydrolytic enzymes and antibiotics (Smitha, 2014).

The present investigation is aimed at optimization of the growth parameters like sucrose concentration, Sodium Nitrate concentration, temperature and pH for protease production from *Aspergillus terreus* from aquaculture ponds of Nellore.

## MATERIALS AND METHODS

### Collection of water sample

The surface water sample was aseptically collected from one to two meters away (from different parts of pond) from aquaculture pond of Nellore, Andhra Pradesh, in pre-sterilized bottle.

### Isolation of *Aspergillus terreus*

Isolation of protease producing fungi from water sample was done by serial dilution method. 0.1 ml of each dilution was pipette out and spread into CzapekDox agar medium. The inoculated plates were incubated at 37°C for 3-7 days.

### Identification of the *Aspergillus terreus*

On the basis of developed colony on agar and morphological characteristics, the fungi were identified. Lacto phenol cotton blue stain was used as mounting fluid. The slides were observed under microscope to identify the fungi upto species level using mycological literature. The following morphological characteristics were evaluated: colony growth (length and width), presence or absence of aerial mycelium, colony color, presence of wrinkles and furrows, pigment production etc (Guy and Summerbell, 2011).

### Protease production by *Aspergillus terreus*

*Aspergillus terreus* was isolated by using CzapekDox medium. The medium was prepared and distributed in 10 flasks 50 ml each along with a control. First 5 flasks were taken. In these, increasing amounts of sucrose was added in the concentration 0.5gm, 1gm, 1.5gm and 2gm. One was kept for control. Another 5 flasks were taken. In these, increasing amounts of NaNO<sub>3</sub> was added in the concentration 0.5gm, 1gm, 1.5gm and 2gm. One was kept for control. Again another 5 flasks were taken with 50ml of medium each. In these, pH was adjusted at 6.5, 7, 7.5, 8 and one was kept for control. All these cultures were inoculated with *Aspergillus terreus* and incubated at 37°C for 24hrs and the protease activity was measured. Another 4 flasks were taken with 50 ml of medium and inoculated with *Aspergillus terreus*. After inoculation, they were incubated at 4°C, 35°C, 28°C and 40°C.

### Protease assay

After 24 hours, these cultures were filtered into different test tubes. From these cultures, 1 ml of culture was taken into different test tubes. To



these cultures 1ml of casein was added. Incubate these mixtures for one hour. To these mixtures, 5ml of Trichloro acetic acid (TCA) was added for arresting the process. Then these mixtures were filtered into different test tubes. From these mixtures, 1ml was taken into different test tubes and 5ml of NaOH was added to each tube. After 10 minutes 0.5ml of F-c reagent was added. After ½ hour incubation, absorbance was observed by using colorimeter at 680nm. Like this process remaining 48hours and 72hours absorbance was also observed. The graph was plotted with different time on x- axis and protease activity on Y- axis.

## **RESULTS and DISCUSSION**

The marine fungus isolated in the present study was identified as *Aspergillus terreus* (Fig. 1).

### **Macroscopic Appearance**

The results of the present study shows that the growth rate of the fungi is rapid and the texture of colonies varies from downy to powdery; surface colony color is beige to buff to cinnamon while reverse is pale yellow to brown with yellow soluble pigments that are frequently present.

### **Microscopic Appearance**

The hyphae are septate and hyaline. Heads of the conidia are in the form of compact columnar and contains metulae which supports the phialides also called as biseriate. Conidiophores are smooth – walled, with length ranging from 70 - 300 µm long, and terminating in mostly globose vesicles; globose, smooth conidia, and small with size of 2 – 2.5 µm in diameter; and Accessory conidia are hyaline, globose, sessile, with size of 2 – 6 µm, and are frequently produced on submerged hyphae (Germain and Summerbell, 2011).

### **Optimization of sucrose for growth of isolated *Aspergillus terreus***

The optimization of carbon source i.e. sucrose was carried out at different concentrations viz. from 0.5g to 2g to enhanced the production of protease. The sucrose concentration 2g had given the maximum protease activity after incubation of 48Hrs in the incubator at 37°C and minimum protease activity was obtained in control after incubation for 48Hrs. The optimal requirement of the sucrose as the carbon source for maximal enzyme production by *Aspergillus terreus* with minimal specific activity incubated at 37°C, the growth increases gradually from 24Hrs to 72Hrs and maximum growth observed at 48Hrs. The protease at 24hrs showed decrease and increase in its production whereas, at 48hrs the production

doesn't show major drastic variance and at 72hrs there is a gradual increase in the production of protease (Fig. 2).

### **Optimization of nitrogen source for growth of isolated *Aspergillus terreus***

The N-source i.e.  $\text{NaNO}_3$  (Nitrite) was optimized for the production of protease at different concentrations viz. from 0.05g-0.20g. In *Aspergillus terreus* the nitrogen source concentration 0.05g had given the maximum protease activity after incubation of 72Hrs in the incubator at 37°C and minimum protease activity was obtained in 0.15g after incubation for 24Hrs. The optimal requirement of Nitrite for the incubation for maximum enzyme production by *Aspergillus terreus* incubated in incubator at 37p C. The protease production is maximum after 72Hrs when compare to 24Hrs and 48Hrs. The graph represents the fluctuations in the protease production the 24 and 72hrs curve, which indicates that there are no constant increase but 48hrs curve shows constant increasing of protease production and slow decreasing (Fig. 3).

### **Optimization of temperature for growth of isolated *Aspergillus terreus***

The enhancement of protease production from *Aspergillus terreus* at different temperatures was carried out from 4°C - 40°C. The maximum protease activity observed at 40°C temperature after 72hrs of incubation and minimum 4°C temperature after incubation of 24hrs. The graph shows the production of protease after 24hrs which indicates a drastic increase at 35p C whereas the production is similar at 48hrs and 72hrs (Fig.4)

### **Optimization of pH for growth of isolated *Aspergillus terreus***

The maximum protease activity were observed after incubation of 72Hrs at pH 7 and minimum protease activity after 24Hrs at pH 8 (Fig.5). The production of protease gradually increases from 24hrs to 72hrs with increase in pH.



Fig.1 *Aspergillus terreus*

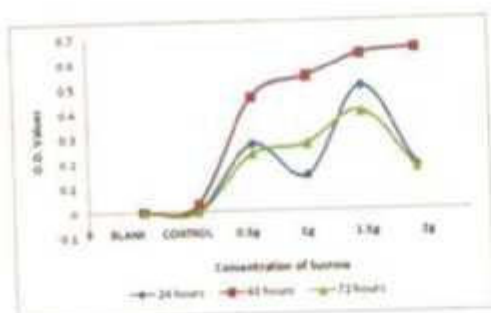


Fig. 2 Standard graph for Sucrose Concentration

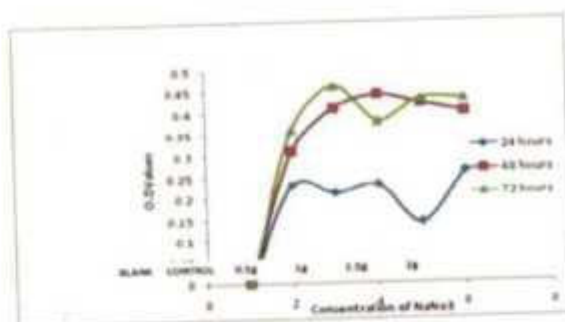


Fig. 3 Standard graph for Sodium Nitrate concentration

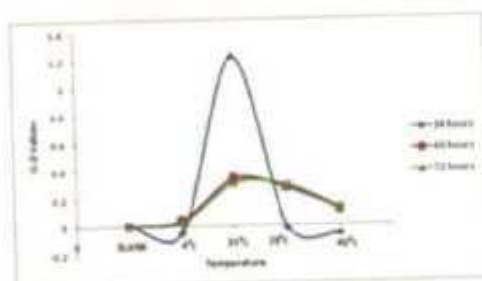


Fig. 4 Standard Graph for different Temperature

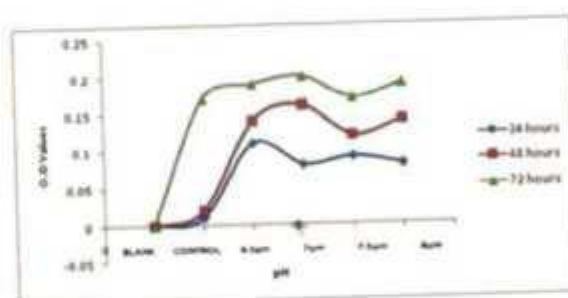


Fig. 5 Standard graph for different pH

## DISCUSSION

The ocean represent a rich source of novel component, recently marine organism have been focus of research as a likely source of potentially useful compounds like enzymes and antibiotics. The important terrestrial fungi as a source of valuable bioactive metabolites as well established i.e. enzymes, organic acids and antibiotics (Pointing and Hyde, 2001; Smitha, 2014). An extensive review of marine microbial enzyme in India is presented by Chandrasekhar and Kumar (2002). Proteases constitute a complex group of enzyme, which differ in properties such as substrate specificity, active site and catalytic mechanism, pH and temperature of activity and stability and profiles. They are most significant enzyme group with several commercial applications employed in food processing, leather making, as detergent, meat tenderization and for therapeutic applications (Najfi, 2005; Ray, 2012). In case of food processing, milk industry, beverages and processing of grains, bakery utilizes enormous amount of protease and other enzyme from several sources including fungi. Ethanol fermentation, production of detergent for biological application has increased exponentially in last decades (Shikha Sharma and Darmwal, 2007; Singh, 2001). Large scale processing of meat and silk fabric also need protease which fetch with climatic issues and quality of meat and silk fabric (Pandey and Singhania, 2008; Benjminand Pandey, 1998). Besides industrial and

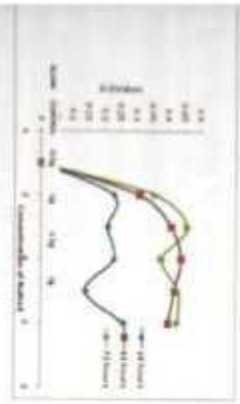


Fig. 3 Standard graph for Sodium Nitrate concentration

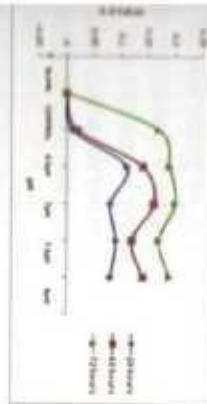


Fig. 4 Standard graph for different pH

source of novel component, recently earth as a likely source of potentially antibiotics. The important terrestrial metabolites as well established i.e. (Ponning and Hyde, 2001; Smitha, microbial enzyme in India is presented proteases constitute a complex group such as substrate specificity, active temperature of activity and stability cant enzyme group with several food processing, leather making, as erapeutic applications (Najfi, 2005; ng, milk industry, beverages and enormous amount of protease and heding fungi. Ethanol fermentation, ical application has increasedharma and Darmwal, 2007; Singh, and silk fabric also need protease ility of meat and silk fabric (Pankey dey, 1998). Besides industrial and

Table. 1. Optimum values of pH and temperature for various species of *Aspergillus*.

| S. No | Species                    | Location  | pH        | Temperature in °C | Author                        |
|-------|----------------------------|---|-----------|-------------------|-------------------------------|
| 1     | <i>A. fumigates</i>        | Centre Hospitalier Universitaire Vaudois, Switzerland | 9.0       | 30                | Monod et. al, 1991            |
| 2     | <i>A. oryzae</i>           | Centre Hospitalier Universitaire Vaudois, Switzerland | 8.0       | 30                | Monod et. al, 1991            |
| 3     | <i>A. oryzae</i>           | NRRL 2160, USA  | 7.0       | 27                | Battaglino et. al, 1991       |
| 4     | <i>A. oryzae NRRL1808</i>  | NRRL, USA   | 7.5       | 30                | Chandran Sandhya et. al, 2005 |
| 5     | <i>A. fumigatus TKU003</i> | Local soil, Tamsui, Taiwan                            | 8.0       | 40                | Wang et. al, 2005             |
| 6     | <i>A. awamori</i>          | Local isolate IIT Kharagpur                           | 4.0       | 37                | Sangeetha and Banerjee, 2006  |
| 7     | <i>A. tamari</i>           | NRRL, USA   | 9.0       | 30                | Dayanandan et. al, 2007       |
| 8     | <i>A. clavatus ES1</i>     | Wastewater, Sfax, Tunisia                             | 8.0       | 30                | Molamed et. al, 2008          |
| 9     | <i>A. niger</i>            | Local soil, Coimbatore                                | 8.5       | 45                | Kalpna et. al, 2008           |
| 10    | <i>A. nidulans HA-10</i>   | Poultry farm soil, Chennai                            | 8.0       | 35                | Charles et. al, 2008          |
| 11    | <i>A. fischeri</i>         | Shola forest, Tamilnadu                               | 10.0-10.5 | 35                | Saravanakumar et. al, 2010    |
| 12    | <i>A. oryzae MTCC5341</i>  | CFTRI, Mysore   | 5.0       | 30                | Viswanatha et. al, 2010       |
| 13    | <i>A. flavus</i>           | Soil around leather industry, Tiruchirapalli          | 9.0-11.0  | 28                | Chellapandi, 2010             |
| 14    | <i>A. terreus</i>          | Soil around leather industry, Tiruchirapalli          | 8.0       | 28                | Chellapandi, 2010             |
| 15    | <i>A. niger</i>            | Paddy soil isolate, Manipal                           | 4.0       | 28                | Kamath et. al, 2010           |

|    |                        |  |         |       |   |
|----|------------------------|--|---------|-------|---|
| 16 | <i>A. spp</i>          | Abattoir, Tirupati                           | 5.0     | 32±2  | Radha et. al, 2011                          |
| 17 | <i>A. niger</i>        | Oil cakes, Chennai                           | 5.0     | 35    | Gnanadoss J et. al, 2011                    |
| 18 | <i>A. niger II</i>     | Université de Sfax, Tunisia                  | 5.0     | 30    | Siala et. al, 2012                          |
| 19 | <i>A. terreus</i>      | Potato grown soil fields, Bangalore          | 10.0    | 37    | Francois N Niyonzima and Sumil S More, 2013 |
| 20 | <i>A. oryzae LBAOI</i> | University of Campinas, Brazil               | 5.0-5.5 | 55-60 | Ruann and Harumi Sato, 2014                 |
| 21 | <i>A. flavus</i>       | Mannargudi Taluk, Tiruvarur Dt               | 8.0     | 30    | Chandrasekaran et. al, 2015                 |
| 22 | <i>A. niger</i>        | Mannargudi Taluk, Tiruvarur Dt               | 7.0     | 30    | Chandrasekaran et. al, 2015                 |
| 23 | <i>A. niger</i>        | Dr. B Lal Institute of Biotechnology, Jaipur | 9.0     | 35    | Sethi and Gupta, 2015                       |
| 24 | <i>A. niger</i>        | Soil sample, Nigeria                         | 4.0,8.0 | 60    | Milala et. al, 2016                         |
| 25 | <i>A. flavus</i>       | Bamboo soil forests, Madhya Pradesh          | 8.0     | 28    | Choubey et. al, 2016                        |

medicinal applications the proteases also play a important role in basic research. Their selective peptide bond cleavage is used in the elucidation of molecular structure-function relationship, in the synthesis of peptides and in the sequencing of proteins. In essence, the wide specificity of the hydrolytic action of proteases finds an extensive application in the food, detergent, leather, and pharmaceutical industries and in the structural elucidation of proteins. Whereas synthetic capability are used for the synthesis of proteins.

The results obtained in the present study agreed with the earlier work. Proteases from various species of *Aspergillus* have optimum values ranging from pH 4-11 and temperature 27-60°C (Table -1).

## CONCLUSION

The present work reveals that the marine fungi are considered a remarkable source of bio-logically active natural products with new chemical structures. Proteases from the *Aspergillus terreus* have been studied extensively by optimizing the physical and chemical parameters and observed to be good source of hydrolytic enzymes and antibiotics. They also play a significant role in remineralisation and can be used as a potential source for enzyme production for industrial applications. Even though the terrestrial strains are well known for antibiotic production, reports on antibiotics from marine sources are meager and therefore worth investigating for the discovery of novel metabolites.

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### About the Editors

**Dr Vandana Rai** received her education at the universities in Lucknow (B. Sc) and Allahabad (M.Sc and D. Phil.) excelling in all the courses of study. Her research interest ranges from Cell Biology, Genetics, Molecular Biology and Human Molecular Genetics; Her contributions on Human Molecular Genetics are well recognized. She joined Veer Bahadur Singh Purvanchal University in 2000, and has involved in teaching and research since then. She is having over seventeen years of teaching experience at post graduate level. She has been guiding post graduate (M.Sc) and doctoral (Ph.D.) students since 2005. She has published over 6 dozen research articles, more than 12 chapters and edited 1 book. She has successfully completed five research projects funded by UGC, DST, DBT and CSIR. Dr Rai has been actively engaged in curriculum development of Biotechnology courses for postgraduate students and pharmacy courses for under graduate students. She has attended more than 30 International and national conferences, seminars and presented her research. She has also organized more than 10 various seminars, workshops, training programmes and genetic awareness programmes. She is member of Editorial Board and reviewers of several Journals like- International Journal of Life Science and Pharma Review, Asian Journal of Medical Sciences, American Journal of Biomedical Research, Molecular Biology Reports, Genetic Testing and Molecular Biomarkers, Indian Journal of Medical Research, Meta Gene, Neuroscience Letter, PLoS One, Journal of Assisted Reproduction and Genetics and The Journal of Obstetrics and Gynecology etc. Dr Vandana Rai is life member of Indian Academy of Neurosciences (IAN), Biotech Research Society of India (BRSI) and Indian Society of Human Genetics (ISHG) etc.



**Dr Pradeep Kumar** has done his M.Sc (Biotechnology) from University of Roorkee, Roorkee and Ph.D. in Biotechnology from VBS Purvanchal University, Jaunpur. His research interest ranges from Bioinformatics to Human Molecular Genetics. He joined Veer Bahadur Singh Purvanchal University in 2000 and has involved in Teaching and Research since then. He has published over 3 dozen research articles and several book chapters. He has presented his research work in several International and national conferences. He has successfully completed two UGC funded research projects. He is member of Editorial Board and reviewers of several Journals. Dr Pradeep Kumar is life member of Biotech Research Society of India (BRSI), Indian National Science Congress, Indian Society for Technical Education and Indian Society of Human Genetics (ISHG).

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Jaunpur (UP)

**Dr Pradeep Kumar**

Assistant Professor

Department of Biotechnology

V B S Purvanchal University

Jaunpur (UP)

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|  |            |
|--|------------|
| • Materials and Methods  | 46         |
| • Results  | 52         |
| • Discussion & Conclusion  | 67         |
| • References   | 67         |
| <b>4. Pharmacological Properties of the Genus <i>Premna</i> L. (Lamiaceae)</b>           | <b>71</b>  |
| Harikrishnan MR, Suhara Beevy S  |            |
| • Introduction   | 71         |
| • Genus Profile  | 72         |
| • Phytochemical Evaluation   | 73         |
| • Pharmacological Importance of the Genus <i>Premna</i>                                  | 75         |
| • Conclusion   | 77         |
| • References   | 78         |
| <b>5. Bioaccumulation and Phytoremediation of <i>Vigna Mungo</i> using Bioinoculants</b> | <b>80</b>  |
| S Lalitha  |            |
| • Introduction   | 80         |
| • Need of Fertilizers Today  | 82         |
| • Taxonomy of AMF  | 82         |
| • Occurrence and Distribution of Vesicular Arbuscular Mycorrhizae Fungi                  | 88         |
| • Occurrence and Root Colonization   | 89         |
| • Uptake of Nutrients  | 89         |
| • Soil Enzyme and Reclamation of Wastelands  | 91         |
| • Pot Culture Studies  | 95         |
| • Assessment of Mycorrhizal Fungal Diversity   | 98         |
| • Mean of three replicate and standard deviation   | 102        |
| • Discussion   | 113        |
| • References   | 116        |
| <b>6. Phytopharmacological Review on the Miracle Plant <i>Boerhavia diffusa</i> L.</b>   | <b>121</b> |
| G R Juna Beegum, S Suhara Beevy and V S Sugunan  |            |
| • Introduction   | 121        |
| • Conclusions  | 132        |
| • References   | 133        |
| <b>7. Commercial Micro Propagation and Challenges in Plant Tissue Culture</b>            | <b>137</b> |
| Kiranmai Chadipiralla, Pachipala Gayathri, Uday Sankar Allam and P.V.B. Reddy            |            |
| • Introduction   | 137        |

|   |            |
|---|------------|
| • History of Tissue Culture   | 138        |
| • Methodology   | 139        |
| • Factors Influencing the Micropropagation  | 147        |
| • Commercial Uses of Micro-Propagation  | 148        |
| • Cloning of medicinal plants through Micropropagation  | 151        |
| • Indian Scenario Vs Rest of the World  | 151        |
| • References  | 154        |
| <b>8. Biodetergents or Biocleaners</b>  | <b>155</b> |
| Sanjay Rathod, Muzaaheed  |            |
| • Introduction  | 155        |
| • Review of Literature  | 155        |
| • Detergents  | 162        |
| • Materials and Methods   | 165        |
| • Results   | 169        |
| • Discussion  | 174        |
| • Conclusion  | 177        |
| • References  | 177        |
| <b>9. Recent Advances in Bioprocess Optimization of Fructo-oligosaccharides</b>                     | <b>181</b> |
| Vaibhav V. Gujar, Anshuman A. Khardenavis and Hemant J. Purohit                                     |            |
| • Introduction  | 182        |
| • Production of Fructo-oligosaccharides   | 185        |
| • FOS purification  | 192        |
| • Bifunctional attributes of FOS  | 192        |
| • Applications of FOS in foods  | 196        |
| • Global status of FOS  | 196        |
| • Concluding Remarks  | 197        |
| • References  | 198        |
| <b>10. Bioprocessing and Strain Development for Microbial Metabolites and Heterologous Proteins</b> | <b>205</b> |
| Gita Sharma, Abhijit Mehta  |            |
| • Historical Perspective  | 205        |
| • Approaches for Industrial Bioprocess Development  | 208        |
| • Classes of Products   | 234        |
| • References  | 301        |
| <b>Author Index</b>   | <b>305</b> |
| <b>Subject Index</b>  | <b>306</b> |

## Commercial Micro Propagation and Challenges in Plant Tissue Culture

**Kiranmal Chadipralla\***, Pachipala Gayathri\*, Uday Sankar Allam\* and P.V.B. Reddy\*\*

### INTRODUCTION

Plant tissue culture is widely used to produce clones of a plant in a method known as **Micro propagation**, a technique that helps in rapid multiplication of stock material thereby generating a large number of progeny plantlets. Commercial tissue culture industry is in existence globally since the last 25 years. India has started plant tissue culture industry about 15 years back and is revolutionizing the commercial agriculture sector by enabling mass propagation of quality of planting material. Plant tissue culture is a collection of techniques which are used to maintain or grow plant cells, tissues or organs under sterile conditions on a nutrient culture medium of particular composition. Tissue culture techniques are important to obtain disease free plants, ranging through molecular genetics, recombinant DNA studies, genome characterization, gene-transfer techniques, aseptic growth of cells, tissues and organ etc., Worldwide there have been numerous efforts to effectively commercialize the large scale propagation of plants by micro propagation and some of these efforts have been more successful. Micropropagation is one of the most commercially exploited areas of plant tissue culture. Micropropagation is used to multiply desired plants such as those that have been genetically improved commercial plants or bred through conventional plant breeding methods. Micropropagation is extremely useful to provide the sufficient quantity/ number of plantlets for planting from a stock plant which does not produce seeds, or does not respond well to reproduction. The advances in the technology during the last 30 years have made it possible to efficiently regenerate plantlets from callus and explants from all types of plants.

\* Department of Biotechnology, Vikrama Simhapuri University, Nellore-524001, Andhra Pradesh (Corresponding Author).

\*\* Department of Life Science & Bioinformatics, Assam University, Diphu Campus, Diphu, Assam-782462

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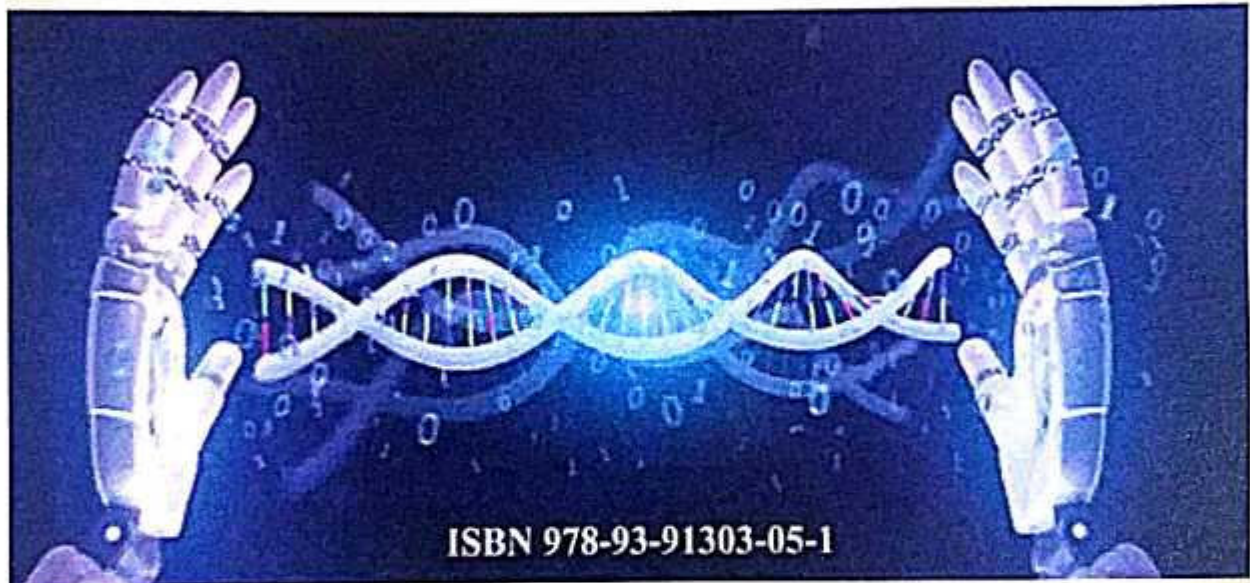
**Dr. V. Sailaja**

Assistant Professor of Zoology

Vikrama Simhapuri University PG Centre

Kavali – 524 201 A.P. INDIA

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Head I/C Dept of Botany  
Asst. Prof. of Zoology  
VIKRAMA SIMHAPURI UNIVERSITY  
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**Dr. V. Sailaja, Head I/C, Dept. of Botany, Assistant Professor of Zoology, Vikrama Simhapuri University P.G Centre, Kavali, Nellore Dist., PIN-524201**

#### BRIEF PROFILE

Dr.V.Sailaja has been working and contributing to the field of organic farming, & environmental science related to bio-diversity and aquaculture. She has 31 years of teaching and Research experience. She was awarded Gold medal in M.Sc Zoology by Sri Venkateswara University, Tirupathi. She has 58 research publications in reputed highly scopus national and international journals and presented more than 50 papers in various National and International seminars and conferences. She attended 25 national and International workshops. She attended more than 50 online seminars and workshops. She has received many honourary awards. Some of the important awards are Best women award-2011, State Best Citizen of Andhra Pradesh Award -2011, International Women of Distinction Award In Sciences -2016, Bharath Vikas National Award -2016, Outstanding Educator and Scholar Award-2017, National Distinguished scholar and Icon -2017, Exemplary Teacher Award -2018, Outstanding National Science service Award -2019, National Distinct Women Educator and Scholar award-2021. She has organized three National Seminars, one National Symposium, one National Workshop, one National webinar, one International Webinar and one training programme on skill development. Two PhD's were awarded under her able guidance. Presently she is guiding three Ph.D students. She Worked as Co-Ordinator, Eco-AIR Project, A.P State science centre, Amaravathi. This project was sanctioned by DST, New Delhi. She has done minor research project on "Ecological Study of Mangroves at Chippaleru Estuary Lakshmpuram Village Thummalapenta, Kavali, SPSR Nellore". She has published 15 books and her biodata was published in books The Magnificence of Humbles and Imminent Researcher and Scholar Icon 2017. She held different positions like In-charge for Central Instrumentation Facilities scheme under UGC Programme in J.B Degree and p.g college, Kavali, worked as HOD, Dept of Biotechnology, J.B. Degree and P.G. College, Kavali, worked as Head In-charge, Department of Zoology, and presently working as Head In-charge, Department of Botany, Vikrama Simhapuri University Post Graduate Centre, Kavali. She acted as paper setter for different Colleges and various Universities. She worked as In-charge for Biotechnology Park at Jawahar Bharathi College, Kavali performing various activities like 'Spirulina Cultivation', 'Mushroom Cultivation', 'Green House and Shady House maintenance', 'Vermicompost and Biopesticide preparation'. She is an Associate fellow of A.P Academy of Sciences. She worked as Co-ordinator, Eco-AIR Project, AP State Science Centre, Vijayawada. She is an Editorial Board Member and reviewer for various reputed journals. She is a life member in Association of Biotechnology and pharmacy, ISCAP, Indian Science Congress and All India Association for Educational Research.

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# 1

## Concept of Biodiversity

Pichili Vijaya Bhaskar Reddy  
Chadipiralla Kiranmai  
Pankaj Kalita

### Introduction

Diversity among the biological environment is meant by the word biodiversity; contracting the phrase biological diversity. It is defined as the measurement of total association of genes, species and ecosystem exploring the richness and variety of life. Biodiversity of a location is the measure of variety and richness of different organisms and biological environment in the selected area.

### Levels of biodiversity

The term biodiversity is described at three levels: Genetic diversity, Species diversity and Ecosystem diversity. All these three levels are interrelated. However, they are significantly distinct enough to be studied as three separate entities. Although few of the researchers are of the opinion that there exist more diverse levels of biodiversity, these three levels are a good number to work with and discuss.

**Genetic diversity:** Genetic diversity refers to the variation of genes within a species. This diversity is due to the different gene combinations possible in the genetic set up of an organism that gives its specific characteristics. Genetic variation is extremely important to the survival of species. Genetic variability, that is majorly responsible for these different traits, interact with local environmental conditions to determine the extent to which populations can adapt to environmental changes and survive when exposure to new conditions or diseases. It enables a population to adapt to its environment and to respond to

07

# SERVICES MARKETING — IN EMERGING — GLOBAL ECONOMY

DR. S. DURGA RAO

BSc (Ag), MBA, PhD, FDP (IIMA)  
DEPARTMENT OF MANAGEMENT STUDIES  
SRI VENKATESWARA UNIVERSITY  
TIRUPATI – 517502, A.P, INDIA.  
Email: [profsdr@yahoo.co.in](mailto:profsdr@yahoo.co.in)

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# SERVICE QUALITY OF MOBILE BROADBAND SERVICES IN INDIAN TELECOM SECTOR

P. Ramesh Babu<sup>1</sup>, J. Vijetha<sup>2</sup>, S. Durga Rao<sup>3</sup>

<sup>1</sup> Research scholar, Department of Management Studies, S.V. University, AP

<sup>2</sup> Asst Professor, Department of Management Studies, V.S. University, AP

<sup>3</sup> Professor, Department of Management Studies, S.V. University, AP

## ABSTRACT

Service quality is the difference between customers' expectation and their perceived performance of a service. Service quality absolutely influences customer satisfaction while customer satisfaction or dissatisfaction about service quality is twisted by their pay of the service and experience of purchase. Customers will be uncertain to switch even if they are not fully satisfied with the services. The telecom services have been recognized the world-over as an important tool for socioeconomic development for a nation and hence telecom infrastructure is treated as a crucial factor to realize the socioeconomic objectives in India. Accordingly, the Department of Telecom has formulated developmental policies for the accelerated growth of the telecommunication services. The Indian Telecom sector is passing through a dynamic transitional phase, as it is clearly undergoing the operation of market forces of demand and supply. The power of consumers is quite clear through their exposed preference in favour of reasonably balanced decisions. The importance of broadband has been recognized worldwide. Broadband is a way of promoting economic development and social benefits. This paper is based on empirical investigation of mobile broadband service quality and customer satisfaction. This study measures that customer service quality significant impact on customer satisfaction and suggested measures to service quality.

**KEYWORDS:** Service quality, Customer Satisfaction, Broadband services, Telecom Sector

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# TEXT BOOK OF ANIMAL BEHAVIOUR



**Dr.C.V.Narasimha murthy**

**Dr.V.Sailaja**

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# TEXT BOOK OF ANIMAL BEHAVIOUR



Dr.C.V.NARASIMHA MURTHY

M.Sc.,Ph.D.,M.Ed.,D.H.Ed.,P.G.D.J.,P.G.D.P.R.A.,P.G.E,

ASSOCIATE PROFESSOR IN ZOOLOGY (CONTRACT)

V.S.UNIVERSITY P.G.CENTRE KAVALI,

SPSR NELLORE (Dt.), A.P.

AND

Dr.V.SAILAJA, M.Sc.,B.Ed.,Ph.D.

ASSISTANT PROFESSOR IN ZOOLOGY

DEPARTMENT OF ZOOLOGY

V.S.UNIVERSITY P.G.CENTRE KAVALI, SPSR NELLORE (Dt.), A.P.

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Dr.C.V.Narasimha Murthy  
M.Sc., Ph.D., M.Ed., Dip. in Higher Education,  
P.G.. Dip. in Journalism, P.G. Dip. Public relations and  
Advertisement. Proficiency in Genetic Engineering.



Dr.C.V.Narasimha Murthy studied M.Sc. Zoology from S.V.University in 1978. He had CSIR Junior and senior research Fellowships and enrolled as distinguished scientist . He carried Research Associateship from Northwestern Medical School, Chicago on Hepatocarcinogenesis. He worked as Scientist at Central Sericulture Research Institute, Mysore, Karnataka state sericulture Development Institute, Bangalore, Germplasm Bank, Ooty. Later worked at J.B.Junior College, Kavali. And J.B.Degree College and retired as Reader in Zoology in 2013. At present he is working as contract Associate Professor in zoology at V.S.University P.G. Centre, Kavali. He published more than 110 original research articles along with four review articles. He authored three text books. He completed two UGC Research projects and out of them one is major and another is minor project. He guided three M.Phil and two Ph.D Scholars.

Dr Sailaja Vemuluri

M.Sc., B.Ed., Ph.D  
Assistant Professor of Zoology  
Vikrama Simhapuri University Post Graduate Centre  
Kavali, SPSR Nellore Dt.



Dr.V.Sailaja has 26 years of teaching experience among which 10 years are for Post graduation. She has awarded Gold medal for securing 1<sup>st</sup> rank in M.Sc Zoology by Sri Venkateswara University, Tirupati in 1990. She has 44 research publications in reputed highly Scopus National and international journals and presented more than 40 papers in various National and International seminars and conferences. She attended 14 national and International workshops. She authored 7 text books. She has received many honorary awards. Some of the important awards are *Best women award-2011*, *State Best Citizen of Andhra Pradesh Award -2011*, *Women of Distiction Award- Sciences-2016*, *Bharath Vikas Award – 2016*, *Distinguished scholar and icon-2017*, *Outstanding Educator and Scholar Award-2017* *Exemplary Teacher Award-2018* for splendid contribution to teaching and scholarly activities in the field of Zoology. Two scholars submitted their Ph.D. she worked as Head of Dept of Biotechnology, J.B. Degree and P.G. College, Kavali and as Head In-charge, Department of Zoology, and Assistant warden(Ladies) at Vikrama Simhapuri University P.G Centre, Kavali .

# **Women Empowerment**

**Leadership and Socio-Cultural Dimensions**



**KVJ. Prof. Dr. R. Ganesan**

**Dr. G. Vijaya Bharathi**

**Dr. S. Anila**

**Dr. R. Kumudha**



## **Role of Women in Science and Technology – A Conceptual Overview**

**Dr. V. Sailaja**

Assistant Professor of Zoology  
Vikrama Simhapuri University P.G Centre  
Kavali, Nellore District, Andhra Pradesh  
&

**Dr. M. Bhavani**

Lecturer in Zoology  
DRW Women's College, Nellore District, Andhra Pradesh

### **Abstract**

The home, school and society are important factors influencing female participation in science and technology. Moreover, the active participation of females depends upon domestic chores, intimidation of girls by boys, gender stereotyping, domestic chores equally between boys and girls at home to enable girls to have enough time to study at home. There is a drastic drop in percentage of women from the doctoral level to the scientist / faculty position due to the recruitment procedures and family responsibilities. Also, there is a false belief that men are better suited for highly skilled tasks and advanced technologies. Women are also facing obstacles in the work place like exploitation by the colleagues and supervisors and treated with less salary and status in comparison with men. Finally, it can be concluded that women must be encouraged by parents, society and government so that they can delve into science and technology.

### **Key Words**

Globalization; Government Policies; Parents; Research; Science & Technology; Women

### **Introduction**

The modern day people lives in the era of globalization and rapid technological development. The role of science and technology is extremely important for the contemporary society, which has changed people's lives dramatically. In tune with this, the roles of men and women have also changed noticeably rhythmically with the contemporary scientific aptitudes. For a long time in the history science and technology has been considered as masculine subject, thereby promoting a gender gap in the field of science in many societies. But at present women have attained more self-determination

to actively take part in the development of science and technologies in spite of lot of problem they face in the work sphere and social structure. As per the report of the United Nations(2011), it has been stated to apply a Gender Lens to Science, Technology and Innovation, although it is required a "gender lens" to science and technology innovation for development to be importantly recognized. It is to be noted that from the time immemorial women have always been effectively understanding the scientific processes and contributing to flourish the field of science. They have made their great efforts for the accomplishment of scientific endeavors. The society has produced the scientific women throughout the centuries, who could develop the very basics in understanding of scientific technology. But unfortunately, they have been continuously hurdled to be accepted in the field of science. The socio scientific transformation, in due course of time, realizes the importance of gender equality for healthy and developed society. The statistical data states that women still have seated on poor platform while accessing to information and technologies in comparison to men. The arena of science and technology is still constricted the technological development and technological resources to support women's activities and occupations. In the 21<sup>st</sup> century world, in most of the countries, the women representation in engineering, physics and computer science is less than 30 percent.

Women face lot of difficulties in perusing the science education and scientific job because of their poor access to finances, property, education and technology. Gender prejudgments, lack of female role models, difficulties in brining into line professional and personal responsibilities are some of the major difficulties. Gender prejudgments present a pitiable belief that women have less talents and inclinations in the field technologies and science. According to UNESCO data of 120 countries, 29 percent of women researchers were present. 46 percent in Latin America, 13 percent in India and Japan, 15 percent in South Korea, 33 percent in Africa, 29 percent in Asia female researchers were present. These numbers shows that women's participation in science and technology is very low and this shows gender in equality. In India many women drop out after getting PhD in science. There is a drastic drop in percentage of women from the doctoral level to the scientist / faculty position due to the recruitment procedures and family responsibilities. There is a false belief that men are better suited for highly skilled tasks and advanced technologies. Women are also facing obstacles in the work place like exploitation by the colleagues and supervisors. Not only in India, have this situation been observed but also all over the world. Though the women were experts in balancing family life and career but criticism from society that she is neglecting her children often makes women quit work. Governments should establish women universities to encourage women scientists.

## History of Women in Science

Women have made significant contributions to science from the earlier times.

a) **Scientific Revolution** was started in sixteenth and seventeenth centuries

b) **Eighteenth century**

The eighteenth century was characterized by three divergent views towards woman that women were mentally and socially inferior to men, that they were equal but different, and that women were potentially equal in both mental ability and contribution to society<sup>1</sup>.

## Late 19<sup>th</sup> Century in Western Europe

The latter part of the 19<sup>th</sup> century saw a rise in educational opportunities for women. The schools aiming to provide education for girls similar to that afforded to boys were founded in the UK, including the North London Collegiate School (1850), Cheltenham Ladies' College (1853) and the Girls' Public Day School Trust schools (from 1872). The first UK women's university college, Girton, was founded in 1869, and others soon followed: Newnham (1871) and Somerville (1879). The Crimean War (1854–6) contributed to establishing nursing as a profession, making Florence Nightingale a household name<sup>2</sup>. James Barry became the first British woman to gain a medical qualification in 1812, passing as a man. Elizabeth Garrett Anderson was the first openly female Briton to qualify medically, in 1865. Annie Scott Dill Maunder was a pioneer in astronomical photography, especially of sunspots<sup>3</sup>. Alphonse Rebière published a book in 1897, in France, entitled *Les Femmes dans la science* (Women in Science) which listed the contributions and publications of women in science<sup>4</sup>.

Other notable female scientists during this period include:

- In Britain, Hertha Marks Ayrton (mathematician, engineer), Margaret Huggins (astronomer), Beatrix Potter (mycologist)
- In France, Dorothea Klumpke-Roberts (American-born astronomer)
- In Germany, Amalie Dietrich (naturalist), Agnes Pockels (physicist)
- In Russia and Sweden, Sofia Kovalevskaya (mathematician)

## Late Nineteenth Century Russians

In the second half of the 19<sup>th</sup> century a large proportion of the most successful women in the STEM fields were Russians. Although many

women received advanced training in medicine in the 1870s<sup>24</sup> in other fields women were barred and have to go to western Europe mainly Switzerland in order to pursue scientific studies<sup>5</sup>:

1. Among the successful scientists were Nadezhda Suslova (1843–1918), the first woman in the world to obtain a medical doctorate fully equivalent to men's degrees
2. Maria Bokova-Sechenova (1839–1929), a pioneer of women's medical education who received two doctoral degrees, one in medicine in Zürich and one in physiology in Vienna
3. Iulia Lermontova (1846–1919), the first woman in the world to receive a doctoral degree in chemistry
4. Marine biologist Sofia Pereiaslavitseva (1849–1903), director of the Sevastopol Biological Station and winner of the Kessler Prize of the Russian Society of Natural Scientists
5. Mathematician Sofia Kovalevskaja (1850–1891), the first woman in 19<sup>th</sup> century Europe to receive a doctorate in mathematics and the first to become a university professor in any field<sup>6</sup>
6. Elizabeth Blackwell, who became the first certified female doctor in the US when she graduated from Geneva Medical College in 1849<sup>7</sup>
7. In 1876, Elizabeth Bragg became the first woman to graduate with a civil engineering degree in the United States, from the University of California, Berkeley<sup>8</sup>

### Early Twentieth Century

Influential female scientists born in the 19<sup>th</sup> century: Ada Lovelace, Marie Curie, Maria Montessori, and Emmy Noether. The details of other women scientists are listed below:

1. Marie Skłodowska-Curie, the first woman to win a Nobel Prize in 1903 (physics), went on to become a double Nobel prize winner in 1911 (chemistry), both for her work on radiation.
2. Alice Perry is understood to be the first woman to graduate with a degree in civil engineering in the then United Kingdom of Great Britain and Ireland, in 1906 at Queen's College, Galway, Ireland<sup>9</sup>.
3. Lise Meitner played a major role in the discovery of nuclear fission.
4. Maria Montessori was the first woman in Southern Europe to qualify as a physician.
5. Emmy Noether revolutionized abstract algebra, filled in gaps in relativity, and was responsible for a critical theorem about conserved quantities in physics.
6. Mary Cartwright was a British mathematician who was the first to analyze a dynamical system with chaos.



7. Inge Lehmann, a Danish seismologist, first suggested in 1936 that inside the Earth's molten core there may be a solid inner core<sup>10</sup>.
8. Florence Sabin was an American medical scientist. Sabin was the first woman faculty member at Johns Hopkins in 1902, and the first woman full-time professor there in 1917. Her scientific and research experience is notable. Sabin published over 100 scientific papers and multiple books<sup>11</sup>.

### **Excellency of Women in Decision-Making**

Each step up the ladder of the scientific research system sees a drop in female participation until, at the highest echelons of scientific research and decision-making, there are very few women left. In 2015, the EU Commissioner for Research, Science and Innovation Carlos Moedas called attention to this phenomenon, adding that the majority of entrepreneurs in science and engineering tended to be men. In Germany, the coalition agreement signed in 2013 introduces a 30 percent quota for women on company boards of directors<sup>12</sup>. Although data for most countries are limited, we know that women made up 14 percent of university chancellors and vice-chancellors at Brazilian public universities in 2010 and 17 percent of those in South Africa in 2011<sup>13,14</sup>. In Argentina, women make up 16 percent of directors and vice-directors of national research centres and, in Mexico, 10 percent of directors of scientific research institutes at the National Autonomous University of Mexico<sup>15, 16</sup>. In the US, numbers are slightly higher at 23 percent. In the EU, less than 16 percent of tertiary institutions were headed by a woman in 2010 and just 10 percent of universities. At the main tertiary institution for the English-speaking Caribbean, the University of the West Indies, women represented 51 percent of lecturers but only 32 percent of senior lecturers and 26 percent of full professors in 2011. Two reviews of national academies of science produce similarly low numbers, with women accounting for more than 25 percent of members in only a handful of countries, including Cuba, Panama and South Africa. The figure for Indonesia was 17 percent<sup>17, 18</sup>.

### **Social Pressures that Repress Femininity**

Beginning in the late twentieth century to present day, more and more women are becoming involved in science. However, women often find themselves at odds with expectations held towards them in relation to their scientific studies. Women were and still are often critiqued of their overall presentation.

## Efforts to Increase Women's Participation

A number of organizations have been set up to combat the stereotyping that may encourage girls away from careers in these areas. In the UK The WISE Campaign (Women into Science, Engineering and Construction) and the UKRC (The UK Resource Centre for Women in SET) are collaborating to ensure industry, academia and education are all aware of the importance of challenging the traditional approaches to careers advice and recruitment that mean some of the best brains in the country are lost to science. The UKRC and other women's networks provide female role models, resources and support for activities that promote science to girls and women. The Women's Engineering Society, a professional association in the United Kingdom, has been supporting women in engineering and science since 1919. In computing, the British Computer Society group BCS Women is active in encouraging girls to consider computing careers, and in supporting women in the computing workforce. In the United States, the Association for Women in Science is one of the most prominent organizations for professional women in science.

In 2011, the Scientista Foundation was created to empower pre-professional college and graduate women in science, technology, engineering and mathematics (STEM), to stay in the career track.

There are also several organizations focused on increasing mentorship from a younger age. One of the best known groups is Science Club for Girls, which pairs undergraduate mentors with high school and middle school mentees. The model of that pairs undergraduate college mentors with younger students is quite popular. In addition, many young women are creating programs to boost participation in STEM at a younger level, either through conferences or competitions. In efforts to make women scientists more visible to the general public, the Grolier Club in New York hosted a "landmark exhibition" titled "Extraordinary Women in Science & Medicine: Four Centuries of Achievement", showcasing the lives and works of 32 women scientists in 2003<sup>18</sup>.

The National Institute for Occupational Safety and Health (NIOSH) developed a video series highlighting the stories of female researchers at NIOSH<sup>19</sup>. Each of the women featured in the videos share their journey into science, technology, engineering, or math (STEM), and offers encouragement to aspiring scientists<sup>20</sup>. NIOSH also partners with external organizations in efforts to introduce individuals to scientific disciplines and funds several science-based training programs across the country<sup>21, 22</sup>.

## Reasons Disadvantaged Women in the Science Industry

We can understand three concepts to explain the reasons behind the data in statistics and how these reasons disadvantaged women in the science industry are indicated below:

- i) The first concept is hierarchical segregation. This is a well-known phenomenon in society, that the higher the level and rank of power and prestige, the smaller the population of females participating. The hierarchical differences point out that there are fewer women participating at higher levels of both academia and industry. Based on data collected in 1982, women earn 54 percent of all bachelor's degrees in the United States, with 50 percent of these in science. The source also indicated that this number increased almost every year. There are fewer women at the graduate level; they earn 40 percent of all doctorates, with 31 percent of these in science and engineering.
- ii) The second concept of women in science is territorial segregation<sup>23</sup>. The term refers to how female employment is often clustered in specific industries or categories in industries. Women stayed at home or took employment in feminine fields while men left the home to work. Although nearly half of the civilian work force is female, women still comprise the majority of low-paid jobs or jobs that society considered feminine. Statistics show that 60 percent of white professional women are nurses, daycare workers, or school teachers<sup>24</sup>. Territorial disparities in science are often found between the 1920s and 1930s, when different fields in science were divided between men and women. Men dominated the chemistry, medical sciences, and engineering, while women dominated the fields of botany, zoology, and psychology. The fields in which the majority of women are concentrated are known as the "soft" sciences and tend to have relatively low salaries.
- iii) Researchers collected the data on many differences between women and men in science. Rossiter found that in 1966, thirty-eight percent of female scientists held master's degrees compared to twenty-six percent of male scientists; but large proportions of female scientists were in environmental and nonprofit organizations. During the late 1960s and 1970s, equal-rights legislation made the number of female scientists rise dramatically. The statistics from National Science Board (NSB) present the change at that time. The number of science degrees awarded to woman rose from seven percent in 1970 to twenty-four percent in 1985. In 1975 only 385 women received bachelor's degrees in engineering compared to 11,000 women in 1985, indicating the importance of legislation to the representation of women in science. Elizabeth Finkel claims that even if the number of women participating in scientific fields increases, the opportunities

are still limited. Jabos, who worked for NSB, reported the pattern of women in receiving doctoral degrees in science: even though the numbers of female scientists with higher-level degrees increased, they still were consistently in a minority. According to Harriet Zuckerman, when woman and man have similar abilities for a job, the probability of the woman getting the job is lower. Elizabeth Finkel stated that "In general, while woman and men seem to be completing doctorate with similar credentials and experience, the opposition and rewards they find are not comparable. Women tend to be treated with less salary and status, many policy makers notice this phenomenon and try to rectify the unfair situation for women participating in scientific fields<sup>25</sup>".

### **Efforts to Increase Participation of Women in Science and Technology**

A number of Government organizations encourage girls away from careers in these following areas:

- i) In the UK The WISE Campaign (Women into Science, Engineering and Construction) and the UKRC (The UK Resource Centre for Women in SET) are collaborating to ensure industry, academia and education are all aware of the importance of challenging the traditional approaches to careers advice and recruitment that mean some of the best brains in the country are lost to science.
- ii) The UKRC and other women's networks provide female role models, resources and support for activities that promote science to girls and women. The Women's Engineering Society, a professional association in the UK, has been supporting women in engineering and science since 1919.
- iii) In computing, the British Computer Society group BCS Women is active in encouraging girls to consider computing careers, and in supporting women in the computing workforce.
- iv) In the United States, the Association for Women in Science is one of the most prominent organizations for professional women in science.
- v) In 2011, the Scientista Foundation was created to empower pre-professional college and graduate women in science, technology, engineering and mathematics (STEM), to stay in the career track.
- vi) There are also several organizations focused on increasing mentorship from a younger age. One of the best known groups is Science Club for Girls, which pairs undergraduate mentors with high school and middle school mentees. The model of that pairs

- undergraduate college mentors with younger students is quite popular.
- vii) In addition, many young women are creating programs to boost participation in STEM at a younger level, either through conferences or competitions.
  - viii) In efforts to make women scientists more visible to the general public, the Grolier Club in New York hosted a "landmark exhibition" titled "Extraordinary Women in Science & Medicine: Four Centuries of Achievement", showcasing the lives and works of 32 women scientists in 2003.
  - ix) The National Institute for Occupational Safety and Health (NIOSH) developed a video series highlighting the stories of female researchers at NIOSH. Each of the women featured in the videos share their journey into science, technology, engineering, or math (STEM), and offers encouragement to aspiring scientists.
  - x) NIOSH also partners with external organizations in efforts to introduce individuals to scientific disciplines and funds several science-based training programs across the country.
  - xi) In India UGC, DST and DBT are sponsoring research programmes, Women researcher awards to encourage the women in science and Technology.

The abovementioned aspects indicated that still we have to do more towards encouraging women in science and technology.

### **Promoting Participation of Women in Science and Technology**

The February 11<sup>th</sup> is International Day of Women and Girls in Science, a day that reminds us to work towards improving access for women to technology and science education and creating an enabling environment for female scientists and technologists. Despite progress in opening new doors of opportunities, women and girls continue to be underrepresented in the fields of science, technology, engineering and mathematics. Increased female participation in science is key to tackling major global challenges such as climate change, not least because it contributes to a better understanding of the impacts of climate change on various communities and helps develop a more effective and sustainable response to the climate threat. UNESCO estimates suggest that only around 35 percent of all students enrolled in Science, Technology, Engineering and Mathematics (STEM)-related fields are female. Closing the gender gap in science is also crucial for achieving the UN's Sustainable Development Goals and meeting the promise of the 2030 Agenda to "leave no one behind". The marking of the occasion of 3<sup>rd</sup> International Day of Women and Girls in Science, UN Climate Change Executive Secretary Patricia Espinosa said: "Inspirational women have over centuries made crucial and vital contributions to the world

of science. From the fourth century astronomer, Hypatia to Iranian mathematician Maryam Mirzakhani and Tu Youyou of China who discovered the anti-malarial drug artemisinin, women have, and continue to make, their special mark across scientific and technological fields”.

Many eminent women from across the world have also contributed their unique insight to the UN's Intergovernmental Panel on Climate Change. In doing so they have provided the evidence and impetus upon which governments are acting under the Paris Climate Change Agreement to address one of the great challenges of our time. Yet women remain under-represented in science and in engineering, depriving humanity of a vital catalyst for shaping a better future for current and future generations. The International Day of Women and Girls in Science should celebrate their achievements but more. It should provide the trigger for all nations and institutions to find ways to really open the doors to this vast pool of talent. It should start with more encouragement, support and opportunities at school for girls to be engaged in the wealth of scientific and technological fields that will define all our futures. According to a study conducted in 14 countries, the probability for female students of graduating with a Bachelor's degree, Master's degree and Doctoral degree in science-related field are 18 percent, 8 percent and 2 percent respectively, while the percentages of male students are 37 percent, 18 percent and 6 percent. Full and equal participation in science for women and girls can play a vital role in ensuring diversity in research, expanding the pool of talented researchers and bringing in fresh perspectives. In his statement, United Nations Secretary General António Guterres stressed the importance of taking concerted, concrete measures to overcome stereotypes and biases that prevent women from realizing their full potential. “We need to encourage and support girls and women achieve their full potential as scientific researchers and innovators. Women and girls need this, and the world needs this, if we are to achieve our ambitions for sustainable development on a healthy planet.”

### **Role of Government to Encourage the Women Participation**

The Governments through the world is driving global efforts to inspire and engage women and girls in science. For instance, US through the STEM and Gender Advancement (SAGA) project, improving the situation of women and reducing the gender gap in science, technology, engineering and mathematics (STEM) fields in all countries at all levels of education and research. The World Meteorological Organisation (WMO) encourages more women to become meteorologists, hydrologists, climate scientists and oceanographers and nurtures leadership talent through dedicated training

workshops and conferences .In celebration of the 2018 International day of Women and Girls in Science, WMO has published an interview with four remarkable pioneers who broke through both the glass and the ice ceiling, and are the first female heads of their respective institutes. Government of India is also offering several women research programmes and women fellow ships to encourage the women.

## Results

The overall observation have showed that home factors pose a great deal of influence on female participation in science especially with respect of time availability for home studies by female students. This could probably be a major reason why many females shy away from the sciences due to the intensive study they involve. They may tend to opt for subjects that may not require a lot of time studying them. School factors are also revealed in this study as influences on female participation in science. The study reveals a high extent of influence of school factor, especially the classroom intimidation faced by girls from boys in a science classroom. The intimidation by males in science classes when females perform better goes to confirm the unacceptable popular notion that science belongs to male domain.

## Suggestions

This study has revealed that home, school and society are important factors influencing female participation in science and technology throughout the world. The aspects of Females being saddled with lot of domestic chores, intimidation of girls by boys over girls in science classes when girls do better, gender stereotyping in science and scarcity of female models in science and technology are noted in this study. Based on the findings, the following recommendations are made:

1. Parents should distribute domestic chores equally between boys and girls at home
2. Parents should start early to dismiss the prevalent notion among their children that science is too tough for girls.
3. Science teachers should be more sensitive to activities of their students in the classroom and motivate girls who perform well in science.
4. Authors of science textbooks should maintain gender equity.
5. Female models in science and technology should encourage and groom young girls into science and technology.
6. Female researchers should encouraged by the government.
7. Still much more encouragement is needed by the parents, schools, colleges and especially government to improve the women participation in science and Technology.

## Conclusion

The woman to emerge in science and technology depends upon various aspects such as: the governmental support, societal encouragement, parents' facilitation, educational equality in a country like India. Moreover, there should be adequate programmes fostering and recognizing women's talents. Also, men's understanding towards women as equals and enabling mutual respect on them for wider participation. The socio-cultural advancements are quite indispensable to highlight women across the globe.

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