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(Ministry of Human Resource Development, Govt. of India)
GANDHIGRAM – 624 302, TAMIL NADU, INDIA

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JOURNAL OF EXTENSION AND RESEARCH

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Editorial

Higher education in India is highlighted by Teaching, Research and Extension which make the process of learning application oriented resulting in integrated development of scholarship on the part of the learner in the education institution in general, teacher and taught in particular. Teaching-learning is expected to promote critical thinking with adoption of innovative methods leading to excellence and eminence. The university level learning resulting in scholarship invariably necessitates research which obviously promotes objectivity in the pursuit of search of truth by adopting scientific methodology. The investigations and enquiries undertaken either through dissemination of knowledge in classroom or discovery of innovative ideas in the premises of physical lab/ social lab promote application based development. This interface between teaching based classroom learning and its verification through laboratory experiments ultimately makes up not only critical mind on the part of the learner but also inquisitive mind to undertake research. The findings of research should have application for the betterment of society, which makes the learning process a practical one. The dimensions of teaching, research and extension make the process of learning through teaching and its verification through experiments and application for societal betterment make the institutions of higher education as centers of development with social responsibility and accountability to the society.

Since establishment in 1956, the Gandhigram Rural Institute (GRI) has been devoted to the cause of rural higher education and linked the institution with rural communities and facilitated integrated development through research and extension, besides teaching. The

education in GRI remained value based as it has integrated abundantly the social responsibility with accountability for the cause of rural reconstruction through its three dimensions of teaching, research and extension. Teaching in GRI influenced applied researches and extension link had promoted village development over the years. It is something like teaching-learning disseminate knowledge, influence in research, findings of research influenced village development through extension programmes i.e. link of class with field (village) and field with class. Consequently the curriculum is made practical according to changing times within the larger framework model curricula of University Grants Commission.

This Journal of Extension and Research is focused on these three dimensions of higher education with special reference to Research and Extension based publication of articles from academia with an intension to promote research based excellence, extension oriented knowledge based creation and application towards generating self-reliant autonomous rural community with a vow to realize micromacro link in the form of ***WHEN VILLAGES DEVELOP NATION DEVELOPS through the Manthra of SUCCESS ATTENDS WHERE TRUTH REIGNS.***

S. Gurusamy
Executive Editor

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Analysis and Treatment of Distillery Wastewater Samples using Potential Materials - An Overview

N. Muthulakshmi Andal

Abstract

Water is an essential source for living systems, industrial processes, agricultural production and domestic use. Pollution occurs when any substance is released into the aquatic streams in harmful amounts as a direct result of human activities. Sources of water pollution include effluent outlets from industries, power plants, mines and oil wells situated. Distilleries are one of the most polluting industries listed by the Central Pollution Control Board. Distillation step is the main source of wastewater generation as for every litre of alcohol produced, molasses based distilleries generate 8-15 litres of dark brown effluent at a temperature range of 71- 81ºC. These effluents have very high chemical and biochemical oxygen demand (COD and BOD), heavy oxygen demand load of organic matter with unpleasant odour of indole, sketol and other sulphur compounds. The current study aims in analyzing the water quality parameters in the distillery waste samples collected from various sources viz., Sugar distillery units, Oil distillery units, Eucalyptus distillery units and identifying suitable eco-friendly materials for the treatment of collected samples.

Keywords: distillery waste, bio-waste, chemical treatment, adsorption, parameters

Introduction

The success of mankind as inhabitants of the earth is to impart the acquired ability to manage environmental systems to our advantage. The changes in the environmental conditions arise not

only through natural processes, but also through the impact of our extensive use. Water is one of the prime necessities of life with increasing number of people depending on this resource. It is said to be polluted when there is any physical, biological and chemical changes in water quality that adversely affects living organisms or makes water unsuitable for usage. Preventing water pollution and conserving water are important to assure a continuous abundance of water that is safe for us and future generations.

Power plants, mines, paper mills, refineries, automobile factories, metal Polishing and platting units, distilleries are disposing wastewaters directly into the aquatic streams. Production of ethyl alcohol in distilleries based on cane sugar molasses constitutes a major industry. The aqueous distillery effluent stream known as spent wash is a dark brown highly organic effluent, most complex, troublesome with extremely high contents of COD, BOD and low pH values. The massive quantity (approximately 40 billion litres) of distillery effluent, if disposed untreated can cause considerable stress on the water courses leading to widespread damage to aquatic life. These wastewater can be subject to treatment, results in the production of biogas through composting and also potash recovery.

In India, bulk quantity of the alcohol is being produced from sugar cane molasses. Molasses is a thick viscous byproduct of the sugar industry which is acidic in nature, rich in salts, dark brown in colour and it also contains sugar which cannot be crystallized.

Table 1: ISI Standard Tolerance Limits - Distillery Effluents

Parameters	**ISI Standards**
Colour/ Odour	Colourless/ Odourless
pH	5.5-9.0
TSS mg/L	100
TDS mg/L	2100
TS mg/L	2200
Hardness mg/L	600
Chloride mg/L	600

In India, tamarind (Tamarindus indica L.) is an economically important tree which grows abundantly in the dry tracts of Central and South Indian states. Indian production of tamarind is about 3 lakh (0.3 million) tonnes per year. The hard pod shell is removed (deshelled) when the fruit is ripe and the fruit is the chief acidulate used in the preparation of foods. Husk is the outer shell or coating of a corn. It often refers to the leafy outer covering of an ear of maize (corn) as it grows on the plant. Literally, a husk or hull includes the protective outer covering of aseed, fruit or vegetable. The shells (hulls) are discarded as waste and pose greater disposable problem. These hulls/husks are available at no cost and so far, no studies have been reported. The scope of the work is to study the impact of Corn husk and Tamarind hull in treatment of the collected distillery waste samples.

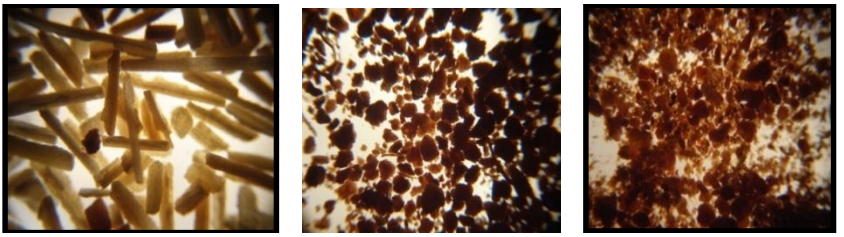
Raw materials Experimental Methods

Commercially available Tamarind Hull and Corn Husk were procured from a place called Kangayam in Tirupur district and Negamam in Coimbatore district of Tamil Nadu respectively. These materials are economically cheap, easily available, ecofriendly and non toxic.

Corn Husk and Tamarind Hull

Chemical Treatment

Raw materials were dried well, pulverized using electrical mixer and categorized into different mesh sizes using scientific test molecular sieves. Tamarind Hull was chemically modified using 0.1N HCl. Both the untreated and treated tamarind hull (UTH, TTH), and the untreated corn husk (UCH) were employed for experimental verification.



Microscopic Structure of UCH, TTH and UTH

Sample Collection

Distillery wastewater samples were collected from various sources As shown in table 2, and analyzed for the physio chemical parametric values mentioned in table 3.

Table 2: Distillery Wastewater Samples

Sample Type	Sample Source
Sugar Distilleries	Sakthi Distillery Unit (Apakkudal)
Sugar Distilleries	Bannari Amman Distillery Unit (Periya Puliyur)
Oil Distilleries	Kannan Departmental Stores (Coimbatore)
Eucalyptus Distilleries	Ganesh Factory (Ooty)

Table 3: Physio- Chemical Parameters

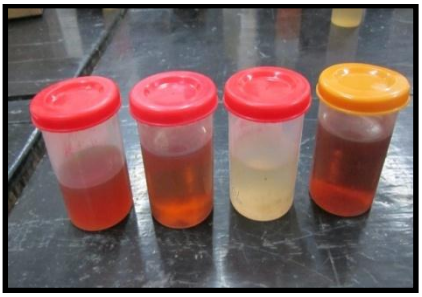
Sample	pH	Conductivity µΩ-1cm-1	Cl- mg/L	Hardness mg/L	TDS mg/L	TS mg/L	TSS mg/L	COD mg/L
Sakthi Distillery Waste	4.29	2704.61	609.7	418.18	41,000	52,00	11,104	73,000
Bannari Amman Distillery Waste	4.44	2026.15	397.0	278.34	43,400	61,800	18,400	86000
Oil Distillery Waste	6.61	9.53	2.83	BDL	_	_	_	180
Eucalyptus Distillery Waste	5.72	34.15	11.04	BDL	_	_	_	500

Batch Equilibration Studies

Adsorption experiments were carried out using batch mode at room temperature, in order to investigate the nature of waste water absorbent materials interaction. The experimental mode was setup in such a way that 50 ml of the wastewater was agitated with the selected particle sizes of the materials for a contact time of 30 minutes in 250 ml iodine flasks using a Kemi Orbital mechanical shaker. Of all the particle sizes, 0.42 mm was fixed as the appropriate size since the finer sizes resulted in agglomeration. The agitated samples were tested for pH, conductivity, chloride, hardness, Total Hardness, TDS, TSS and COD values pertaining to these materials used viz., UTH, TTH, UCH.

Results and Discussion

Samples before treatment



Samples after treatment

Tables 4, 5 and 6 highlight the analyses of water samples collected from various distilleries and their treatment with UTH, TTH, UCH respectively. The liquid distillery waste samples before and after treatment are depicted below wherein the changes in the colour of the samples obviously indicate the lowering the physio-chemical parametric ability of the selected materials. The sample analysis pertaining to the sources of Kannan Departmental Stores, Coimbatore & Ganesh Factory, Uthagamandalam (Ooty) have been not carried out, as the treated values were below detection limit.

Table 4: Analysis of Samples Using UTH

Parameters	Sakthi distilleries		Bannari Amman distilleries		Oil distilleries		Eucalyptus distilleries	
	Initial	Final	Initial	Final	Initial	Final	Initial	Final
pH	4.29	4.65	4.44	4.98	6.61	6.72	5.72	5.84
Conductivity	2704.61	2683.07	2026.15	2012.67	9.53	--	34.15	--
Chloride	609.74	524.66	397.04	368.68	2.83	--	11.04	--
Hardness	418.18	411.00	278.34	264.50	BDL	BDL	BDL	BDL
TDS	41000	36500	43400	41000	--	--	--	--
TS	52100	42500	61800	59000	--	--	--	--
TSS	11104	6000	18400	18000	--	--	--	--
COD	73000	--	86000	--	180	--	500	--

Table 5: Analysis of Sample Using TTH

Parameters	Sakthi distilleries		Bannari Amman distilleries		Oil distilleries		Eucalyptus distilleries	
	Initial	Final	Initial	Final	Initial	Final	Initial	Final
pH	4.29	4.43	4.44	4.68	6.61	6.84	5.72	6.02
Conductivity	2704.61	2569.23	2026.15	2001.52	9.53	--	34.15	--
Chloride	609.74	482.12	397.04	354.50	2.83	--	11.04	--
Hardness	418.18	402.60	278.34	242.90	BDL	--	BDL	--
TDS	41000	35600	43400	39000	--	--	--	--
TS	52100	41550	61800	56790	--	--	--	--
TSS	11104	5900	18400	17760	--	--	--	--
COD	73000	--	86000	--	180	--	500	--

Table 6: Analysis of Samples Using UCH

Parameters	Sakthi distilleries		Bannari Amman distilleries		Oil distilleries		Eucalyptus distilleries	
	Initial	Final	Initial	Final	Initial	Final	Initial	Final
pH	4.29	4.69	4.44	4.85	6.61	6.92	5.72	6.04
Conductivity	2704.61	2698.30	2026.15	2020.36	9.53	--	34.15	--
Chloride	609.74	595.56	397.04	482.12	2.83	--	11.04	--
Hardness	418.18	406.89	278.34	267.76	BDL	BDL	BDL	BDL
TDS	41000	35000	43400	35560	--	--	--	--
TS	52100	41550	61800	56790	--	--	--	--
TSS	11104	8500	18400	14440	--	--	--	--
COD	73000	--	86000	--	180	--	500	--

Amongst the untreated and treated tamarind hulls, TTH is found to possess better chelating property. This can be attributed to the fact that, the treatment of Tamarind Hull using 0.1N HCl has increased sorption capacity.

However, the experimental results pertaining to the pH of the treated sample which may be due to the acidic treatment of the employed materials. The COD values of had least pronounced effect while being treated with the materials used. Henceforth, the final values for COD parameter are not included in the respective tables. While comparing the influence of raw materials, the overall impact of raw tamarind hull is found to possess better removal capacity than raw corn husk.

Conclusion

Distillery waste samples from four different sources viz., Sakthi, Bannari Amman, Kannan Departmental Stores and Ganesh Factory (Ooty) were collected and analyzed for various physio

chemical parameters to assess the water quality of the samples. The measured values for various factors viz., TDS, TS, TSS, Chlorides, COD of the collected samples, were found to exceed the tolerance limits. Amongst the Four collected samples, the sample from Bannari Amman Sugar Distilleries recorded a higher value. The distillery wastes were agitated with raw and treated eco-friendly materials and the results imply that the treated tamarind hull (TTH) exhibited greater capacity in the reduction of parametric values against the raw tamarind hull (UTH) and corn husk (UCH). It is concluded that the naturally occurring materials have the capacity to reduce the exceeding levels of the physiochemical characteristics of the distillery wastewater samples and can be employed by developing suitable methodology in the treatment of distillery wastewater samples.

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Photocatalytic Degradation - An Ecofriendly Method for Dye Stuff Removal

A. Rajeswari and Anitha Pius

Abstract

This paper presents a review on the merit of photocatalyst for the degradation of dye stuff. The photocatalytic degradation of dyes containing different functionalities in aqueous solution under UV irradiation is an environment friendly method. The degradation of dyes depends on several parameters such as pH, catalyst concentration, substrate concentration and the presence of electron acceptors such as hydrogen peroxide. Photocatalytic degradation, offers a number of advantages over conventional technologies with regard to its operation at low or room temperature, degradation of a broad range of contaminants into innocuous final products and lower cost of catalysts. Utilization of renewable energy that is sunlight make this technology to be adequately attractive compared to other techniques and has proven to be a promising technology for the degradation of organic compounds such as dyes from wastewater.

Keywords: Degradation, photocatalysts, dyes, catalyst concentration, irradiation.

Introduction

Water is one of the vital sources for the survival and sustenance of life for all living beings. The increasing contamination of freshwater systems with thousands of industrial and natural chemical compounds is one of the key environmental problems faced by humanity worldwide. One of the main sources of water pollution worldwide is the textile industry and its dye- containing wastewater. Textile dyeing industries are condemned as being one of the world's most offenders in terms of pollution. 10-25% of textile dyes are lost

during the dyeing process, and 220% is discharged as aqueous effluents in different environmental components [1]. In India alone, dyestuff industry produces around 60,000 metric tons of dyes, which is approximately 6.6 % of total colorant used worldwide [2]. There are about 10,000 garment manufacturers and 2100 bleaching and dyeing industries in India. Majority is concentrated in the states of Tamil Nadu, Punjab and Gujarat. Many textile processing units in Tamil Nadu use a number of unclassified chemicals that are likely to be from the Red List Group which is said to be harmful and unhealthy [3]. Water sources are minimal in Dindigul district and the water-table is deep due to over exploitation for irrigation, tanning and for other household purposes. Dye solutions are carcinogenic and mutagenic to various organisms and this is a serious issue because many chemicals can cause damage to genetic material without being expressed immediately [4]. Hence removal of dyes from textile effluents is essential to protect the environment as well as the living organisms in water. Photocatalytic degradation is one of the ecofriendly methods for dyes stuff removal.

Degradation of dyes in industrial wastewaters has therefore received increasing attention and some methods of remediation have been suggested. Traditional physical techniques like adsorption on activated carbon, ultrafiltration, reverse osmosis, coagulation by chemical agents, ion exchange on synthetic adsorbent resins, etc. have been used for the removal of dye pollutants [5,6]. These methods only succeed in transferring organic compounds from water to another phase, thus creating secondary pollution. This will require a further treatment of solid-wastes and regeneration of the adsorbent which will add more cost to the process. Microbiological or enzymatic decomposition, biodegradation, ozonation, and advanced oxidation processes such as Fenton and photo-Fenton catalytic reactions, H_2O_2/UV processes [7-11] have also been used for dye removal from wastewaters. Traditional wastewater treatment technologies have proven to be markedly ineffective for handling wastewater of synthetic textile dyes because of the chemical stability of these pollutants and their resistance towards decolorization by conventional biochemical and physicochemical methods.

Photocatalytic degradation has proven to be a promising technology for the degradation of organic compounds such as dyes from wastewater.

Photocatalytic Degradation

Photo catalytic degradation includes photo dissociation or breakup of molecules into smaller molecules by catalyst when it was irradiated by light sources. Semiconducting oxide photo catalysts are focused more in recent years due to their potential application in environmental purification. Semiconductors tested for their efficiencies in dye degradation includes TiO_2, ZnO, V_2O_5, WO_3, CdS, ZrO_2 and their impregnated forms [12]. Photocatalysis may be termed as a photo induced reaction which is accelerated by the presence of a catalyst. The absorption of light leads to a charge separation due to promotion of an electron (e^-) from the valence band of the semiconductor catalyst to the conduction band, thus generating a hole (h^+) in the valence band. The recombination of the electron and the hole must be prevented as much as possible if a photocatalyzed reaction must be favored. The ultimate goal of the process is to have a reaction between the activated electrons with an oxidant to produce a reduced product, and also a reaction between the generated holes with a reductant to produce an oxidized product.

Mechanism of Photodegradation

The photocatalytic degradation of dyes believed to take place according to the following mechanism. The photocatalytic degradation of dyes in solution is initiated by the photo excitation of the semiconductor photocatalyst when exposed to UV radiation. The electrons promoted from valance band to conduction band with the formation of conduction band (e^-) and valance band holes (h^+).

$$ZnO + h\nu \rightarrow ZnO\ (e^-_{CB} + h^+_{VB}) \text{ ----------> } 1$$

$$h^+_{VB} + H_2O \rightarrow {}^{\bullet}OH + H^+ \text{ ----------> } 2$$

The oxidative potential of the hole (h^+_{VB}) in the catalyst permits the direct oxidation of dye to reactive intermediate or very reactive hydroxyl radicals can also be formed either by the decomposition of water or by the reaction of the hole with OH^-. The hydroxyl radical is extremely strong nonselective oxidant ($E°=+3.06V$) which leads to partial or complete mineralization of dye molecules.

$$e^-_{CB} + O_2 \rightarrow {}^{\bullet}O_2^- \quad \text{----------> 3}$$

$${}^{\bullet}O_2^- + \text{Dye} \rightarrow \text{Dye-OO}^{\bullet} \quad \text{----------> 4}$$

$${}^{\bullet}O_2^- + HO_2^{\bullet} + H^+ \rightarrow H_2O_2 + O_2 \quad \text{----------> 5}$$

Electrons in the conduction band of the catalyst surface can reduce molecular oxygen to superoxide anion. This radical in the presence of organic scavengers, may form organic peroxides or hydrogen peroxide. The conduction band electrons are responsible for the production of hydroxyl radical species, which cause primary mineralization of organic matter. The dye molecule also degraded by superoxide radicals produced by dye sensitization mechanism. The proposed mechanism for the dye degradation was represented with the schematic diagram below Fig 1. As below:

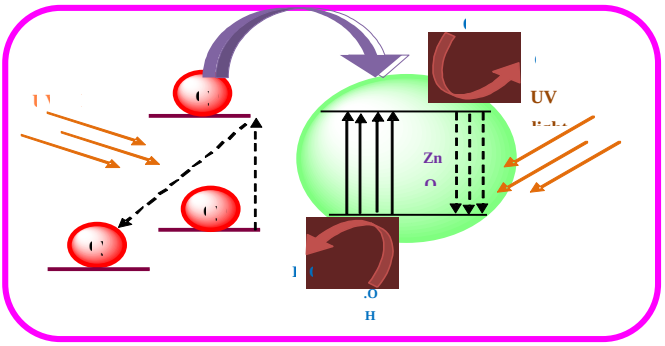

Fig.1. A Schematic Diagram explaining the Photo Catalystic Process for Degradation of Dye using ZnO nanoparticles.

Table 1. Summary of Dyes Degraded by Various Researchers using Photocatalysts

Pollutants	Photocatalyst	Lamp	Reference
Fast green	TiO2	UV	[13]
Acid red 27	TiO_2	Vis	[14]
Salicylic acid	TiO_2	UV	[15]
Methylene blue	ZnO	Vis	[16]
Congo Red and Benzopurpurine 4B	ZnO	UV	[17]

Conclusion

Photocatalytic degradation of pollutants is a promising technology due to its advantage of degradation of pollutants instead of their transformation under ambient conditions. Significant amount of research has been conducted on photocatalysis at laboratory scale; its application on industrial scale requires certain limitations to be addressed. Heterogeneous photocatalysis using semiconductors for water and wastewater treatment continues to attract much interest. The lower cost of catalysts and the utilization of renewable energy make this technology to be adequately attractive compared to other techniques. As the process relies on the photo activation of semiconductors, the efficiency of the catalyst is qualified by the capacity to generate electron hole pairs in addition to radical production. Hence, the selection of proportionate semiconductors is the key to reactivity control. Some promising results of pollutant degradation in the photo degradation of dyes indicate that various possibilities exist in this field which needs to be explored. In coming years exciting results in this demanding research area are awaited.

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Removal of Rhodamine-B And Acid Orange 7 Dyes from Dyeing Effluents using Activated Carbon Prepared from Ailanthus Excelsa Leaves

Sankaran Meenakshi, Palanichamy Rajeshkanna and N.S. Nagarajan

Abstract

Adsorption of Rhodamine B (RhB) and Acid Orange 7 (AO7) from effluents using Ailanthus excelsa leaves Activated carbon (AEAC) was accomplished under the optimized conditions of temperature, various dye concentration, pH, contact time and quantity of adsorbent. Spectrometric technique was used for the measurements of concentration of dyes before and after adsorption. The maximum adsorption capacity of the AEAC for RhB and AO7 has been calculated as 16.55 and 15.84 mg/g, respectively. The adsorption process is in conformity with Freundlich isotherm for both RhB and AO7. Kinetic results suggest that the adsorption of RhB and AO7 onto AEAC followed pseudo-second-order kinetic model.

Keywords: Adsorption; Ailanthus excelsa leaves; Rhodamine B; Acid Orange 7.

1. Introduction

Textile industries use dyes or pigments to color their final products. For example, Rhodamine B and Acid Orange 7, which are the most common among all other dyes of their category, are generally used for dyeing cotton, silk and making paper. Since dyes have a synthetic origin and complex aromatic molecular structures, are inert and difficult to biodegrade when discharged into waste streams. This aspect has always been overlooked in their discharge[1].

The discharge of highly coloured effluents into natural water bodies is not only aesthetically displeasing, but it also impedes light penetration [2,3], thus upsetting biological processes within a stream. In addition, many dyes are toxic to some organisms causing direct destruction of aquatic communities. Some dyes can cause allergic dermatitis, skin irritation, cancer and mutation in man. Wastewaters from dyeing industries released into nearby land or rivers without any treatment because the conventional treatment methods are not cost effective. Adsorption is one of the most effective methods and activated carbon is the preferred adsorbent widely employed to treat wastewater containing different classes of dyes, recognizing the economic drawback of commercial activated carbon [4]. Therefore, there is a need for an alternative technique which is efficient and cost effective. Biosorption, based on living or non-living microorganisms or plants, is a promising potential alternative to conventional processes for the removal of dyes [5].

Among several chemical and physical methods, the adsorption onto activated carbon has been found to be superior to other techniques for removal of dyes from aqueous solution in terms of methodology, its capability for efficiently adsorbing a broad range of different types of adsorbate and simplicity of design of adsorbent. Commercially available activated carbons are usually derived from natural materials such as wood or coal, and therefore, are still considered expensive [6]. This has led to the search for cheaper substitutes. Hence, low-cost activated carbons based on agricultural solid wastes are investigated for a long time. Agricultural by-products and waste materials used for the production of activated carbons include plum kernels [7], cassava peel [8], bagasse [9], jute fiber [10], palm-tree cobs [11], rice husks [12], olive stones [13], date pits [14], fruit stones and nutshells [15].

In the present study, activated carbon was prepared from Ailanthus excelsa leaves by H_3PO_4 treatment and evaluated for the removal of RhB and AO7 dyes from aqueous solutions. In order to explore the advantages of activated carbon, further investigations based on batch experiments were carried out to evaluate the effect of

pH, contact time, RhB and AO7 dyes initial concentration, and dosage for the removal of RhB and AO7 dyes in aqueous solution. The sorption capacity of AEAC was compared for both dyes in all the studied conditions. The Ailanthus excelsa activated carbon was characterized using FTIR and SEM–EDX.

2. Materials and Methods

2.1. Preparation of Biosorbent

The green leaves of Ailanthus excelsa used in the present investigation were collected from Arumanai, Nagercoil district. The collected materials were washed with distilled water for several times to remove all the dirt particles. The washed materials were then completely dried in an oven at 70^{o}C until constant weight. Then the dried leaves were powdered using pulveriser and the powder was sieved for the particle size of 4575 µm. Then, the obtained powder was modified as activated carbon and used for adsorption studies.

2.2. Chemicals and Reagents

Phosphoric acid (H_3PO_4) 85 % (wt) was used as the chemical activating agent obtained from Merck with analytical grade. The azo dye, AO7 ($C_{16}H_{11}N_2NaO_4S$) and the basic dye, RhB ($C_{28}H_{31}ClN_2O_3$) were also procured from Merck with analytical grade. The chemical structures of the dyes were shown in Fig.1. All other chemicals were of analytical grade and obtained from Chemical Drug House (CDH) Ltd., India. The double distilled water (DD) was used to prepare all the aqueous solutions. The stock solution of each dye was prepared by dissolving 1 g in 1000 mL of distilled water and diluted to get desired concentration of the dyes. All experiments were carried out at room temperature (29±1 ^{o}C) using a constant agitation speed of 100 rpm. The pH of solutions was adjusted with 0.1 M concentrations of HCl and NaOH, using a pH-meter. All the experiments were carried out in a batch system in order to evaluate the effects of different operational variables.

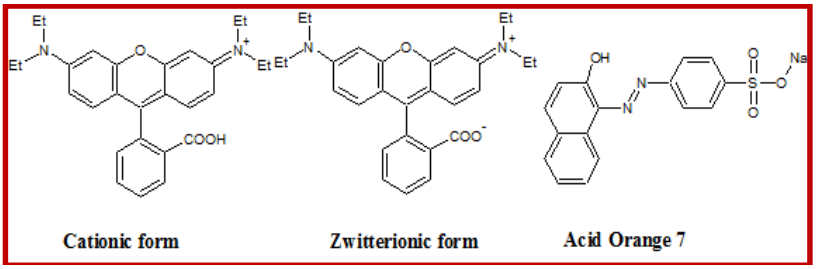

Fig. 1. Molecular forms of RhB (cationic and zwitterionic form) and AO7

2.3. Preparation of Activated Carbon

Ailanthus excelsa leaves were chosen as precursor for the production of activated carbon by one-step chemical activation. The Ailanthus excelsa leaf powder (AE) was soaked in a ratio of 1:1.5 wt of AE powder/wt of H_3PO_4 solution to cover it completely, slightly agitated to ensure penetration of the acid throughout, then the mixture was heated to 80 ^oC for 1 h and left overnight at room temperature to help appropriate wetting and impregnation of the precursor. The impregnated mass was dried in an air oven at 80 ^oC overnight, then, carbonized in a closed stainless steel reactor placed in a programmable Muffle Furnace. The temperature was raised at the rate of (50 ^oC/10 min.) to the required end temperature. The carbonization process was carried out at 500 ^oC for 30 min in limited air. The product – (AEAC) refers to H_3PO_4 treatment – was thoroughly washed with warm distilled water (70 ^oC) until pH of the solution came close to the initial pH of the rinsing water. Finally, the activated carbon was dried at 105 ^oC for 24 h and sieved to different particle size by using ASTM mesh and accepted particle size of 45 µ was kept for use [19].

2.3.1. Characterization of Activated Carbon

Activated carbons are a widely used adsorbent due to their high adsorption capacity, high surface area, and micro porous structure, high chemical and mechanical stability. The chemical

nature and pore structure usually determined the sorption activity. The activated carbons employed in the present study were characterized by determination of various physicochemical properties. Various properties like pH, moisture content, density, water insoluble matter, ion exchange capacity, surface area of the prepared carbon was determined by using the standard methods and the details are given in Table 1.

Table 1. Characteristics of the Adsorbents

Properties	Activated carbon AEAC
Density (g/cc)	0.1892
Moisture content (%)	4.82
Water insoluble matter (%)	91.2
pH of aqueous solution	6.9
Ion exchange capacity (meq/g)	0.0086
Surface area (m^2/g)	1727.1

2.4. Characterization

The surface morphology and elemental analysis of AEAC were carried out by scanning electron microscope equipped with an energy dispersive X-ray analyzer (SEM-EDX, VEGA3 TESCAN). The functionality present in the prepared AEAC adsorbent before and after treatment with dyes were characterized using Fourier transform infrared Spectroscopy (FT-IR) (JASCO-60 plus).

2.5. Batch Experiments

The batch experiments were performed in a 250 mL conical flask in which 0.1 g of the activated carbon was added to 50 mL of dye solutions. Then, the mixture was kept at room temperature (30 $^{\circ}$C) for the desired time under shaking at 300 rpm. After the desired

time, the material was filtered through filter paper. The dyes concentrations were determined using absorbance values measured before and after the adsorption by UV-spectrophotometer (Pharo 300 Merck) at the wavelength corresponding to the maximum absorbance of 452 and 554 nm for AO7 and RhB, respectively. The maximum wavelength

(λ_{max}) for both adsorbents was recorded by UV–vis spectrophotometer. In all cases, a proper dilution was necessary to obtain a well measurable absorption. The pH of the solutions during the studies was determined by a pH meter.

To optimize the conditions for dye removal, and also to evaluate the adsorption capacity of AEAC, the adsorption reactions were conducted at a wide pH range (pH 2–10), contact time (15–90 min),various initial dye concentration (10–50 mg L−1), and adsorbent dose (0.020–0.140 g). The working solution pH was adjusted by adding 0.1M of HCl/NaOH. For isotherm studies, the experiments were carried out at three different temperatures with four different concentrations of dyes viz., 10, 20, 30 and 40 mgL^{-1}. Thermodynamic parameters such as standard free energy change (ΔG^o_{ads}), standard enthalpy change (ΔH^o_{ads}) and standard entropy change (ΔS^o_{ads}) were determined using equilibrium data. Kinetic data were obtained by conducting experiments at 303K with three different concentrations of both the dyes. While doing the experiment, the samples were withdrawn at pre-determined time interval and analyzed for the dye concentration. The percent-age of dye removal by AEAC was computed using the following equation.

$$\text{Removal efficiency} = \frac{C_0 - C_e}{C_0} \times 100 \qquad (4)$$

where, C_o and C_e are the initial and final concentration of dye, respectively. The sorption capacity of the activated carbon was calculated according to the following mass balance Eq. (5):

$$\text{Sorption Capacity (SC), } q_t = \frac{(c_0 - c_e)}{M} \times V(\text{mg/g}) \qquad (5)$$

where, q is the adsorption capacity of the composite (mg/g), V is the volume of the sample (mL), C_o is the initial concentration of dye solution (mg/L), C_e is the final concentration of dye solution (mg/L) and M is the mass (g) of the activated carbon.

3. Results and Discussion

3.1. Characterization of Activated Carbon

FTIR analyses on AEAC before and after dye adsorption were conducted to understand the adsorption chemistry. As shown in Fig. 2.-(b), for untreated AEAC sample, the intense band at around 3400- 3500 cm^{-1} was assigned to OH group stretching and the peaks at 2930 and 2500cm^{-1} are observed due to the presence aliphatic groups (asymmetrical and symmetrical stretch of CH_3) [23]. After dye adsorption, the band intensity at 3460 cm^{-1} has been significantly reduced, probably indicating some interactions between OH groups in AEAC and those of the dye functional groups. The small peaks located at (400 to 700) cm^{-1} could be the C-H out-of-plane bending in benzene derivatives that is quite common for activated carbon. As can be seen in Fig. 2-(a), 2-(c) the shift and sharp reduction at 3438 and 3415 cm^{-1} suggests the major role of –OH group for AO7 and RhB adsorption onto AEAC.

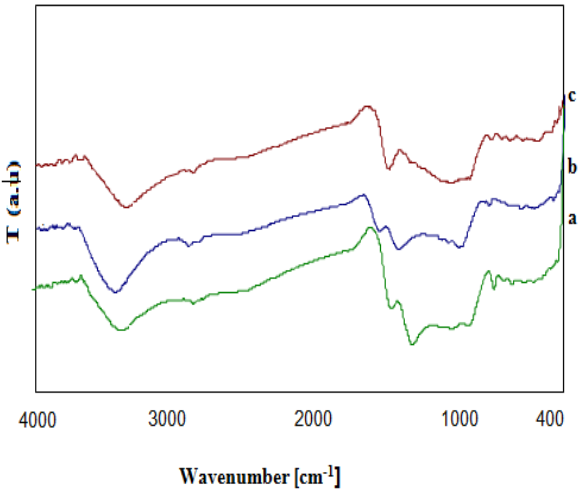

Fig. 2. FTIR spectra of (a) AEAC (b) AO7 adsorbed AEAC and (c) RhB adsorbed AEAC

The morphology of activated carbon was studied by SEM. Fig. 3 shows different views of activated carbon. Pores of different size and different shape could be observed in these figures.

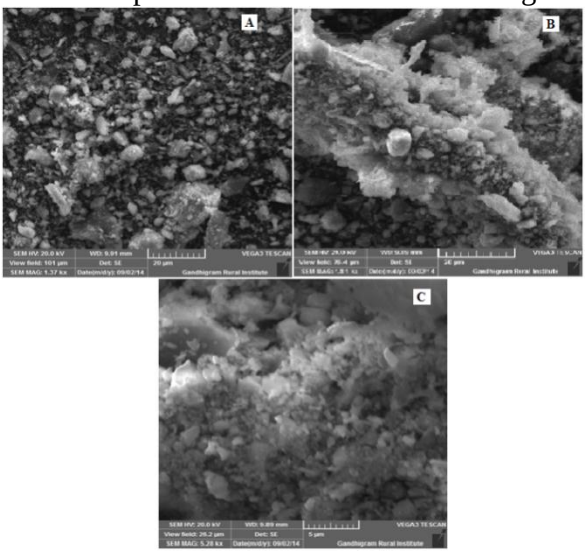

Fig. 3. SEM micrographs of (a) AEAC (b) RhB adsorbed AEAC and (c) AO7 adsorbed AEAC

3.2. Effect of pH

The influence of solution pH on the removal of RhB and AO7 onto the AEAC was studied and is illustrated in Fig. 4A. The uptake of RhB at pH 10.0 was minimum and a maximum uptake was obtained at pH 4.0. It appears that a change in pH of the solution results in the formation of different ionic species, and also different carbon surface charge. At pH values lower than 4, the dye can enter into the pore structures of the carbon. At a pH value higher than 4, the zwitterions form of RhB in water may increase the aggregation of RhB to form a bigger molecular form (dimmer) and became unable to enter into the pore structure of the carbon surface [19,24,25].

In case of AO7, the dye removal percentage was decreased significantly with an increase in the solution pH and the maximum adsorption level was observed at pH 2. It is well known that at lower pH, more protons will be available to protonate the adsorbent surface, thereby increasing the electrostatic attractions between negatively charged dye anions and positively charged adsorption sites and causing an increase in the dye adsorption. A negatively charged site on the adsorbent does not favour the adsorption of anionic dyes due to the electrostatic repulsion [26-28] and hence lesser sorption at higher pH values.

3.3. Effect of Dosage

Fig. 4B explains the effect of dosage on the removal percentage of RhB and AO7. It was apparent from the graph that the removal of both the dyes increased with an increase in dosage. This can be attributed to increase in the number of sorption sites available for the adsorption of both dyes. Also, when the dosage was increased from 0.020 to 0.140 g/L, the removal of RhB increased from 47.08 to 91.26 % and for AO7, adsorption capacity increased from 57.56 to 92.54 %. Similar trends were observed for the removal of RhB and AO7 using different adsorbents like Sago waste [29] and canola stalks [30].

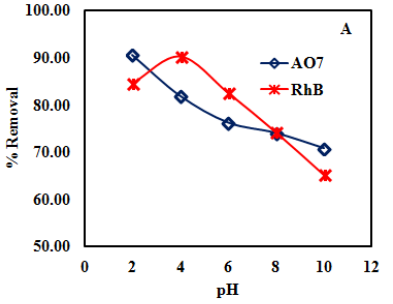

Fig. 4. (A) Effect of pH

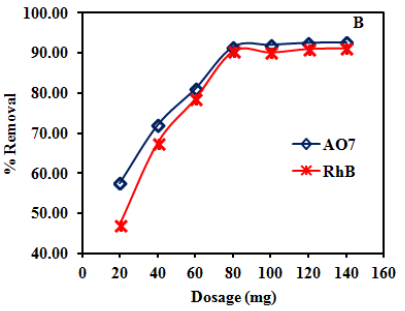

Fig. 4. (B) Effect of Dosage

3.4. Effect of contact time and concentration

Fig. 5C and D shows the effect of contact time with 0.1 g of AEAC and different initial concentrations on the removal of RhB and AO7. It is evident from the graphs that the removal of RhB and AO7 were rapidly increased with increase in contact time. The adsorption process with AEAC was almost saturated within 60 min. These results revealed that the percentage of removal of both the dyes mainly depends on the number of active adsorption sites available on the sorbent surface for the sorption. Hence, the optimum contact time for the removal of both the dyes by AEAC was fixed as 60 minutes for the further adsorption studies and the initial concentration was fixed as 10 mg/L.

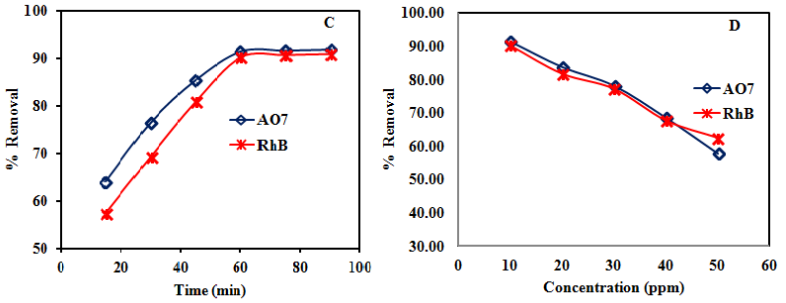

Fig.5.(C)Effect of Contact time (D) Effect of Concentration

3.5. Effect of Co-Anions

The effect of the presence of common anions like chloride, carbonate, and bicarbonate on the removal of the selected dyes RhB and AO7 were studied by adding a fixed 200 mg/L initial concentration of each selected ion and a 50 mg/L initial dye concentration at room temperature and keeping all other parameters constant. Fig. 6E shows that the dye removal percentage was slightly altered by the presence of co-anions competition with the surface binding sites and hence a slight reduction in dye removal was observed.

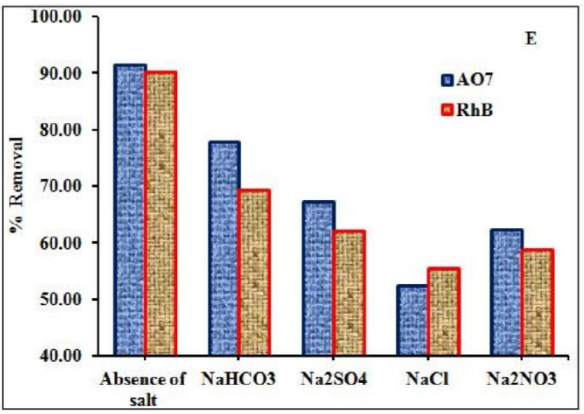

Fig. 6. (E) Effect of co-anions on the RhB and AO7 removal using AEAC

3.6. Adsorption Isotherm

Adsorption isotherm plays major role in the design of adsorption system and also it provides the maximum sorption capacity for AEAC for the removal of RhB and AO7 from aqueous solution. Many isotherm models have been used to describe the adsorption process. Among them, Langmuir, Freundlich and Dubinin– Radushkevich (D–R) isotherm models have been widely employed to describe the adsorption equilibrium process. In Table 2, the equations of the above said isotherms were given.

Table 2. Isotherms and their linear forms

Isotherms		Linear form	Plot
Freundlich	$q_e = k_F C_e^{1/n}$	$\log q_e = \log k_F + \frac{1}{n}\log C_e$	log q_e vs log C_e
Langmuir	$q_e = \frac{Q^o b C_e}{1+bC_e}$	$\frac{C_e}{q_e} = \frac{1}{Q^o b} + \frac{C_e}{Q^o}$	$\frac{C_e}{q_e}$ vs C_e
Dubinin - Radushkevich	$q_e = X_m \exp(-k_{DR}\varepsilon^2)$	$\ln q_e = \ln X_m - k_{DR}\varepsilon^2$	ln q_e vs ε^2

Adsorption of RhB and AO7 dyes onto AEAC obeyed the Freundlich isotherm model. The higher r values and lower sd values obtained for Freundlich isotherm confirms physisorption.

3.7. Thermodynamic Study

The values of thermodynamic parameters [32] such as free energy change (ΔG^o), standard enthalpy change (ΔH^o) and standard entropy change (ΔS^o) can be determined from the following Eqs. (7) and (8):

$$\Delta G^O = -RT \ln K^O \quad (7)$$

$$\ln K^O = \frac{\Delta S^O}{R} - \frac{\Delta H^O}{RT} \quad (8)$$

where, K^o is the sorption distribution coefficient, ΔG^0 is the standard free energy change of sorption (kJ mol^{-1}), T is the temperature in K, R is the universal gas constant (8.314 J $mol^{-1}K^1$), ΔH^o is the standard enthalpy change (kJ mol^{-1}) and ΔS^o is standard entropy change (kJ mol^{-1} K^{-1}). The values of ΔH^o and ΔS^o can be obtained from the slope and intercept of a plot of $\ln K^o$ against 1/T. The values obtained for ΔG^o, ΔH^o and ΔS^o are listed in Table 3.

Table 3. Thermodynamic parameters of AEAC

Thermodynamic parameters		**RhB**	**AO7**
ΔG^o (kJ mol^{-1})	303 K	-5.454	-5.169
	313 K	-7.076	-6.400
	323 K	-8.073	-7.259
ΔH^o (kJ mol^{-1})		-10.160	-10.642
ΔS^o (kJ $mol^{-1}K^{-1}$)		-0.024	-0.025

The negative values of ΔG^oindicate the removal of RhB and AO7 by AEAC is a spontaneous process. The negative value of ΔH^o confirmed the exothermic nature of the sorption process.

The typical range of ΔH^o value for physisorption is between 2.1 and 20.9 kJ/mol and for chemisorption involving complexation is between 20.9 and 418.4 kJ/mol [33-35]. The ΔH^o values were obtained by this study, which falls within the range of physical adsorption i.e., electrostatic interaction between AEAC and both dyes. In addition, the negative values of ΔS^o indicates a decrease in randomness at solid/solution interface and no significant changes occurs in the internal structure [35] during the RhB and AO7 sorption onto AEAC.

4. Conclusions

On the basis of the results, it was apparent that AEAC acted as a good adsorbent for the removal of RhB and AO7 dyes from aqueous solution. The maximum monolayer capacity obtained from the Langmuir isotherm was 16.55 and 15.84 mg/g for RhB and AO7dyes, respectively. Adsorption of RhB and AO7 dyes onto AEAC, obeyed the Freundlich isotherm model. The results of thermodynamic study revealed the exothermic and spontaneous

nature of the present adsorption process. The AEAC, being a natural waste material, could be an alternative even though for many of the costly adsorbents used in dye remol in wastewater treatment processes.

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Synthesis of Ca^{2+} Ion Cross-Linked Nano-Hydroxyapatite Alginate Hybrid Beads for Defluoridation of Water

Kalimuthu Pandi and Natrayasamy Viswanathan

Abstract

The calcium ion (Ca) cross-linked nano hydroxyapatite(n-HAp) encapsulated alginate (Alg) hybrid beads (n-HApAlgCa) was prepared by introducing n-HAp powder in alginate polymeric gel and the resulting mixture was dropped into Ca^{2+} ions solution for cross-linking. The synthesized nHApAlgCa composite beads possessanenhanced defluoridation capacity (DC) of 1352 mgF^-/kg when compare to n-HAp and AlgCa beads which posses the DC of 1296 and 680 mgF^-/kg respectively. The defluoridation experiments were carried out in batch mode to optimize various influencing parameters like contact time, pH and competitor anions. The results of nHApAlgCa composite beads demonstrate that it can be effectively employed for defluoridation and it pave the way for the development of defluoridation technology.

Keywords: Nano-hydroxyapatite; Alginate; Composite beads; Fluoride. Removal.

1. Introduction

Fluoride is a precious ion at lower levels, but harmful when it exceeds the tolerance limit (>1.5 mg/L) as suggested by World Health Organization (WHO). Drinking water is a major source of fluoride intake. The presence of excess fluoride in groundwater is a serious human health trouble because the consumption of drinking water with higher concentration of fluoride causes fluorosis. Generally, the fluoride is entered into the environmental system by both the natural behaviors, including leaching of fluoride from

contaminated soils/minerals and man-made activities like glass, aluminum and semiconductor manufacturing industries. In the developing countries, millions of people are suffering from fluorosis, mainly due to the high fluoride concentration in drinking water. Since, fluorosis is an incurable and irreversible disease, prevention is the best option to control fluorosis. One such preventive measure is defluoridation. Various defluoridation technologies like precipitation, ion exchange process, electro coagulation, membrane separation and adsorption have been adopted. Among the reported techniques, adsorption seems to be an useful technique because of its easy handing, selectivity and cost-effectiveness.

Hydroxyapatite (HAp) is a biocompatible and potential material for the removal of toxic ions and organic pollutants in water/waste water. Nowadays the research studies have been focused on n-HAp because of its high surface area and reactivity. However, the application of n-HAp in adsorption columns is limited due its powder form, insufficient strength and brittleness. The development of the polymeric composites will help to triumph over such technological troubles. The inorganic materials like HAp, alumina and clays can be modified using polymers will generate polymeric composites which possess the unique properties such as rigidity, hardness and mold shrinkage which can't be possessed by individual components. The polymeric composites provide a platform for the development of defluoridation technology.

The searches for the new adsorption technologies involving the removal of toxic ions from water/waste water have paid more attention to biosorption technique. In biosorption, the biological materials have the ability to accumulate the toxic ions from water/wastewater through metabolically interceded or physicochemical pathways. Chitin, chitosan, cellulose, gelatin, alginate, etc., have been utilized for toxic ions removal. Alginate is one of the biopolymer have been studied extensively for the sorption of fluoride because of its low cost, biodegradability, biocompatibility and eco-friendly nature. However, it possesses limitations like low removal capacity, stability, etc. The biopolymer supported inorganic

composites has significant attention in recent years for fluoride removal as it possess the high uptake capacity than the base components.

Hence, the present research investigation aimed to synthesize the composite beads by incorporating n-HAp in the alginate polymatrix followed by cross-linking with Ca^{2+} ions. The developed n-HApAlgCa composite beads were utilized for fluoride removal in batch mode. Various sorption influencing parameters like contact time, pH and presence of competitor anions have been optimized for maximum fluoride removal.

2. Materials and Methods

2.1. Materials

Sodium alginate was purchased from Himedia (India). Calcium nitrate tetrahydrate, ammonium dihydrogen phosphate, calcium chloride and 25 % ammonia solution were purchased from Merck (Mumbai, India). Sodium fluoride (ACS grade > 99 %) was purchased Merck (Mumbai, India) and all are used without further purification. Double distilled water was used to prepare the standard solutions.

2.2. Synthesis of n-HApAlgCa Composite Beads

n-HAp powder was prepared by chemical co-precipitation method according to Sairam Sundaram et al.[16] About 2 g of n-HAp powder was uniformly dispersed in 100 ml of deionized water. During dispersing, the n-HAp particles tended to agglomerate in water and the dispersing process was well assisted by sonication for 30 min and followed by mechanical stirring for 1 h. After obtaining the complete dispersion solution, 2 g of sodium alginate was added into nHAp solution and stirred vigorously for 3 h. The resulting homogeneous n-HApAlg solution was dropped into 0.2 mol/L of $CaCl_2$ solution to get n-HApAlgCa beads. For complete cross linking reaction the beads were left for 24 h in Ca^{2+} solution. Then, the

composite beads were thoroughly washed with deionized water and then dried at 80 ºC in hot air oven for 10 h and then used for fluoride removal studies.

2.3. Fluoride sorption experiments

The synthesized n-HApAlgCa beads were utilized as sorbent for the removal of fluoride from the aqueous solution by the batch equilibration method in duplicate. The experiments were conducted by adding 0.1 g of dry sorbent into 50 mL of 10 mg/L sodium fluoride solution at room temperature. The influence of pH on fluoride sorption by the sorbent was studied by varying the pH of the solution in the range of 3-11 using 0.1M HCl/NaOH solution. The mixture was shaken in an orbital shaker rotating with a speed of 200 rpm at room temperature. Samples were taken at determined time intervals for the analysis of fluoride concentrations in the solutions until sorption equilibrium was gained satisfactorily.

2.4. Analysis

The fluoride concentration was measured using Thermo Orion Benchtop multiparameter kit (VERSA STAR 92) with the fluoride ion selective electrode (Thermo Orion, USA). The pH measurements were made with the same instrument using pH electrode.

3. Results and Discussion

3.1 Effect of Contact Time

To find the minimum contact time for the maximum DC of the materials, the experiments were carried out in the time range of 10-60 min with 10 mgL^{-1} initial fluoride concentration, 0.1 g adsorbent dosage with neutral pH at 30 ºC. The results showed that the DCs of AlgCa beads, n-HAp and n-HApAlgCa composite beads were found to be 680, 1296 and 1352 mgF^{-}/kg respectively. All the adsorbent materials have attained equilibrium at 50 min, which is

shown in Fig. 1. Among the sorbents, n-HApAlgCa composite beads possess higher DC when compare to AlgCa beads and n-HAp. Therefore, further studies were limited to n-HApAlgCa composite beads.

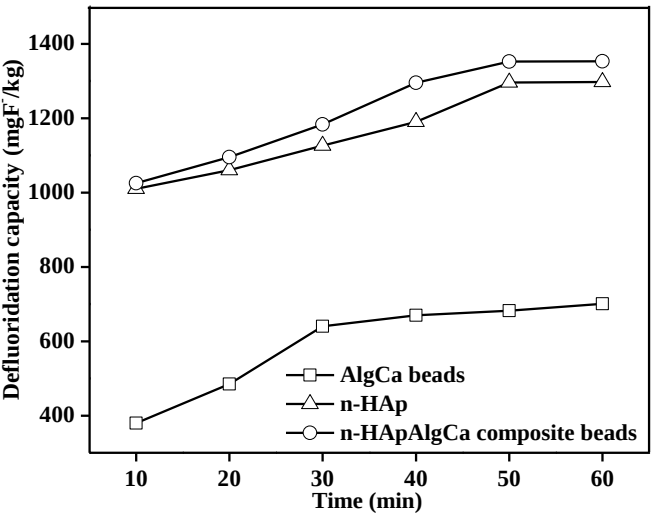

Fig. 1. Effect of contact time on the DCs of AlgCa beads, n-HAp and n-HApAlgCa composite beads.

3.2. Performance of the Composite Beads in pH Medium

The solution pH is one of the important factors which influence the uptake capacity of fluoride in the water-adsorbent interface. The removal of fluoride by n-HApAlgCa beads were studied with different initial pH ranges from 3 to 11, by keeping all other parameters as constant.

As evident from Fig. 2, the sorption of fluoride onto the beads was found to be maximum between 3 and 5. At lower pH values, more protons available in the medium combine with fluoride leading to the formation of HF which leads to unfavorable adsorption of fluoride onto beads. When moving towards higher pH ranges (pH 5 to 11), the DC decreases with increase in solution pH. The main reason could be at higher pH ranges the hydroxylions may also

compete with fluoride ions in the active sites of the beads during sorption.[17] Irrespective of the initial pH solution, after treatment with n-HApAlgCa beads, the pH of the solution becomes neutral, which indicates that nHApAlgCa composite beads can be used in all types of pH environment (i.e., acidic, basic and neutral) which is one of the advantages of this composite material.

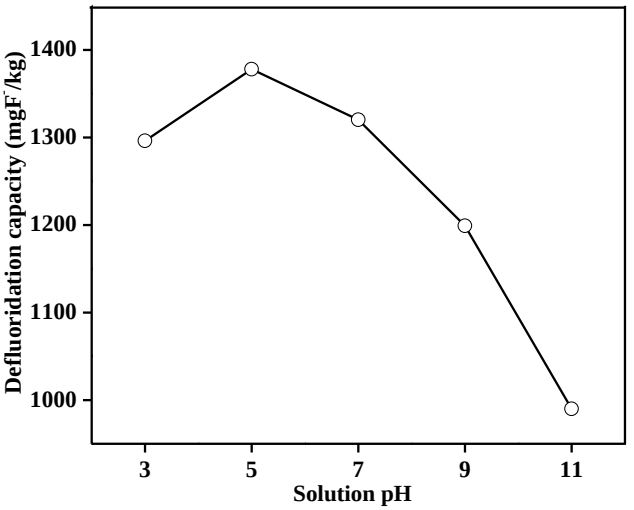

Fig.2.Influence of solution pH on the DC of n-HApAlgCa composite beads.

2.1. Effect of competitor anions during fluoride sorption The normal drinking water contains other anions like Cl^-, NO_3^-, SO_4^{2-} and HCO_3^- ions in addition to fluoride. In order to know the effect of these challenger anions on fluoride sorption, it was investigated with 200 mg/L as initial concentrations of these ions, 10 mg/L as the initial fluoride concentration and by keeping all other parameters as constant. Fig. 3 shows that there is no significant change in fluoride uptake capacity in the presence of the challenger anions like Cl^-, NO_3^- and SO_4^{2-} ions. But, the DC of the composite beads decreases in the presence of HCO_3^- ion which is due to increase in solution pH simultaneously reducing the active sites for fluoride sorption.

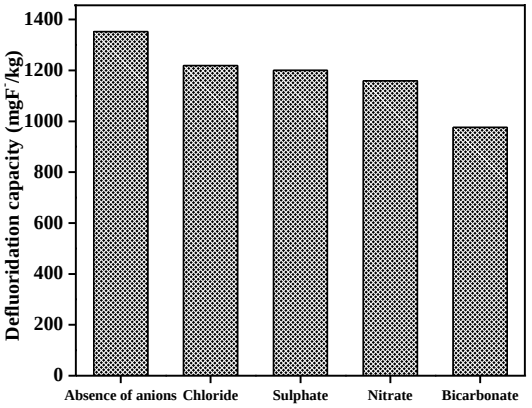

Fig. 3.Effect of co-anions on the DC of n-HApAlgCa composite beads.

3.4. Mechanism of Fluoride Removal by n-HApAlgCa Composite Beads

The feasible mechanism of fluoride removal by n-HApAlgCa composite beads was governed by adsorption and ion-exchange, which is shown in Fig. 4. The binding of n-HAp with alginate often occurs through hydrogen bonding. The positively charged Ca^{2+} ions present in n-HApAlgCa composite beads attracted negatively charged fluoride ions by means of electrostatic attraction. In addition, the OH^- ions present in the nHAp lattice are replaced by F^- ions through ion-exchange mechanism.[18]

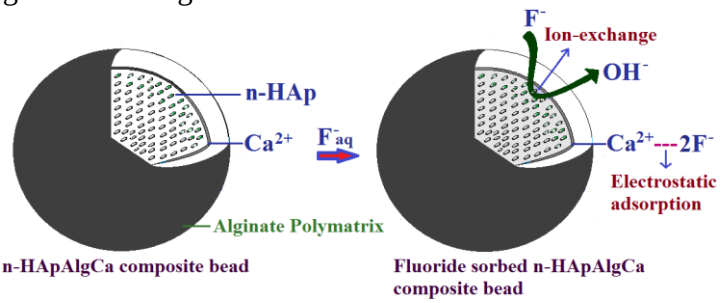

Fig. 4.Feasible Fluoride Removal Mechanism of n-HApAlgCa Composite Bead

4. Conclusion

The present investigation displays the synthesis of nHApAlgCa composite beads by incorporating n-HAp into alginate polymatrix followed by cross-linking with Ca^{2+} ion. The DC of the developed n-HApAlgCa composite beads was influenced by the pH of the medium and altered slightly in the presence of bicarbonate ions. The result reveals that the developed n-HApAlgCa composite beads could be a feasible, eco-friendly and economical adsorbent for the development of defluoridation technology.

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Adoption of Integrated Nutrient Management on Maize to Economize the Fertilizer Bill of the Farmers

M. Manimaran and T.T. Ranganathan

Abstract

A field experiment was conducted in a neutral and normal soil during Jan-April, 2008. The experimental plot was located at Madurai District, Tamil Nadu, India. The experimentation plotsoil has the pH of 7.2, EC 4 dSm^{-1} and the available phosphorus content is 8 kg ha^{-1}. The maize crop cv. Ganga - 5 was grown as a test crop. There were ten treatments imposed in randomized block design (RBD) with three replications. The treatments comprised of Control (T_1), 100 % RDP as SSP alone(T_2), 100 % RDP as SSP + GM + PB(T_3), 100 % RDP as SSP + FYM + PB(T_4), 75 % RDP as SSP alone(T_5), 75 % RDP as SSP + GM + PB(T_6), 75 % RDP as SSP + FYM + PB(T_7), 50 % RDP as SSP alone(T_8), 50 % RDP as SSP + GM + PB(T_9), 50 % RDP as SSP + FYM + PB(T_{10}). The result indicated that the yield and yield attributes of maize crop as affected by different inorganic P sources, organics and phosphobacteria. Among different treatments, the treatment T_3(100 per cent RDP as single super phosphate in combination with green manure and phosphobacteria) recorded higher percentage of double cobs (59.58 %), length (22.5 cm) and girth (20.30 cm) of the cob, 100 grain weight (27.64 g) , grain yield (5.86 t ha^{-1}) and straw yield (13.71 t ha^{-1}) of the maize crop.

Introduction

Maize *(Zea mays)* is globally the top ranking cereal in potential grain productivity. Among cereals grown in India, it ranks fifth in area (6.42mha), fourth in production (11.47mt), third in productivity of 1790 kg ha^{-1}. Maize occupies a wide range of utility as a value based product in the industries of corn oil, starch, glucose, cosmetics, fermentation products (like alcohol, syrup), baby food, edible oil, poultry, livestock and fish feed, etc. Among the major nutrients, phosphorus ranks next to nitrogen in importance on account of its vital role in major life processes. It is one of the limiting nutrients in soils because of its high fixation and very low recovery of applied phosphorus from the soil. India has a vast scope for utilization of organic manures such as green manures, farmyard manure, vermin compost and other industrial by-products. Utilization of organic materials in conjunction with inorganic fertilizers leads to improved crop productivity in various soil conditions. Organic manures have considerable quantities of macro and micro nutrients, besides having ameliorating effects and can be used to improve the physical, chemical and biological properties of soils.

As far as Tamil Nadu is concerned, the area under maize is increasing due to escalation in broiler feed production and various food processing industries. As such, the existing recommendation towards phosphorus fertilization to maize crop is far below the uptake. Hence, there is a need to fix up the dose of P to be applied for maize which consumes at a higher rate than the recommended dose. Comprehensive studies on best suited source of inorganic P, organic manures and bio fertilizers and their best combination to enhance the efficiency of applied phosphatic fertilizers in soils in Tamil Nadu, have not been documented so far adequately. Keeping these points in mind, the present investigation was taken up.

Materials and Methods

A field experiment was conducted in a neutral and normal soil during Jan-April, 2008. The experimentation plot was located at Madurai District, Tamil Nadu, India. The experimental soil has the pH of 7.2, EC 4 dSm^{-1} and the available phosphorus content is 8 kg ha^{-1}. The proposed experimental site in the field was well ploughed till a fine tilth was obtained. Plots of 5m x 4 m dimensions were laid out in the field. Ridges and furrows were formed with 4 m long and 60 cm apart. Irrigation channels were formed across the ridges. The maize crop cv. Ganga - 5 was grown as a test crop. Good quality seeds @ 20 kg ha^{-1} were sown with a spacing of 20 cm apart. The seeds were dibbled at a depth of 4 cm along the furrows and covered with soil. Life irrigation was given immediately after sowing of seeds. The subsequent irrigations were given at 15 days interval to the crop. The recommended dose of N and K were applied uniformly to all the experimental plots (135:50 kg N and K ha^{-1}). The phosphorus, organic manures and phosphobacteria was applied as per the treatment structure. There were ten treatments imposed in randomized block design (RBD) with three replications. The treatments comprised of Control (T_1), 100 % RDP as SSP alone(T_2), 100 % RDP as SSP + GM + PB(T_3), 100 % RDP as SSP + FYM + PB(T_4), 75 % RDP as SSP alone(T_5), 75 % RDP as SSP + GM + PB(T_6), 75 % RDP as SSP + FYM + PB(T_7), 50 % RDP as SSP alone(T_8), 50 % RDP as SSP + GM + PB(T_9), 50 % RDP as SSP + FYM + PB(T_{10}). Two manual weedings were given one at 30^{th} day and another at 60^{th} day and earthing up was done during these periods to provide additional anchorage to the plant. The crop was grown upto maturity and harvesting was done. The yield attributes viz., double cobs percentage; cob filling percentage, length and girth of the cob and 100 grain weight were recorded. The grains were separated by thrashing the cob. The grain and straw yield from each treatment were recorded individually and expressed in t ha^{-1}.

Results and Discussion

Table:1 Effect of integrated use of inorganic P, organics and phosphobacteria on yield attributes and yield of maize *(Zea mays)*

Treatments	Yield attributes				Yield (t ha^{-1})	
	Double cobs (%)	Cob length (cm)	Cob girth (cm)	100 grain weight (g)	Grain	Straw
T_1 – Control	46.14	16.30	13.50	17.82	3.56	9.31
T_2 – 100 % P_2O_5 as SSP alone	56.13	20.30	18.20	24.92	4.85	11.50
T_3 – 100 % P_2O_5as SSP + 10 t GM + PB	59.58	22.50	20.30	27.64	5.86	13.71
T_4 –100 % P_2O_5 as SSP + 12.5 t FYM ^{1} + PB	59.24	22.20	20.00	27.35	5.81	13.55
T_5– 75 % P_2O_5 as SSP alone	54.71	19.50	17.40	23.75	4.55	11.03
T_7 – 75 % P_2O_5 as SSP + 12.5 t FYM ^{1} + PB	57.56	21.20	19.00	26.00	5.43	12.51
T_8 – 50 % P_2O_5 as SSP alone	48.53	17.00	14.20	18.91	3.82	9.74
T_9 - 50% P_2O_5 as SSP + + 10 t GM h PB	**a**53.30	18.70	16.40	22.55	4.28	10.60
T_{10} – 50 % P_2O_5as SSP + + 12.5 t FYM ha^{-1} + PB	51.21	18.00	15.40	21.14	4.05	10.16
SED	0.61	0.30	0.34	0.48	0.12	0.21

The result indicated that the yield and yield attributes of maize crop as affected by different inorganic P sources, organics and phosphobacteria are presented in Table 1. Among different treatments, the treatment T_3 (100 per cent RDP as single super phosphate in combination with green manure and phosphobacteria) recorded higher percentage of double cobs (59.58 %), length (22.5 cm) and girth (20.30 cm) of the cob, 100 grain weight (27.64 g) , grain yield (5.86 t ha^{-1}) and straw yield (13.71 t ha^{-1}) of the maize crop.

The treatment T_4 (100 per cent RDP as single super phosphate in combination with farmyard manure and phosphobacteria) and T_6 (75 per cent RDP as single super phosphate in combination with green manure and phosphobacteria) were on par with the treatment T_3. Gawai and Pawar (2005) reported that the application of 75 per cent RDF, farmyard manure and biofertilizer (PB) gave significantly higher grain and fodder yield of sorghum and showing 25 per cent saving of fertilizers. The combined use of inorganic P along with phosphobacteria and green manure might have increased the nutrient supply (Chitdeshwari and Savithri, 2005) and perhaps resulted in improvement in the yield attributes of maize crop. It might be due to the reason that the availability of P at optimum level for the better establishment of crop stand, even though the crop was supplied with low dose of inorganic fertilizers along with green manures in sufficient amount and phosphate solubilising bacteria. Phosphorus solubilising microorganisms mobilize the P in soil and hence resulted in higher uptake, which in turn led to the improvement in the yield contributing parameters of maize crop. Similar results were recorded by Patil *et al.* (2008) in soybean crop. Duraisamy and Mani (2001) reported that the application of single super phosphate along with phosphobacteria improved the yield attributes of cowpea.

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System of Rice Intensification Method Vis-A-Vis Conventional Method of Paddy Cultivation : Prospects and Problems

Sajith Kumar, R and K. Manikandan

Abstract

This paper is an attempt to analyze the advantages of a cost effective method of paddy cultivation, so called the System of Rice Intensification in a comparative framework with Traditional method of paddy cultivation. The main objective is to estimate and compare the cost- return structure of both SRI and Traditional method of rice cultivation. The study also attempts to identify the major motivating factors and constraints in adopting the method of rice intensification among the respondents. The study is conducted in Kannur district of Kerala state, India, where both methods of rice cultivation are practiced. The respondents were selected randomly comprising a total sample of 72 farmers including 36 adopters and 36 non-adopters of SRI technique. The study revealed that the total input requirement for SRI method is comparatively lower than conventional system of cultivation. Similarly, in SRI method the average yield and return is comparatively higher than traditional method of cultivation. Since ignorance of SRI technique among farmers is considered as major drawback, government intervention at grass root level in educating the farmers about the SRI technique may help in improving the paddy productivity at cheaper cost.

Keywords: Water Scarcity, Input Cost, Nursery Management, Higher Yield and Net return.

Introduction

Rice has the unique capacity to grow in standing water. Therefore, this crop is abundantly grown in the low-lying areas of the

globe. In irrigated rice, a tradition of keeping standing water in rice field is an age-old practice. This might be mainly because the availability of water was abundant, it was easy to control weeds and water logging improves the availability of certain important plant nutrients. But in the years to come, water availability would be a serious problem because of the higher demand of water for agriculture, industry, and drinking purposes. Climate change is expected to affect water availability. In such a situation, an innovative technique of rice culture, which would reduce the need of water for rice cultivation without reducing the productivity, is the need of the hour (Geethalakshmi and Nagothu, 2012). To overcome the challenges, agriculture research worldwide has been looking forward for alternative approach. The System of Rice Intensification (SRI) is one such emerging alternative (Thiagarajan et al., 2012).

The System of Rice Intensification involves cultivating rice starting with young seedlings planted singly at wider spacing in square pattern; and with intermitted irrigation that keeps the soil moist but not inundated and frequent inter cultivation with weeder that actively aerates soil. In other words, the System of Rice Intensification is a holistic agro-ecological crop management technique seeking alternatives to the conventional high-input oriented agriculture, through effective integration of crop, soil, water and nutrient management (Uphoff, 2006; Stoop, 2011; Surajit et al., 2012).

Studies carried out in different locations in India suggest that paddy cultivated using the method SRI can significantly increase the productivity of paddy. While the area under paddy cultivated using the method of SRI has been increasing, the studies conducted on SRI also on the increase in India (Basavaraja et al., 2008; Anjugam et al., 2008, Rajkumar, 2013). However, comprehensive studies using farm level data covering various socio-economic aspects of the method are very less in Kerala state compared to other predominant agricultural states of India. Some of the available studies seem to have highlighted the impact of SRI productivity of paddy, ignoring the other important aspects of SRI such as awareness level, input usage, and constraints.

Therefore, there is a need to study the various issues relating to the adoption of SRI method and its constraints by using a farm level survey data. It is also important to study the efficiency and effectiveness of SRI cultivation not only in agriculturally predominant state but also less predominant states for it would add up to the existing knowledge. This calls for systematic study to assess the performance of SRI method of rice cultivation at field level. Towards this end the present study is carried out in two villages selected from Payyanur block in Kannur, the northern district of Kerala with the following objectives.

1. To understand the socio- economic background of SRI cultivators in a comparative frame work.
2. To assess the efficiency of SRI method by comparing the costs and return from Conventional and SRI method of cultivation
3. Identify the factors that motivates the farmers to adopt SRI method and
4. Provide policy implications for the constraints in the adoption of SRI techniques.

Data and Methodology

The study is purely analytical in nature. The study seeks to compare the cost- return structure and adoption level and constraints of both SRI method with conventional method of paddy cultivation. The present study was conducted in two villages selected purposively from Payyanur block in Kannur district of Kerala where both methods of rice cultivation are practiced. The study relies mainly on primary data collected from respondents who practice SRI method of rice production and conventional method in the study area. The farmers adopting system of rice intensification were selected randomly from the selected villages. In order to compare the impact of SRI adoption, it was decided to have a matching sample of conventional paddy cultivating farmers from the same area. The respondents were selected randomly. As such data were collected from 36 SRI farmers and 36 conventional farmers making the total sample to 72. Data were collected from them through a pretested

interview schedule. Besides simple statistical tools such as percentages and averages the study also used more analytical tools like 't' test, decomposition analysis, Cost Benefits Analysis and Garrett's Ranking Technique for more validating the findings.

Results and Discussions

This study firstly discusses the socio – economic status of the respondents in a comparative frame of SRI farmers and the conventional farmers. In this, the general information of the respondents, under both methods is analysed. Secondly, study explains about the cost and return structure of rice cultivation among the sample respondents. Finally, it analyses the knowledge, level of adoption, and the reasons and constraints in adopting SRI method of rice cultivation.

Socio- Economic Characteristics of the Respondents

There is some difference exists in the socio- economic characteristics between the respondents who adopt SRI method and conventional method of cultivation. (Table. 1.) The average age of SRI adopters was comparatively lower (48.7) than those farmers who follow the conventional method of cultivation (56.3). This shows that the, SRI method is more popular among new generation farmers, while, aged farmers continue to follow conventional method of cultivation. Education seems to be one of the important determinants in the adoption of SRI method of cultivation. In comparison to the conventional cultivators, most of the SRI respondents are well educated. As a result, most of the respondents who do occupation other than agriculture as the main one follow SRI method. They consider agriculture as a subsidiary occupation. Similarly, most of the respondents who undertake agriculture as the main occupation follow conventional method of cultivation.

Among SRI respondents, only 30.56 percent take up agriculture as the main occupation and the major proportion of respondents undertake occupation other than agriculture as main one.

But in case of conventional cultivators 80.56 percent of the respondents do agriculture as the primary occupation, and only 19.44 percent pursue non-agricultural occupation as a main occupation. Thus, most of the respondents who undertake agriculture as the main occupation follow conventional method of cultivation. Most of the respondents who do occupation other than agriculture as the main one follow SRI method. They consider agriculture as a subsidiary occupation. Average annual family income is more (Rs. 46583) in case of SRI respondents and it is less (Rs 38720) in case of conventional farmer respondents. This indicates that, relatively higher income earning respondents adopt SRI method as compared to their counter parts, the conventional farmers.

Conventional cultivator respondents possess more land and that too more of irrigated land as compared to their counter parts, SRI respondents. As compared to conventional farmer respondents, SRI respondents possess more of farm machineries and equipments, which indicate the managerial ability of SRI farmers. This makes one to point out that SRI method is more suitable to small landholders. While cow-rearing practice is relatively more among conventional farmer respondents, goatrearing practice is more among SRI respondents. A little more number of conventional farmer respondents have obtained loan as compared to SRI farmers. Most of those who have obtained loan from both the categories of farmers depend on cooperatives for their credit needs. As compared to SRI farmer respondents the average loan outstanding of conventional farmer respondents is higher.

Cost and Return from Cultivation

The cost of cultivation includes all the expenditure involved in the production process. The cost of cultivation differs mainly due to changes in the amount/quantity of inputs used for production of paddy. Thus, cost of cultivation is mainly a function of input prices. The cost of nursery is much lower under SRI cultivation as compared to conventional cultivation in the study area. Major proportion of total nursery cost incurred under conventional method is in the order: seed,

land preparation and fertilizers. But, in case of SRI the order is land preparation, FYM and other expenditures. Seed cost is much lower under SRI method. Number of man days of labour employed under SRI method is much lower as against conventional method. Under both the methods of cultivation hired labourers are predominant in total labour. Share of input cost to total cost is comparatively very lower in SRI method, than in case of conventional method of cultivation (Table.3.) SRI involves only less expenditure on nursery management, ploughing, main field preparation, transportation, fertilizers and PPC (Figure 1). Thus in terms of cost, SRI method is more efficient.

The number of man days of labour employed under SRI method is much lower as against conventional method. Under both the methods of cultivation, hired labourers are predominant. However, their predominance is much higher under SRI method and considerable proportion of family labour is employed under conventional method.

Total output and total return are the important factors that influence the farmers to adopt any new method of production. The total output, average output per acre, total return and average return per acre all under SRI method are comparatively higher than that of the conventional method. The average yield under SRI method is significantly higher than the level of output in Conventional method. The total profit or the net income is the most important measure to determine whether a method of cultivation is effective. Total profit from cultivation is the function of total cost and total revenue. The net return from SRI method of cultivation is higher than the cost incurred, placing the method in a superior position. One rupee of expenditure in SRI method could result in a return equal to Rs 1.67, and one rupee of expenditure under conventional method provides relatively a lower return of Rs 1.07. The difference in benefit between SRI and conventional method of cultivation is Re.0.60 more placing the SRI in a superior position. Thus, SRI is more effective method.

Knowledge and Adoption level of SRI method

The System of Rice Intensification is an improvised system over the methods of cultivation practiced yet. It is comparatively a new management technique. Thus, good knowledge is essential for the successful adoption of various SRI methods. For half of the respondents the prime source information on SRI is Agricultural Extension Officers/Agricultural Officers. Thus, it appears that, Agricultural Extension Officers (Department of Agriculture) could play a major role in disseminating the practice of SRI among farmers.

SRI method requires comparatively less amount of water and it is a water saving method. That is a reason why these farmers show more interest towards SRI method of rice cultivation (Table 3). In SRI the incidence of pests and diseases seem to be comparatively less, this provides greater advantage to the farmers, as it facilitate higher yield on it one hand and incur less cost for pest management on the other. An important reason why the farmers changed the method of cultivation from conventional to SRI was, mainly to get subsidy and less water requirement.

Lack of comprehensive awareness is the major constraint to the farmers in adopting SRI method, followed by difficulty in using rotary weeder and Flood (Table 4). If there is heavy rain or flood within 10 to 15 days after re-planting, the young seedlings cannot withstand. Thus, there is a huge risk under SRI in this respect.

Policy Implications

From the study, it became clear that SRI method provides comparatively very higher yield and return than the conventional system of cultivation. However, the SRI method was not successful in attracting the whole farmers in to the new system. Due to certain constrains in the operation, and lack of proper knowledge on its application most of the farmers continue to stick on the conventional methods of cultivation. Thus, in order to extend and scale up SRI, wider dissemination needs to be done. In this context, promoting SRI

through a sustained campaign must be the most desirable option available now. This would bring most of the cultivators into the new system. The specific policy recommendations on the basis of the above findings are as follows.

- ❖ Government's initiative at the grass root level is necessary to give proper awareness to farmers about the advantages of SRI method.
- ❖ Training is essential to enhance capacity of farmers on various SRI methods and its applications. This could increase the confidence level of the farmers to adopt SRI.
- ❖ Incentives in the form of subsidy could be extended to the present times to attract more farmers.
- ❖ Field demonstrations and more exposure visits may be organized.
- ❖ Modifications and adjustments could be made in the techniques or prescriptions of SRI methods so as to suit to the climate and geographical conditions of the area. In this respect there is a need to take up more Research and Development activities on addressing constraints faced by farmers.

Conclusion

The study conducted among 72 paddy farmers (SRI and Conventional) has brought out findings on socio- economic elements, cost and output differences and adoption of SRI on a comparative framework. By and large, the study suggests that adoption of SRI technique would help increase the rice production without increasing the area under cultivation and by reducing the required inputs and cost. Saving water for rice cultivation is another important advantage of this method found in the study. More productivity and net profit in SRI as found in the study would help attract more farmers, into the rice cultivation. Given the limited resources, scaling up SRI cultivation is a viable option towards food security. The policy implications drawn from the study could help realize this end. At the same time, still there is a gap in the available literature about the issues in adoption of SRI among the farmers. Therefore, it is

necessary to have a comprehensive study, to appraise the level of adoption of SRI, the factors of adoption of SRI, and impact of adoption of SRI. Thus, a thorough and detailed study is needed by covering the entire nation across different agro climatic conditions.

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Tables

Table 1
Comparison of General Information

Particulars	SRI farmers	Traditional farmers
Average Age (year)	48.69	56.37
Agriculture as Main Occupation (%)	30.56	80.56
Social Participation (%)	58.33	36.11
Average Annual family Income (Rs)	46582.54	38719.63
Average Family Size (no)	5.18	5.74

Table 2
Decomposition analysis cost difference

SI No	Source of differences	Percentage Difference (SRI-Traditional method)
	Difference in total cost	-36.65
A	Seed cost	-88.75
B	Cost for Human labour	-20.59
C	Fertilizer cost	-37.03
D	FYM cost	100.75
E	Cost for PPC	-48.48
F	Machine cost	14.26
G	Miscellaneous cost	-1.32

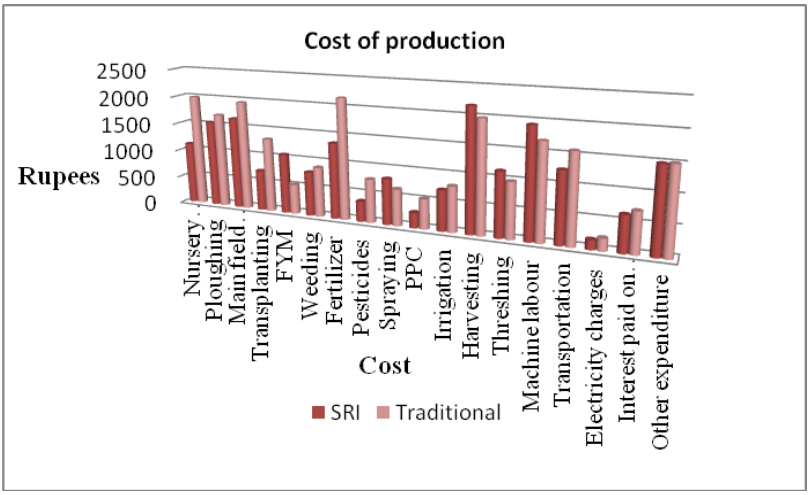
Table 3
Reasons for practicing SRI method

Reason	Mean Score	Rank
Less water requirement	75.89	I
Subsidy	73.44	II
Higher yield	60.39	III
Less seed rate	59.19	IV
Less incidence of pests and diseases	53.28	V

Table 4
Constraints for adopting SRI method

Reason	Mean Score	Rank
Lack of proper awareness	72.08	I
Difficult to use rotary weeder	62.61	II
Heavy Rain/ flood	59.31	III

Figure 1



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Awareness and Perception of the Consumer Public on FDI in the Indian Multi Brand Retail Sector

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Abstract

Introduction

Foreign Direct Investment (FDI) is an investment made by a company or an entity based in one country, into a company or an entity based in another country. Foreign direct investment differs substantially from indirect investments such as portfolio flows, wherein overseas institutions invest in equities listed on the nation's stock exchange. Entities making direct investments typically have a significant degree of influence and control over the company into which the investment is made. Open economies with skilled workforces and good growth prospects tend to attract larger amounts of foreign direct investment than the closed and highly regulated economies. FDI contributes to export growth, productivity and finance for balance of payments, and supports in increasing the national income. FDI brings private overseas funds into the country in the form of investment.

India is one of the fast growing countries in economies in the world. India has initiated major economic reforms in 1991 and since then Indian economy has registered significant growth. The Indian retail business in estimated at about Rs.13.5 lakh crore, which is about one third of the Gross Domestic Product (GDP). It is also estimate that there are 15 million retail outlets in the country accounting for the highest retail outlets density in the world. Today an estimated five crore people are directly and indirectly involved in retail trade. Against this background, this study has made an attempt to analysed, the government’s decision to allow Foreign Direct Investment (FDI)

up to 51 per cent in multi brand retail and 100 per cent in single brand retail.

FDI in India

India is the fifth largest economy in the world and has the third largest GDP in the entire continent of Asia. It is also the second largest among the emerging economies. India is also one of the few markets in the world which offers high prospects for growth and has earning potentials in all areas of business and commerce.

India is believed to be a good investment destination despite political uncertainty, bureaucratic hassles, shortage of power and infrastructural deficiencies. India presents a vast potential for foreign investment and is actively encouraging the entry of foreign players into the market. Foreign investors in the present contest cannot ignore India, which is expected to become one of the top three emerging economies because of the huge investment fixed by the policy to the tune of $100 million or Rs.500 crore. According to world Investment Report 2010, India.emerges as the fifth largest recipient of foreign direct investment across the globe and second largest among the developing countries. **FDI Inflows to India**

FDI inflows to India witnessed significant moderation in 2010-11 while other **Emerging Market Economies** (EMEs) in Asia and Latin America received large inflows. This had raised concerns in the wake of widening current account deficit in India beyond the perceived sustainable level of 3.0 per cent of GDP during April-December 2010. This also assumes significance as FDI is generally known to be the most stable component of capital flows needed to finance the current account deficit. Moreover, it adds to investible resources, provides access to advanced technologies, assists in gaining production know-how and promotes exports. A perusal of India's FDI policy vis-à-vis other major emerging market economies (EMEs) reveals that though India's approach towards foreign investment has been relatively conservative to begin with, it progressively started catching up with the more liberalized policy

stance of other EMEs from the early 1990s, *inter alia* in terms of wider access to different sectors of the economy, ease of starting business, repatriation of dividend and profits and relaxations regarding norms for owning equity. This progressive liberalization, along with considerable improvement in terms of macroeconomic fundamentals, reflected in the growing size of FDI flows into the country. It increased nearly 5 folds during the first decade of the present millennium.

According to the Indian economic statistics survey, 2013-2014 data on FDI inflows into the country has shows an increasing trend with 16.73 per cent of compound annual growth rate in the net FDI in India over a period from 2000– 01 to 2013–14, except in the year 2008–09. It is found that the Net FDI flow has reached Rs. 1300 billion in the year 2013–14. The highest growth rate of total FDI inflows into the country has registered in the year 2009–10 that is, 583.76 per cent. Similarly, the total FDI as a percentage of agricultural GDP was registered highest in the year of 2007–08 that is, 24.35 per cent and thereafter it has noticed a total fluctuating trend. Overall total FDI has registered a seven fold, which indicates an increase 13.63 per cent of compound annual growth rate during a period of 14 years from 2000 – 2001 to 2013–2014.

Statement of the Problem

Foreign Direct Investment (FDI) plays an important role in the growth of developing required economies. It provides for the introduction of new technology, cheaper production facilities, new skills and financing to the Indian firms. It is considered as an important driver of economic growth. The FDI can influence the economic output and growth : by increasing the capital stock of increasing the productivity of labour force through job creation and by enhancing human capital base through technology and knowledge transfer via training and development efforts in new management practices and organizational arrangements. India is one of the fastest growing economies in the world. India has initiated major economic reforms in 1991 and since then Indian economy has registered

significant growth. The government's decision to allow foreign direct investment (FDI) up to 51 per cent in the multi-brand retail and 100 per cent in single brand retail has manifested in the Parliament being adjourned frequently.

The Indian retail business is estimated at about Rs. 13.5 lakh crore, which is about one third of the GDP. It is also estimated that there are 15 million retail outlets in the country accounting for the highest density retail outlets in the world. Today an estimated five crore people are directly and indirectly involved in retail trade.

The main focus of the study is : (i) to examine the awareness of the consumer public about the policy of allowing 51 percent FDI in Indian multi brand retail sector and (ii) to assess the socio economic problem of the respondents in the study area. Consumer public is who are affected due to foreign direct investment in the Indian multi brand retail sector are covered by the researcher for the purpose of this study. The socio economic conditions prevailing in the study area has also been explored in order to understand the awareness level in the background of the respondent's socio-economic status. The major focus however remains on the empirical perception of the Consumers and their knowledge about the policy of allowing 51 per cent FDI in Indian multi brand retail sector. Against this background, the present study analyzed the perception of the Consumer public on the FDI in the Indian multi brand retail sector in Dindigul District.

Objectives

The study has been conducted with the following specific objectives.

1) To examine the perception of consumer public about the policy of allowing 51 per cent FDI in Indian multi brand retail sector.
2) To assess the awareness level of the respondents about the policy of allowing 51 per cent FDI in Indian multi brand retail sector.

Methodology

The present study is an empirical and analytical exercise based on primary data. The study is based on survey method. The primary data are collected from 60 respondents by using non-probability sampling technique. This technique is one of the non-probability sampling methods. It refers to that fraction of the population being investigated which is selected neither by probability nor by judgment but by convenience. A wellstructured and pretested interview schedule has been administered by the researcher. The investigator personally contacted the respondents and collected relevant information. The data so collected were tabulated and analyzed using simple statistical tools.

Period of the Study

This study has been carried out by the researcher during the period 2013-2014.

Major Findings

- With regard to the perception of consumers on FDI in multibrand retail, it was found that all the consumers (100 per cent) have awareness on the policy of allowing 51 per cent of the foreign direct investment in the Indian multibrand retail business.
- It was also found that the majority of the consumer respondents (62 per cent) gained awareness on the policy of allowing FDI in Indian multi-brand retail business through the television news.
- With regard to the mindset of the consumers towards FDI, it was found that majority of the consumer respondents (77 per cent) strongly supported the presence of Indian retailers in the retail market.
- Regarding the awareness of the consumers on shopping in the super market environment, it was found that majority of the consumer respondents (98 per cent) are found to have

thorough knowledge on shopping in the super markets though the city has limited number of small size super markets.

- ❖ With regard to the super market shopping culture, it was found that the majority of the consumer respondents (78 per cent) do not like to have super market shopping due to high pricing of the products.
- ❖ It was also found that majority of the consumer respondents' (57 per cent) depended upon the small retailers nearby their residence for buying their day- to- day requirements.
- ❖ It was also reported by 63 per cent of the consumer respondents that the price and quality of the products of the super market are not suitable for their family income as 60 per cent of the respondents were belonging to families with less than Rs10,000 monthly income in the study area.

Conclusion

In the globalised business environment, FDI becomes inevitable for the economic progress of the developing countries. It is necessary in the industrial sector, and also in the service sector particularly in infrastructure development. FDI to some extent in the agricultural sector is also justifiable in the context of modern mechanized agriculture. But in the retail sector allowing FDI may affect the livelihood security of millions of tiny, small and medium indigenous retailers besides the consumer public and the farmers. If it is inevitable, Government may restrict their entry by creating some conditions as it is done being in Japan. The Government has to ensure that domestic traders are not at complete disadvantage. The retail sector in India by its very nature is a highly sensitive one. Therefore, decisions regarding FDI in this sector need to taken with utmost care with proactive measures.

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Communicative Language Teaching Through Audio - Visual Aids: A Need Assessment

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Abstract

The main objective of this study was to assess the need for utilizing Audio-visual aids in enhancing English language communicative competence among students in Puducherry Government Rural High Schools. The data were collected from 120 high school level students in government schools of Puducherry. The key survey questionnaire was on profile characteristics of students, English language teachers' usage of Audio-visual aids for enhancing English communicative competence skills, and students' need in learning English communicative competence through Audio-Visual aids. The results revealed that majority of student respondents felt that there is need for utilizing Audio-visual aids by English teachers in classroom for enhancing English communicative competence. In the light of the findings of the study and related discussions, it is recommended to utilize Audio-visual aids by English language teachers in their classrooms to meet the high demand of English communicative competence among students.

Keywords: English Language Teaching, Audio-Visual Aids, English Communicative Competence, Communicative Language Teaching, Communicative Skills.

Introduction

In Indian Government school teaching, English language development is done as compulsory education without any day-to-day practical usages and beyond. Landauer and Dumais (1997), claim that teenagers learn ten new words a day. Older children have

to broaden their linguistic repertoire to accommodate the language demands of an increasingly diverse range of communicative situations. Nowadays, in classroom language teaching, English teachers are expected to provide communicative situations which are presented in books and according to the need and interest of the students. Attitude towards providing interactive/communicative situation of teachers play important role in practicing functional English skill development in classrooms. In most of the Government schools, both in Mother tongue medium as well as English medium, English Teacher's role is considered as passive in developing English communicative competence (competency in four language skills – Listening, Speaking, Reading and Writing) among students. There has been a consequent greater emphasis on developing communicative English language proficiency among rural student for their social identity, access to social mobility, excel in day-today English communication, keep in touch with social media, opt for higher education, achieve success in job market etc. Nowadays, in Puducherry, English medium schools are much preferred by parents over the mother tongue medium schools and parents prefer to send their children to town schools for enriching communicative abilities in English language.

Communicative Language Teaching (Clt): An Overview

According to Richards and Rodgers (2001), "CLT starts with a theory of language as communication, and its goal is to develop learners' communicative competence. Despite being a simplistic account of CLT, this idea of communicative competence is considered to be the main conception of CLT. Communicative competence included knowing what to say and how to say it appropriately based on the situation, the participants, and their roles and intentions."

According to Larsen-Freeman (1986), "the most obvious attribute of CLT is that almost everything that is done is done with a communicative purpose. In CLT, meaning is given prime importance, which is achieved through interaction between reader and writer, and

through negotiation between speaker and listener. There are a variety of communicative activities (e.g. games, role plays, simulations, and problem-solving tasks), which offer learners an opportunity to practice their communication skills meaningfully in different contexts and by taking on different roles."

Brown (1994) lists some of the core features of CLT,

- "Classroom goals are focused upon in all the components of communicative competence; they are not restricted to grammatical or linguistic competence.
- Language teaching techniques are designed to engage learners in the pragmatic, authentic, and functional use of language for meaningful purposes. Linguistic structures do not represent the central focus but rather aspects of language which enable the learner to accomplish those purposes.
- Fluency and accuracy are seen as complementary principles underlying communicative techniques. At times, fluency may have to take on more importance than accuracy in order to keep learners meaningfully engaged in language use.
- In the communicative classroom, students ultimately have to use the language, productively and receptively, in unrehearsed contexts."

Similar to Brown, Yang and Cheung (2003) argues that "CLT puts emphasis on purposeful and meaningful activities, the use of authentic elements, the use of extra materials used besides textbook activities, the avoidance of mechanical drills in pair or group work activities, and the diversity of activities." Littlewood (1981) reveals that "CLT gives planned emphasis on functional as well as structural features of language, combining these into a more completely communicative view."

Clt: A Learner-Centred Approach

The learner-centered characteristic of CLT and the new type of classroom activities imply different roles in the language

classroom for teachers and learners than from those found in more traditional second language classrooms. Learners in CLT classrooms are supposed to participate in classroom activities that are based on a collaborative rather than individualistic approach to learning. They are portrayed as active participants in the language learning process. Therefore, CLT alters the role of the teacher. Also, CLT as a methodology has much to do with interaction. It uses communication as a means to reach the goal, which is also communication. Accordingly, it would be wise to claim that teacher's and students' roles in CLT classroom have a dynamic feature, and thus they tend to vary all the time. Deckert (2004), emphasizes that "the CLT approach features low profile teacher roles, frequent pair work or small group problem solving, students responding to authentic samples of English, extended exchanges on high interest topics, and the integration of the four basic skills, namely speaking, listening, reading and writing." She further states that "CLT discourages pervasive teacher-controlled drills, quizzing of memorized material, and extensive explanation of forms of English."

Use of Audio-Visual Aids in Clt

Audio-Visual type of language learning can be highly helpful for the teaching- learning process in enhancing functional usage of English in classrooms. In English language teaching, Audi-Visual materials can be very powerful tool to enhance English communicative confidence and English communication skills among students.

Richards (2006) lists the following arguments in favor of the use of authentic sources like Audio-Visual aids as the basis of communicative classroom learning:

- They provide exposure to real language.
- They relate more closely to learners' needs.
- They support a more creative approach to teaching.

Wright and Haleem (1991) note that: "one of the most important aspects of language teaching is the role of audio-visual material. The importance of using visual media helps to make one's teaching more effective, communicative, and interesting."

Rationale and Background

Use of Audio-Visual aids in language teaching in English classrooms often neglected in Puducherry Government rural high Schools where oral instruction and verbal discussion are the main dominating scenes in English language teaching classrooms. Using Audio-Visual aids in language learning can be highly helpful for the teaching- learning process in enhancing functional usage of English skills in classrooms. Audio-Visual materials can be a very powerful tool to enhance communicative confidence and Communication skills among students. However, even experienced teachers do not exploit the potential of visual materials to the full. Communicative Language Teaching through Audio-visuals can make student active in using English communicative activities in a more interesting ways. Hill (1990) Points "Visuals evoke an immediate response from learners in a class which is the vital seed of all meaningful language learning in general and vocabulary in particular". Presenting communicative tasks through visual materials including White/Blackboard with colour chalks, paper handouts, photographs, diagrams, charts-flow, tree, drawings, key words, or video sequences help teachers to improve student-centred atmosphere with creative choice of images to achieve the most impact in developing language skills. Singh (2005:p.177) states "often teachers know the value of certain visual aids, but they fail to utilize them to the fullest because they do not take time to plan their use".

It is visible that most of the Government school teachers in rural schools neglect utilizing Audio-visual materials in their day-to-day teaching due to traditional attitude to English language teaching, poor attitude towards using Visual Aids, non-availability of Audio-visual materials in schools, pressure in completing syllabus and exams etc and so on. In view of Thamizhiniyan (2015) "Most of the

English teachers feel that teaching English and correction of errors are the teachers' prime responsibility… The students are passive, unable to put language learning in practice. Teachers often ignore communicative activities in practice and it leads to lack of independence and self-confidence in communicative competence among students". Regular usage of Audio-Visual Aids in English teaching for enriching English communicative competence among students is the need of the hour.

Methodology

The need assessment was carried out by a survey method based on questionnaire through interview. The questionnaire contained both open ended and close ended questions. The questionnaire was administered to the purposively selected 120 sample from Puducherry Government Rural High Schools in the two regions- Puducherry and Karaikal which follow Mother tongue medium of teaching. Equal numbers of sample were chosen (60:60) from the two regions of the Union Territory of Puducherry. The questionnaire consisted of the items on: profile characteristics of students, teachers' usage of Audio-Visual Aids for developing English communicative skills, students' need for Audio-Visual Aids in teaching English for communicative development. The data were analyzed using simple frequency and percentage (Table 1 to 8). The results of the need assessment study were presented through tables and discussed under the three sections namely; A. Profile characteristics of the students, B. Usage of Audio-Visual Aids for developing communicative skills and students participation levels C. Need of Audio-Visual Aids in Communicative Language Teaching.

Result And Discussion

A. PROFILE CHARACTERISTICS OF THE STUDENTS

Puducherry Union Territory (U.T) has four regions namely; Puducherry, Karaikal, Mahe and Yanam. For this research study, 120 students from Government Rural Mother-Tongue Medium schools

were selected. With regard to distribution of respondents by sex, equal percent (50 percent) of students belong to male and female from government high schools in Puducherry and Karaikal region of Puducherry U.T. were selected. All the student respondents belong to the age group of 10-16 years. All of the students (100 percent) were from rural areas. Most of the student respondents, 80 (66.7 percent) were selected from the class 6th, 7th and 8th standard. And, 40 students (33.3 percent) were from 9th and 10th standard. Three Schools from Puducherry region and three Schools from Karaikal region were selected.

B. TEACHERS' USAGE OF AUDIO-VISUAL AIDS FOR DEVELOPING COMMUNICATIVE SKILLS

Table 1. Students' responses to teachers' usage of Audio-Visual Aids in seven aspects.

1.English Teacher's usage of Audio-Visual Aids for developing communicative skills		
Does your English teacher use Audio-Visual Aids for communicative skills?	**Frequency**	**Percentage**
Yes	97	80.8
No	23	19.2
Total	**120**	**100**
2. Frequency of Teachers Usage of Audio-Visual Aids for Communicative Development		
How often does your English teacher use Audio-Visual Aids?	**Frequency**	**Percentage**
Always	20	16.6
Often	14	11.6
Sometimes	42	35
Rarely	21	17.5
Never	23	19.3
Total	**120**	**100**

3. Students' level of participation when Teacher use Audio-Visual Aids		
Do you actively participate when teacher use Audio-Visual Aids in classroom?	**Frequency**	**Percentage**
Yes	112	93.4
No	8	6.6
Total	**120**	**100**
4. Frequency of students' participation when Teacher use Audio-Visual Aids		
How often do you participate when teacher use Audio-Visual Aids?	**Frequency**	**Percentage**
Always	91	75.8
Often	17	14.2
Sometimes	8	6.6
Rarely	4	3.4
Never	0	0
Total	**120**	**100**
5. Students' Interest in learning Communicative English through Audio-Visual Aids		
Are you interested in Learning communicative English by using Audio-Visual Aids?	**Frequency**	**Percentage**
Yes	112	93.4
No	8	6.6
Total	**120**	**100**
6. Students' rating of learning English communication with Audio-Visual Aids		
How do you rate learning communicative English through Audio-Visual Aids?	**Frequency**	**Percentage**
More effective	89	74.2
Effective	23	19.2
Average	8	6.6
Ineffective	0	0
More Ineffective	0	0
Total	**120**	**100**

7. Students' belief on Audio-Visual Aids in developing their communicative competence		
Do you believe Audio-Visual Aids develop your communicative skills?	**Frequency**	**Percentage**
Yes	112	93.4
No	8	6.6
Total	**120**	**100**

With regard to the English teachers' usage of Audio-Visual Aids for developing communicative skills among the students (Table 1- No. 1), the data showed 80.8 percent of the students responded that their English teachers used Audio-Visual Aids for developing communicative skills. 19.1 percent of the students opined that their English teachers do not use Audio-Visual Aids for developing communicative skills. Most of the rural schools, minimum number of English teachers do not show much interest in using Audio-Visual Aids in their regular classroom teaching. Teachers felt that they might need more time in using them. A few teachers felt that using Audio-Visual Aids mighty deviate students' attention level from regular class room teaching-learning process.

With focusing frequency of teachers' usage of Audio-Visual Aids for communicative development among students (Table 1- No. 2), 16.6 percent of students responded that their English teachers always used Audio-Visual Aids. 11.6 percent of students agreed that their English teachers often incorporated Audio-Visual Aids in regular communicative language teaching. 35 percent of students responded that sometimes their English teachers utilized Audio-Visual Aids in teaching for communicative development. 17.5 percent of students opined that rarely their English teachers use Audio-Visual Aids and 19.3 percent of students agreed that their English teachers never used Audio-Visual Aids in class for developing communicative competence among students. Students opined that the English teachers who never used Audio-Visual Aids in teaching have poor attitude towards Audio-Visual Aids.

About 6.6 percent of students who were blind with different vision impairment stated that they could not actively participate in language learning process when English teachers use only Visual Aids in classroom (Table 1- No. 3). This was mainly due to their vision impairment. But, majority of the students (93.3 percent) answered positively that they actively participated language learning process when their teachers use Audio-Visual Aids for improving communicative competence. The 3rd aspect shows that majority of the student were active when they engaged English language development in classroom through Audio-Visual Aids.

Regarding to the frequency of students' participation when Teacher use Audio-Visual Aids (Table 1- No. 4), the data showed that 75.8 percent of students always participated in learning process when their English teacher used Audio-Visual Aids in teaching. 14.2 percent of students opined that they often participated in learning English language skills. 6.6 percent of students answered that they sometimes participated in learning language when their English teacher use Audio-Visual Aids. Only 3.3 percent of students expressed that they rarely participated in learning process when Audio-Visual Aids are used by teachers. On the whole, all students engaged in their language learning process when their teachers utilized Audio-Visual Aids in language teaching.

The opinion regarding students' interest in learning English through Audio-Visual Aids (Table 1- No. 5), majority of students, 93.4 percent, responded that they were interested in learning communicative English through Audio-Visual Aids. Only 6.6 percent of students felt negatively that they were not interested in learning English through Audio-Visual Aids. Visually impaired students showed negative interest in learning communicative English when their English teachers used varieties of Audio-Visual Aids.

With regard to the students opinion on rating of learning English communication with Audio-Visual Aids (Table 1- No. 6), the data showed that majority of the students, 74.2 percent, opined that learning English communication with Audio-Visual Aids was more

effective than learning communicative skills without Audio-Visual Aids. 19.2 percent of students opined that learning English communication with Audio-Visual Aids was effective than without Audio-Visual Aids. Only 6.6 percent of students opined that learning communicative English through Audio-Visual Aids was average. No student responded that learning with Audio-Visual Aids is ineffective and more ineffective.

With focusing to the belief of students on Audio-Visual Aids in developing their communicative competence, (Table 1- No. 7) majority of the students believed positively, 84.2 percent, that Audio-Visual Aids in regular classroom teaching helped them in developing English communicative competence. Only 6.6 students responded that due to their vision impairment believed negatively that Audio-Visual Aids in regular classroom teaching did not help them in developing English communicative competence.

C. Need of Audio-Visual aids in Communicative Language Teaching

Table2. Need of Audio-Visual Aids in English Teaching for communicative development

Need of Audio-Visual Aids in English Teaching for communicative development		
Do you need Audio-Visual Aids for enhancing communicative development?	**Frequency**	**Percentage**
Strongly Agree	43	35.8
Agree	66	55
Neutral/Undecided	11	9.2
Disagree	0	0
Strongly Disagree	0	0
Total	**120**	**100**

Need analysis is an important preparatory activity in improving teaching/learning process. Here (Table 2), the data presented in 5 point scale, show that students in Puducherry Rural High Government Schools were in need to develop communicative

competence through Audio-Visual Aids. Majority of the students, 55 percent, opined that they agreed the need for Audio-Visual Aids in enhancing communicative development. 35.8 percent of students strongly agreed that they need Audio-Visual Aids in their learning for communicative development. Student respondents, a very few, 9.2 percent, showed neutral response towards the need of Audio-Visual Aids. None of students responded that their level of disagreement and strong disagreement towards need of Audio-Visual Aids for enhancing communicative development.

Conclusion

On the whole, the findings suggest that Audio-Visual Aids are very effective in developing communicative competence among the students in Government Rural High Schools, especially mother tongue medium schools. The study revealed that there is a strong need for using varieties of Audio-Visual Aids in English Language classrooms in enhancing communicative skills among students. Keeping students motivated and actively engaged in developing communicative competence is the need of the hour in puducherry government rural high schools. English teachers should be in the position to enhance students' interest and keep them involved. By using Audio-Visual stimuli English teachers can maintain student attention and encourage active participation in developing English communicative skills. Continuing Professional Development of English teachers in using Audio-Visual Aids can be highly helpful to the teaching-learning process in enhancing communicative language development among students.

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Development - Climate Change - Quandary of Peasantry in India : A View

Partha Sarathi Bhattacharjee

Abstract

Development is meaningful when it pays more attention towards equality, social justice along with clean environment that has direct affect on economic activity, the labour relations and condition of actual producers of wealth-peasants and workers who produce growth. The paradigm shifts of development's intention often found ignore common minimum needs of people. Affect of green revolutions already on. Peasants are mostly patients to tackle expenditure for cultivation which has changed their psychology. Again volatile climate has put another pressure on them to ascertain minimum benefits from cultivation/related activities failing which they are direction less and no other way to go then taking their own lives(suicides), violent path or leaving farming for alternatives in town/cities as(IDPs), a great concerned today, needs study.

Development

Development means making better life for everyone. But many questions are raised in from different forums to know what exactly does it mean? A few decades ago also essentially meeting basic human needs like food, cloth and shelter etc. was meant for better life within the spectrum of common people but today in this highly uneven world where science and technology is dominating our society and this definition has taken a new shape and model which has multiple dimensions in the country like India where large number of people with many diversifications of culture, language, tastes are living together. The course taken by development is subject to the material and cultural visions of different society's development beyond meeting these basic needs, basic to human survival. The

development is understood as a better life is a powerful emotive ideal because it appeals to the best in people. Therefore, development is a founding belief of modernity (Peet and Hartwick, 2010). All the modern advances in science and technology, in democracy and social organization, in rationalizes ethics and values, fuse into the single humanitarian project of deliberately and cooperatively producing a far better world for all. In the modernist tradition, the radical version of development is fundamentally different from more conventional economic growth (Peet and Hartwick, 2010). More Gross Domestic Product-(GDP) and Gross National Income-(GNI) does not mean a poverty free nation. Development is meaningful when it pays more attention towards equality, social justice along with clean environment that has direct affect on economic activity, the labour relations and conditions of actual producers of wealth-peasants and workers who produce growth (Peet and Hartwick,2010).

To-day the multiple dimensions of development which is based on technology, is not clear how new smart phones and connectivity that feed cheap narcissism will address the urgent problems of the world.

Progress on crucial problems like improving crop yields, cheap clean energy and its storage is slow(Das,2016) Many new technologies such as robotics reduce living standards as they replace or deskill most workers. Innovation enriches a few people who control or finance the technology at the expense of the vast majority of the population, entrenching and increasing inequality. The world is remarkably unprepared for the crisis that is unfolding. During the last half –century each successive crisis has increased in severity, requiring progressively larger measures to ameliorate its effects. Over time, the policies have distorted the economy. The effectiveness of instruments has diminished. With public finances weakened and interest rates at historic lows, there is now little room for maneuver. Resources constraints and environmental problems are increasingly pressing (Das, 2016). A new environmental crisis will be like a virulent infection attacking a body whose immune system is already

compromised where humankinds in general and peasantry in particular are victimised .

A very few studies are found in this issue. Intellectuals belong to modern-classical-neo classical schools of thoughts have linked this issue with different angles time to time in the quest of development programs and policies. Parenti (2015) where he found that farmers in particular regions of Eastern Ghats starting from Bihar to Telangana –West Bengal and some extends in South and West are mostly debt burdened. They are mostly trapped in a downward economic cycle. Government's abandonment of the poor, predatory private credit markets and due to climate change an increasingly hostile environment combine to fuel desperation. At the same time Aiyar (2015) studied on affect of monsoon on farmers where he argued that bad monsoon does not just hit agricultural production and prices ; it hits industry and services too. He views that many industries notably textiles, jute, sugar and edible oils were dependent on farm output for raw materials. It creates employment also. Monsoon failures have great impact on peasants' economy and livelihood. Again Mahapatra (2015) viewed about important of monsoon in the agriculture as monsoon gives life to agriculture. The agricultural workforce reinforces India's granaries and ensures its food security. Varma (2015) studied socio-economic conditions of peasants in Badaun district in UP and found majority of peasants are holding megre portion of land, they can merely save up for future. Dutta (2016) one of his study reports on agriculture shows that peasants must be self-dependent to produce freely the agricultural products. Governments are offering many freebies but most of the takers are peasants'. He argues that then why peasants will go for farming? Instead they would relax in their houses. Hobsbawm one among traditional thinker whose findings are based on historicity of peasantry in India through his famous ' Age of Revolution': 1789-1848(1996). He describes that it was the combination of greed and legal individualism which created the actual catastrophe on Indian soil. This came in the form of Zamindari and Ryotwari system with an idea to introduce effective and convenient method of land taxation. Indian land created neither a body of enlightened state owner nor a sturdy yeoman peasantry,

rather it introduced an element of uncertainty and another complex web of bloodsucker and exploiter of the village. Another historical works by Kalita(2014) 'Agrarian Unrest in Assam' a social constructive approach where he shows gender injustice or structural violence due to vulnerable production relations among land owners and peasantry during colonial and post colonial periods. Whereas sociologist like Bose (1989) sees peasant's quandary in the angle of change in agro structure. His findings are based on development of capitalist relations of production which involves an agrarian bourgeoise and rural proletariat. At the same time sociologist like Gurusamy (1993) linked peasant's quandary with political issues in his famous work in ' Peasant politics in South India'

After globalization and liberalization in 1991, the farmers became more unrest to produce more food grains to survive in the global competitions. They believed science and technology to get relief, productivity increased many fold but they lost their independency. Commercialization in agriculture creates a room for developed countries in marketing inputs required for crop cultivation which naturally be expensive that put extra burden to farmers. Though governments, NGOs/INGOs are working for sustainable solutions to these problems but it is not enough. Agriculture's share in the economy fell steadily, from 52 percent in 1950 to just 14 percent today. Services now constitute 60 percent of the economy, and do not depend on the monsoon. Industrial production has diversified into engineering and chemical products and is no longer dominated by farm-based industries like cotton textiles, sugar and jute textiles (Aiyar,2015).Now land has come to market. The penetration of market players like industrialists, money lenders, brokers, agents etc. have pushed many farmers for distress selling of their land. There are nearly 120 million cultivators and 144 million landless agricultural labours, between 2001-2011 9 million people quit cultivation but 38 million joined the ranks of agricultural labourers (Varma,2015). All though by all economic logic that agriculture should be unable to sustain this huge population, but industrial/service sector jobs need skill. Our illiterate farmers how can they aspect these job? Therefore, lack of industrial jobs leave

people with no option. Migration to cities, a vicious cycle of poverty and even unconscionable suicides are the result (Varma,2015). Recent survey reports of the national Sample Survey Organisation (NSSO) seem to confirm that farmers in India own less than a hectare of land. Although such small holders make up nearly 83 percent of cultivators households, their average monthly income-expenditure shows that they are all in the red (see table)

Table 1: Land Holdings - Average Monthly Income-Expenditure – Investment - Savings of Farmers in India

	Marginal farmers	**Small farmers**	**Big farmers**
Land Holding	**Up to 1 ha (Percentage)**	**1-2 ha (Percentage)**	**Over 10 ha (Percntage)**
Proportion of All Farmers	**75%**	**10%**	**0.24%**
Hare of Land Owned	**30%**	**24%**	**6%**
Average Monthly Income(Rs)	**Up to 5247**	**7348**	**41,388**
Average monthly Expenditure(Rs)	**Up to 6020**	**6457**	**14,447**
Average Investment in Productive assets(Rs)	**Up to 540**	**422**	**6987**
Average Savings/deficit(Rs)	**Up to –1500**	**469**	**19,954**

Source: The Times of India (Kolkata edn) dt. 12 April 2015

despite of having supplement their income from other sources like Mahatma Gandhi National Rural Employment Guarantee (MNREG) programs, raring of animal husbandry, wage labour in other fields and through a range of non-farm activities including casual labour in construction, petty sale of goods and services etc. All input costs-water, fertilizer, seeds, machines, labour and fuel have gone up while prices obtained for the final produce have not risen commensurately. This has made small holdings unviable(Varma, 2015) on other hand government's abandonment of the poor ,predatory private credit markets and due to climate change an increasingly hostile

environment - combine to fuel desperation. How government cope up with recent changes in climate to extend supports to farmers particularly peasantry whose savings is zero?. Rapid change in climate due to global warming is affecting both the monsoons as a result untimely rainfalls(see Chennai flood recently) heavy , less or no rains leads to crop failures, less productivity etc push farmers into the bank of poverty and moreover the intake of small and marginal farmers are more in our country. Coping with the frequent climatic change becomes almost impossible.

Climate Change, its Causes and Consequences

The climate is defined as' the general or average weather conditions of a certain region, including temperature, rainfall, and wind'. The earth's climate is most affected by latitude, the tilt of the Earth's axis, the movements of the Earth's wind belts, and the difference in temperatures of land and sea, and topography. Human activity, especially relating to actions relating to the depletion of the ozone layer, is also an important factor. It changes due to the following reasons:-

Manmade

Green House effect is the phenomenon whereby the earth's atmosphere traps solar radiation, and is mediated by the presence in the atmosphere of gases such as carbon dioxide, water vapor, and methane that allow incoming sunlight to pass through, but absorb the heat radiated back from the earth's surface. Thus the Green house gases (GHGs) provide a blanketing effect in the lower strata of the earth's atmosphere, and this blanketing effect is being enhanced because of the human activities like burning of fossil fuels, remaining parts of crops etc. enhanced global warming.

Global Warming

Global warming is defined as an increase in the average temperature of the Earth's atmosphere, especially a sustained increase

great enough to cause changes in the global climate'. The term global warming is synonymous with Enhanced green house effect, implying an increase in the amount of green house gases in the earth's atmosphere, leading to entrapment of more and more solar radiations, and thus increasing the overall temperature of the earth.

Effect of Global Warming on the Earth's Climate

Detailed researches of climatic events of the past 150 years have revealed that the temperatures have risen all over the globe, with the warming occurring in two phases. The first phase was from 1919 to 1940, with an average temperature gain of 0.35°C, and the second phase was from 1970 to the present, exhibiting temperature gains of 0.55°C.

India, the second most populous country of the world with a population over 1.2 billion, is a large country in South Asia. India lies to the north of the equator between 6° 44' and 35° 30' north latitude and 68° 7' and 97° 25' east longitude. It shares a coast line of 7517 km with the Indian Ocean, the Arabian Sea and the Bay of Bengal. The Indian economy is considered as one of the fastest growing major economies. However, the country is plagued by the climatic disasters that continue to wreak havoc on its economy. As a result, in spite of the leaping economical progress, the majority of the people of India continue to live in poverty, with malnutrition and diseases corroding the society. **[IPCC (Intergovernmental panel on climate change), 2007]**

Climate of India

Being such a huge country, India exhibits a wide diversity of temperatures; from the freezing cold winters in the Himalayas to the scorching heat of the Thar Desert. The above two regions play a very significant role in controlling the weather of India, making it warmer than to be expected with its latitude.

Monsoon Season

The climate of India is dominated by the monsoon season, which is the most important season of India, providing 80% of the annual rainfall. The season extends from June to September with an average annual rainfall between 750–1,500 mm across the region. The monsoon of India is regarded as the most productive wet season on the earth.

Impacts of Global Warming on Climate of India

There has been a particularly alarming effect of global warming on the climate of India. India is already a disaster prone area, with the statistics of 27 out of 35 states being disaster prone, with most disasters being water related. The process of global warming has led to an increase in the frequency and intensity of these climatic disasters. According to surveys, in the year 2007-2008, India ranked the third highest in the world regarding the number of significant disasters, with 18 such events in one year, resulting in the death of 1103 people due to these catastrophes.

With the increasing trends of global warming, predictions of severer climatic events have been made for India. The anticipated increase in precipitation, the melting of glaciers and expanding seas are projected to influence the Indian climate particularly severely, with an increase in incidence of floods, hurricanes, and storms. Global warming is also posing as a mammoth threat to the foods security situation in India with recurring and severe droughts and ravaging floods engulfing the arable land. Rising Temperatures on the Tibetan Plateau are causing the melting of the Himalayan glaciers, reducing the water flow in the rivers Ganges, Brahmaputra, Yamuna, and other major rivers, on which the livelihoods of hundreds of thousands of farmers depend. (**Pathak H et.al, 2012)** According to the 'The Indira Gandhi Institute of Development Research', if the process of global warming continues to increase, resulting climatic disasters would cause a decrease in India's GDP to decline by about 9%, with a decrease by 40% of the production of the major crops. A

temperature increase of 2 ° C in India is projected to displace seven million people, with a submersion of the major cities of India like Mumbai and Chennai.

Climatic Disasters in India

a) Floods

India is the most flood distressed state in the world after Bangladesh, accounting for 1/ 5th of the global deaths every year with 30 million people displaced from their homes yearly. Approximately 40 million hectares of the land is vulnerable to floods, with 8 million hectares affected by it. Unprecedented floods take place every year at one place or the other, with the most vulnerable states of India being Uttar Pradesh, Bihar, Assam, West Bengal, Gujarat, Orissa, Andhra Pradesh, Madhya Pradesh, Maharashtra, Punjab and Jammu & Kashmir. Recent flood in Tamil Nadu reminded us about uncertainty of climate. (**Pandey, J.S, 2013).**The climatic history of India is studded with a very large number of floods, which have wreaked havoc on the country's economy.

b) Droughts

As explained above, the process of global warming has such an impact on the climate that it increases the severity of precipitation at one time, and minimizes it in the other. Therefore, this process has resulted in severe drought like conditions in India, (**Nagdthu,2014)** with tens of millions of deaths resulting from it in the past few centuries. India depends heavily on prolonged and optimum monsoons for its agricultural productivity, failure of which results in the decreased crop productivity, leading to droughts. Of the total agricultural land in India, about 68% is prone to drought of which 33% is chronically drought prone, receiving rainfall of less than 750mm per year. This is particularly the states of Maharashtra, Gujarat, Rajasthan, Karnataka, Andhra Pradesh and Orissa. The World Record of Drought Was in 2000 in Rajasthan, India.

c) Cyclones

As a result of global warming, the average number of Category 4 and 5 hurricanes per year has increased over the past 30 years. India has an 800 km coastline, and is therefore very susceptible to cyclonic activity. Cyclones have been observed to be more frequent in the Bay of Bengal than the Arabian Sea. Consequently the states of West Bengal, Orissa, Andhra Pradesh, and Tamil Nadu along the Bay of Bengal are the most affected. The notable cyclones in Indian history include the 1737 Calcutta cyclone, 1970 Bhola cyclone, and Cyclone 05B, which affected more than a million people. Recently Ayila, Phellon, in the coastal regions of Orissa, Bengal effected mostly agriculture and displaced many poor people in the coastal regions

Climatic Effects on the Sea and Coastal Areas

As explained above, India has a long coastline with the Arabian Sea and the Bay of Bengal. The coastal areas of India are highly vulnerable to the effects of global warming, as they are densely populated with people who are totally dependent on the sea for their food supply. Therefore any damage to the natural cycle of the sea affects the people of India very severely.

Already global warming has resulted in an increased cyclonic activity, sea level rises displacing people, flooding, and the reduction in the sea food due to the acidification of the waters. Thousands of people have been displaced by ongoing sea level rises that have submerged low-lying islands in the Sundarbans. A one meter sea level rise is projected to displace approximately 7.1 million people in India and about 5,764 Km2 of land area will be lost, along with 4200 Km of road. Around seven million people are projected to be displaced due to submersion of parts of Mumbai and Chennai if global temperatures were to rise by a mere 2 °C. (**IPCC, 2007)**

The effects of global warming have also caused damage to coastal infrastructure, aquaculture and coastal tourism. The aquatic

ecosystems such as mangroves, coral reefs and grass lands have also been affected by the climatic change. Therefore, suicide for many is the only escape. A total 5650 farmers have committed suicide during 2014, accounting for 4.3% of total suicide victims in the country (see table)

Table: 2 : Farmers' Suicides and Percentage share to Total Suicides During 2014

Total Nos. of male farmers committed suicides & Percentage	Total Nos. of female farmers committed suicides & Percentage	Total Nos. of farmers suicides	Total Suicides	Percentage of farmers suicides to total suicides
5178(91.6)	472(8.4)	5650	1,31,666	4.3

Source: National Crime Bureau Records (NCBR) 2014

The same desperation that drives suicide also drives political homicide; which is to say Naxalites violence. It needs proper attention to curve the social damage. The adaptation to climate change will require deeper solidarity and more cooperation. Naxalites violation is not only an issue of peasantry but forced displacement (Judge,2013) due to climate change has a major impact on socio-economic-political-environmental off/ on host states/countries. Currently there are an estimated 60 million refugees worldwide, 8.3 million jump from 2013 is biggest rise in a single year (The Times of India, Kolkata, June 19, 2015. A Study from Columbia University projects that by 2050 fully 700 million climate refugees will be on the move. India sharing a longest border should take corrective measures now itself by charting a path toward a clean energy future and just climate adaptation based on economic redistribution, social justice and sustainable development (Raighatta, 2015).

Research Methodology

This study is based upon descriptive research design. Data collected through secondary sources like newspapers, journals,

periodicals, and published works. Data collected were edited, tabulated, and processed and accordingly conclusions are made and inferences are drawn.

Findings and Conclusion

India being second largest populated country in the world need development in all sectors particularly agricultural sectors where majority people still are dependent. Since independence this issue is raised and many development policies and programs are made but ultimately no fruits of that could reach to the lower rank of the society i.e peasants. Using technology to get immediate results has affected peasant's life and livelihood. Our most of the peasants are unskilled, semiskilled or illiterate. Governments should plan accordingly before applying new technology to the farms. This impromptu development has great affect on environment which is on discourse today. Amitav Ghosh 'India seems to be home of lost causes' quoted '' people do not want to engage with climate change because it is not sexy. The effect is felt in out of way places, on unseen people. But when the impact is really felt, people like us will be hit the worst. We are absolutely not climate resilient. . In Ghosh's view, extreme climate events in India were likely to become more potent because these would tend to exacerbate existing crises such as the over exploitation of underground water. There is this strange nexus of pumping up water from the Upper-Ganga aquifer particularly in North India coinciding with the sudden shift in rainfall patterns.(The Times of India,Kolkata,2015), escalating natural disasters like storms, tsunami, droughts, floods etc. As a result peasants in our country have often felt at risk-at times from crop losses. There have been insurance schemes for peasants' in the past as well. However, they were unsuccessful because of various reasons-ranging from high premium rates to low claim value and no coverage of localised crop-loss. Therefore, majority of them feel safe to shift from agriculture to non-farming activities and join in the rank either as agricultural labourers or move out to town/cities become refugees.

Suggestions: 1.Governments should follow the delivery of Paris summit last year in checking erosions of CO2 in the phased manners to clean our environment. 2.Science and technology which is not environment friendly should be avoided in industrial purposes in general and agriculture in particular because it has direct impact on peasant's health and production.3.Climate Resilient Agriculture(CRA) programs conducted by NICRA in the year 2011 must be encouraged and to be provided supports.4. Many improvements in the agricultural sectors have taken place through governments policies and programs/ with the help of NGOs/INGOs but still bottom up approach is to be strengthen up using community development programs, peasants' participation through involvement of Blocks/Panchayats.5. In any development process governments should avoid any political instrument to motivate stake holders.

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Aged Population and Social Disability in Rural South India : The Social Exclusion and Inclusion Perspective

'Old age is shamefully seen like head lice in children and venereal disease in their older siblings' ***- Stott***

S. Gurusamy

Introduction

Ageing is a natural process that begins at birth, or to be more precise, at conception, a process throughout one's life and ends at death. Ageing is a universal feature and has attracted the attention of biologist, economist and many other experts in the second half of the 20 century. A common human being is likely to consider himself/herself as young and others older than himself/herself however old he/she may be, more so because of the prevailing unfavourable attitudes towards ageing. The United Nations Organization (UNO) considers those who are over 65 years of age as senior citizens. The Indian Census classifies people in the age range 60 years and above as old. According to another classification commonly used in the developed countries, there are three groups: the young-old (65yrs. to 74 yrs.), the middle-old (75 yrs. to 84 yrs.), and old-old (85 yrs. and over). Old people have enjoyed honour and authority in the traditional Indian society because of the norms and values prescribed in the ancient scriptures. The joint family system has reinforced, from generation to generation, the high status assigned to the older members of the society. In the later half of the twentieth century, things began to change due to a complex web of interlocking factors. Westernization, industrialization, urbanization and technological progress have brought in their wake several outcomes. Social change has been taking place at a faster pace than ever before in terms of consumerism, new lifestyles and waning of traditional familial values. The changing scenario has been having an unfavourable impact on the aged in that they have lost much of the

respect and care in the family and the community. At the same time, the number of the aged has increased due to advances in medical technology, economic development and social progress in some areas having brought in benefits like better health and nutrition and prevention of diseases which have raised the life-expectancy of the average Indian.

Demography of Elder Population

According to projections by the UN Population Division, there will be two elderly persons for every child in the world by 2050. This implies that the aged 60 and above, which currently constitute less than 20% of the population will account for 32% of the population by 2050. The 2001 census shows that the elderly population (60+) in India accounted as 77 million and census 2011 projection indicates the elderly population has crossed the 100 million mark. The life expectancy has also gone up to over 70 years today. In absolute terms, there has been a tremendous increase in the number of older persons in India; from 20.19 million in 1951 to 43.17 million in 1981 and to 55 million in 1991. This number is expected to increase to 177.4 million in 2025. According to Indira Jai Prakash's report for WHO on "*Ageing in India"* (1999) revealed that, "Indian aged population is currently the second largest in the world. The absolute number of the over 60+ population in India will increase from 76 million in 2001 to 137 million by 2021".

Social Exclusion Dimension of Elder Population in India

In the Indian Society, the cultural values and the traditional practices emphasize that the elderly members of the family be treated with honour and respect. The families of the aged persons are expected to ensure the needed care and support for the aged. However, recent changes in the size and structure of families have caused the re-arrangement of the roles and functions of the members in the families. The Governments in India both Central and State, have taken up the responsibility to take care of the aged and have started certain schemes to provide care and support for the aged. Also,

there are some Non-Governmental organizations (NGOs) which have undertaken the work of taking care of the aged. However, it is still the family that plays the most important role in India. An attempt is made in this study to present the Governmental and the Non-Governmental (NGO) care and support that have become available for the aged and the changes that are occurring the same. Attention is also focused on the factors affecting the care and support for the aged in the families, and the perceptions of the aged regarding the care and support they are getting from their family members.

Several studies suggest that the process of demographic transition, urbanization, industrialization and occupational restructuring, coupled with social and spatial mobility, the emergence of the small family norm, individualism and soon have a significant effect on the life of the aged. With younger women increasingly entering the labour force, the availability of care givers for older persons has been decreasing. Besides, out migration of young people from rural areas leaves behind many older persons without caregivers. Evidently, in the process of growing ageing population and substantive changes in household structure, family support for the elderly is becoming a critical challenge. In many countries of the Asia-Pacific region including India, the family continues to support its elderly members; the traditional older person co-residing with family members is generally the norm. However, in most societies, as traditional means of family support get steadily eroded, governments urgently needed to establish a societal protection system for the aged. The rapid spreads of modernization, growing urbanization and crumbling of joint family system have conspired to increase insecurity and loneliness among the geriatric population. However, Lack of family support, poor financial status, physical and mental disorders and guilt of being dependant on others are some of the problems nagging the elderly population in India, and other developing countries around the world. An ageing population will give rise to special problems from health, family and social angles. From the family side, the elderly population looks forward for emotional support, love and affection and there will be an increasing demand for geriatricians with knowledge and expertise required to

handle and treat the elderly population. But unfortunately, the concept of welfare state where many of the needs of the ageing population are taken care of by the state and provide only minimum levels of social security to the elderly population groups.

Changing Indian Family Structure, Support system and Social Disability

Social disability is the unproductiveness, redundancy and social maladjustment to the environments. The family is a social institution and foundational institution the always being regarded as a core element for the development of the individual as well as for the society and for the state. The function of the family is not any more natural than its earlier conception, but they are changing and shifting in relation to social and economic developments that happen in the country. Family is also described as "a group of persons directly linked by kin connections, the adult members assume responsibility for caring for children". In India, people learn the essential themes of cultural life within the bosom of a family. In most of the country, the basic units of society are the patrilineal family unit and wider kinship groupings. The most family unit is the joint family, ideally consisting of three or four patrilineally related generations, all living under one roof, working, eating, worshipping, and cooperating together in mutually beneficial social and economic activities. The joint family system has been considered as a characteristic of Indian life. In all kinds of families, the prominent feature is the interrelationships between the family members. One of the functional role of the family is taking care of the elderly. Moreover, the role of elderly in the family plays a significant role in wellbeing, the type of family in which the elder people live, the hardship they enjoy, the place they stay in and the people they stay with, the kind of relationship they maintain with their kith and kin, and the extent to which they adjust to the changing environment are the key significance. But the traditional roles and functions of the family are changing. Indian family structure id rapidly changing. Due to the swift modernization and urbanization has resulted in the breaking up of the family structure in India. More number of fragmentations has

happened in breaking the traditional joint family system to remain accommodative and flexible nuclear families. With modernization and urbanization, more number of nuclear family system is emerging and it is becoming increasingly difficult to give care and attention to the elderly, as there are fewer family members who can act as caregivers. With the changing roles of family members, relationships are also undergoing change. This results in conflicting situations in the family. With growing urbanization and depending on the availability of jobs, children and kin's move out of the extended and joint family set-up and establishing their own nuclear families.

In the coming years the elderly population will phenomenally grow in numbers and at the same time the family size is reducing, more so in the rural areas when compared to urban areas. In the absence of traditional caregivers, due to the disintegration of the joint family and women moving out of the household, the elderly have become a vulnerable group, needing care and attention. Under these circumstances, family relationships are affected and it calls for adjustments from family members, which may or may not be to the liking of all members. This gives rise to conflict situations in the family, some even acquiring a serious and un-resolvable nature. The problem arising from the elderly people's presence in families causing conflict in terms of financially or psychologically among other family members and between the elderly and other members. Increased rate of survival beyond 60 years have implications for financial burden from both family as well as state. Provision of health care and support, and social and psychological assistance brings enormous burden to the small family members with limited financial capabilities. This wretched circumstances happens when the elderly people in the family distributes his property and assets to their kin and kith. The elder in the family feels alienation syndrome. So deprivation and neglect emerges as the result of financial crisis. Local health care systems like PHCs (Primary Health Centers) have its own limitations when it comes to geriatric care. Access to health care facility also plays a major role. Assistance to take the elderly to the hospital by the family member and involvement of time and cost for

medical care and transport makes the family members to elude themselves in this process.

Migration plays a major reason for the state of Neglection and alienation among the elderly. Employment related migration in a large scale occur from rural to urban and urban to metropolitan due to the failure of seasonal cycle and decline in traditional agricultural practices. Children leave for employment with their spouses and kid specially the son's, even unmarried sons. They move for the financial stability and capacities and inspire for higher order of quality life and satisfaction. Two-thirds of the elderly males and 90-95 percent of the elderly females are illiterate and a large number of them, particularly females, are single. Thus, the level of economic dependency is quite high. The majority of the illiterate elderly were engaged either in agricultural pursuits in the rural areas as unskilled or semiskilled workers, many of whom most likely were living from hand to mouth with little or no savings. Since their employment was in the unorganized sectors, they would not be covered by social insurance schemes and thus would be in need of economic support. Moreover, migrated family members and individuals prolong for an autonomous lifestyle where they feel elderly person as obstacle for their freedom. So they leave the elderly parents and the native land, even assets and liabilities and family relationships remain stray. Fertility decline is due to the effect of socio-economic development achieved by the county during the last two decades and the effective implementation of family planning programmes. The contribution of socio-economic development to fertility decline was mainly by increasing the cost and effect of children. It became absurd for many people to have large families fearing of fulfillment of health care and support to children, provision of education etc. An emerging feature in the modern family system is the changing attitude towards the values of children. The emphasis was on the quality of life rather than the quantity of children. Here there exist a loss of intergenerational relationship will determine the living arrangements of the elder people in the family which may result in wandering, left alone, exclusion and abuse. The loss of support from the family at the time of old age is not only restricted with financial assistance but includes the physical care also.

The issues of economic dependency, security and negligence amongst the elderly are becoming an increasing area of concern in the rural areas. This is prevalent in all part of India in different forms and structure. Recently the Indian parliament passed a bill – "Maintenance and welfare of parents and senior citizens Act"- which indicates the necessity to evolve appropriate measures for protecting the elderly left behind to mend themselves. But the operational part is the questionable.

Conclusion

The problem of the elderly in India was not serious in the past because the numbers were small and the elderly were provided with social protection by the family network. But owing to relatively recent socio-economic changes, aging of the population is emerging as a problem, with increasing proportion of elderly, the absence of social security mechanism, the plight of elderly poor is really miserable in rural areas. Social Disability and social pressure continues to be placed on persons who fail to discharge this responsibility to their elderly family members. Thus it is important to strengthen these values and the capacity of families to cope with the problems of caring for the elderly. The elderly should be considered as human resources and their rich experience and residual capacities should be put to optimum use for the benefit of national development. Their ability to lead healthy and fruitful lives should be ensured. In the context of the increasing elderly population this is going to be a major challenge for the individuals, families, governments and other agencies in India.

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Culture as an Interlocutor of Development Dilemmas: Sustainability and Gender in the Context of Displacement

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Abstract

The present paper tries to contextualize two major problems associated with development induced displacement- threat to the sustainability of physical environment and social re-articulation of displacees, and gender inequality in the post displacement scenario- in the background of cultural dynamics of the people affected by the displacement process. This paper tries to illuminate the argument that culture has intricate connection with the above mentioned development dilemmas. The first section of the paper deals with the destruction in physical environment and the lack of preemption of the threat to sustainability in the case of Vallarpadam . The next section gives some insights on on the role of culture for framing a sustainable social re-articulation model. The third section deals with the origin of gender inequality through two prominent perspectives and tries to assert the validity of these perspectives in the context of displacement using empirical evidences. The final section of the paper deals with a practical suggestion to enable a sustainable re-integration of women into formal economy that can help in improving their cultural position.

Keywords: Culture, Development Induced Displacement, Resettlement, Re-articulation, Gender.

Introduction

While the concept culture is confronting new and real problems across the globe in various social contexts, it is seen that simultaneously new discourses are emerging that signify the best way

to understand the concept in those particular contexts. Highly distinguished academicians are keen on seeking finer scientific methods to grasp the dynamics of this concept that underlie the many taken-for-granted phenomenon. Such emerging discourses on culture unambiguously supports the view that many modern scholars of liberalism is emphatic about, 'the return of culture'. Thus in this age of post colonialism a state cannot intervene in the affairs of its people unless it not only appreciate the multicultural scenario of the people they want to intervene but also modify the method of intervention to suit their cultural setting. Here, local culture cannot be considered as a mechanical part of the wider national culture. But as an organic whole that have an independent existence.

Displacements are result of the states` blind embracing of economic growth model of development. The increase in inequality it results has been a prominent point of debate. But much less attention has been given to the potential long term impact that the inequality can have on the sustainability of the natural resources it ruthlessly destroys and the social tradition and customs it wipes out. In this regard the crisp yet pointed analysis of Herman Daly, a proponent of ecological view of sustainable development is significant. In her view development whether economic or uneconomic is a clear accumulation of wealth by few rich people at the cost of (1) the present poor, (2) the future and (1) the non-human species (Herman E Daly, 2002). While the much regarded Bruntdland Commission envisaged rapid economic growth as the most essential requirement for both industrial and developing countries many scholars were unambiguously assertive about the need for replacing the economic growth approach with the ecological view of sustainable development that using its environment management repertoire can to a certain extend conflate development with sustainability.

Development implies progress. But progress towards what end. If the end is the welfare of the humanity then the course of development that we have been following in this age of globalization has more fault-lines than potentialities. Although many scholars

would endorse this view none could ignore the fact that man has progressed beyond the imagination of the man of the middle ages. It is indeed technology that assisted man in his course of progress. But isn't technology the product of culture? Yes, it is. Culture have been the only transcending effect on the whole idea of development and its unimaginably vast material realizations.

Culture versus Development Induced Displacement

The pattern of development we have followed so far is now associated with negative socio-economic consequences, in terms of inequality, cultural fragmentation and its impact on environment (Vidhu Verma, 2004). A skimming through of the literature on development induced displacement of past few decades will unambiguously suggest that displacement has become that dominant problem which already did negatively affect the welfare of a considerable proportion of people globally. The literature will also suggest that the ill effects of displacement is durable. It acquires this durability not just by the material deprivation of the people -which in the technical terminology of the literature can be expressed through the phrase "eight impoverishment"- but also by radically redefining the social interaction patterns of the community affected by displacement.

Experience indicates that the process of dealing with communities, families, and individuals who are to be affected by dislocation has crucial implications for what the consequences of resettlement will be. It affects the real and perceived sense of power and efficacy of those involved, and plays a crucial role in determining whether those affected will be embittered and unable to resolve their grief or will be prepared to move ahead with their lives.

It is a fact that a population belonging to the same geographical space might have different cultural allegiances. The fact derives its significance from the ever growing rate of migration too. The diversity of cultural spaces within a region have an unquestionable role in shaping the social relations and social selves

existing in that region. Thus when a development project displaces a large chunk of the population, is it appropriate to consider the displaced as a single community just because they belong to the same region? More precisely, should the people's cultural affiliation gets subordinated to their regional affiliation? To understand the implications of these questions it is necessary that we delve into the mechanisms at play that unleash destructive impacts on the cultural allegiances of the displaced. Displacement intrude into the social fabric of a community and effect lasting changes in it through the following ways.

1. ***By letting Class Consciousness Eclipse Community Consciousness***

The people of a community affected by Development induced Displacement often joins the camps that best represent their positional difference in the society. Naturally, the economic interests of one camp might be in opposition with the other and the whole apparatus of displacement might increase the inequality between these opposing groups. Since all groups are socially created they are socially created for a purpose. And the purpose is to advance the rights and privileges of the group. It is therefore inevitably the case that doing this is at the expense of some other group . As Iris Marion Young gives out, the following factors influence this inequality. Some institutional rules and practices, the operation of hegemonic norms, the shape of economic or political incentives, the physical effects of past actions and policies, and people acting on stereotypical assumptions, all conspire to produce systematic and reinforcing inequalities between groups.

The most prominent and recurring interest groups that emerge in the context of development induced displacement are that of developmentalists and developees. The former representing the displaced people who knows how to turn the whole process of displacement for their economic benefit. They possess good knowledge of the legal complexities of the whole process and of the proper investment methods that might help them to elicit the

maximum profit out of the process. Moreover they might have lands or enterprises in proximity to the command area of the development project the value of which will increase many fold due to the commission of the development project. Now without further qualification it can be asserted that the people of this camp do not bother much about the possible ill-effects of the displacement.

The latter are that category of displaced people who possess no or negligible knowledge of the legal aspects of displacement and of the right way to invest their resources to draw good returns for a long time. In fact, most often they are left with no resources at all. The people joining in these opposite camps will soon develop a class consciousness of their own especially when the latter camp resort to unrelenting struggles against the injustices they suffer because of the displacement. The class interests will eclipse the community solidarity and it will reflect in the social interaction pattern.

2. ***By letting the New Institutions to Reign***

The new institutional settings that are created for the execution of the development project became a significant aspect in the day to day affairs of the displaced community of Vallarpadam. It is indeed a sociologically interesting phenomenon. This fact is exemplified particularly by their increased frequency of interaction with these institutions. Displacement in a sense integrated the people into these institutions which were until then unfamiliar to them. It should be noted that the term integration here doesn't suggest that the resulting interaction between the people and the new institutions was smooth. The consequence of the interactions with these institutions which were being run by top bureaucrats of the state was that it gradually detached people from the feeling of belongingness to the community. As Andre Beteille points out, with the emergence of modern institutions the collective forces loose their ground to the individualizing force that are unleashed by the institutions . In the meetings they had with the displaced community on resettlement problem, they considered individuals as entirely detached from their community, as if the community never existed.

3. ***By Paralyzing the Critical Sense of Media***

After going through the newspaper reports on Vallarpadam displacement one could understand that a proper analysis of what will happen to the community life in the aftermath of the event is dubiously absent in them. Media never posed the critical question, whether development should be achieved at the cost of community life? There were dialogues on the possible impacts of the development project on the environment. But the importance of collective life was largely forgotten. Instead media helped the advantageous stakeholders in diverting people`s attention to the political intricacies of achieving a 'fair resettlement scheme'. It is contradictory that a 'fair resettlement scheme' is far from possible if this critical problem is left unanswered.

Is Preemption of Environmentally Unsustainable Practices Possible?

The environmental problems encountered in the field of environment in India arise due to Each development induced displacement scenario is completely diametric to the very principles of ecological view of sustainable development. The pattern of development we have followed so far is now associated with negative socio-economic consequences, in terms of inequality, cultural fragmentation and its impact on environment (Vidhu Verma, 2004) . To bring forth the discussion on sustainability pertinent to displacements, it is imperative to consider the present trend in land acquisition pattern. Usually the intensity of displacement caused by linear infrastructure projects is higher than that caused by any other types of development projects, especially in states with higher population density. Besides, the wider geographical coverage of such projects very often crosses ecologically fragile spaces. The risk of such projects destructing sensitive environments and common property resources in it very rarely attracts the attention of policy makers. But this risk has a preemption scope in case of linear infrastructure development projects. At the planning stage a number of alternative blue prints of land acquisition pattern that suggest the

acquisition of different constellation of geographical tracts that satisfies the needs of infrastructure projects are presented.

From among the choices if the blueprint that involves lesser displacement and environmental destruction which at the same time meets the contingencies of the development project is chosen and land acquisition is done as per this blue print, it would surely pre-empt the ecological risks of the development project to a great extent. But the empirical evidences suggest that such good alternatives are played down by the authorities stating the practical difficulties that could come along with such alternatives. In Vallarpadam people say the authorities were well-decided on the tract to be acquired even before the alternative choices of land tracts were publicized. That is, in reality, authorities rather than scraping the blue print of land acquisition that suggest the constellation of geographical tracts that makes utmost destruction of environmental resources and augment the quantity of the displaced is given approval and done away with.

Further, the displacement incinerate the sensitive cords of displaced people's non-material culture by demolishing their sacred spaces. In India such sacred spaces are invariably characterized by a very sensitive ecology, disturbing which can cause irreparable damages to the flora and fauna in it. The authorities when they plans to destroy a Kavu or such other ecologically sensitive spaces would represent it in their cost analysis as a bunch of trees. In fact, it doesn't matter how fairly the ecology is valued in terms of money, it won`t compensate for the instability that the environment had suffered by the destruction of such sensitive ecologies.

Role of Culture in Social Re-articulation

In India where environment and socio-cultural life of people are very closely linked, the chaos in the environment leashed out by displacement cannot be viewed in isolation. Scholars while considering this link often use the term "cultural genocide" to describe the impact of displacement in the cultural fabric of the displaced people. A community displaced form its geographical roots

that until then represented the symbols and signs of their culture, where their ancestral sacred lands exists, where their deep-rooted memories of childhood and colorful festivities rest, the consequence is that the social behavior determined by the traditional values and customs associated with their land break away or cease to exist. One of the Vizhinjam displacees expressed this disassociation as follows:

"The famous Chandanakudam Procession in the eve of Urs has lost its charm after the displacement. Now we view it from a distance just like any other spectators". The displaced people once were an inalienable part of the procession. The festivity was socially meaningful as the relatives would gather in the houses nearby through which the procession passes. The celebrated ethnologist, Bronislaw Malinowski`s view of tradition is valid in this context also. "And tradition is biologically speaking, a form of collective adaptation of a community to its surroundings. Destroy tradition, and you will deprive the collective organism of its protective shell, and give it over to the slow but inevitable process of dying out."-(Bronislaw Malinowski, 1992).

What is mean by the threat to social sustainability is a question that cannot be eluded at this juncture. The social structure of the communities that are affected by displacement undergoes radical changes. The social sustainability here refers to successful interventions in reconstructing the changed social structure of the displaced. Reconstruction of the social and economic lives of the displaced have been conceived merely as a post displacement reparation effort by the authorities and in our country till date no long term planning in this regard has been conceived that might enable the affected to get back to their much valued cultural and social values, systems, and institutions. It has been found out that in re-articulation and reintegration processes, common cultural values can overcome material deprivations, economic disadvantage, and inadequate physical provisions (Hirshon, Renee. 2000).

The conventional planning approaches that cause many to be displaced and allow only a few to be rehabilitated do not adequately

protect against risks and loss of entitlements and rights (Cernea). The loss of social capital is indeed difficult to be assessed, but this is no impossibility. But the authorities often depend on the weak and inept legal frameworks governing land acquisition to bail out from their responsibilities to assess it.

Culture and Gender Inequality

Gender as a concept emerged out of a critique of the Women in development (WID) approach that was concerned essentially with anti-poverty and efficiency measures in development programs (Vidhu Verma, 2004) . Starting with the basic needs approach in the 1970s, development has been redefined as enlargement of people's choices and human capabilities (Nussbaum, Martha and Amartya Sen. 1993) : Quality of Life, OUP.). The gender inequality that becomes the prominent and implied mode of behavior in the post displacement scenario is anachronistic in an era of such advanced notion of development.

Gendering debates are finding space in the development literature. One such debate has intricate relation with the central subjects of the present study namely development induced displacement. For sometimes the major argument of Eco-feminists was that the relation between women and nature is an intrinsic reality rather than a symbolic juxtaposition promulgating patriarchal ideology. In their view gender inequality had its emergence ever since culture was begun to be regarded as superior to nature. Because men have a predominant position in culture than women, domination of culture over nature was simultaneous with domination of men over women. Although the universal validity of this argument was questioned within the Eco-feminist milieu itself, development induced displacement provide certain good empirical evidence that can strengthen this argument.

Displacement projects are inextricably linked with environmental degradation. Women in India as of other Third World countries depend on nature to sustain her family and society. Vandana

Shiva's stance in this regard can't be overlooked as a blind resonance of the Eco-feminist position. She observes that the destruction of environment has a simultaneous effect on the social position of women that materialize in the form of "marginalization, devaluation, displacement and ultimate dispensability" (Vandana Shiva, 1988) .

Gender Salience and Patriarchal Bargains in the Context of Displacement

Correl's study that deals with Gender salience delineates that gender salience is more visible and prominent in certain social relational contexts than others. The present study found out that displacement events dealt here have turned into suitable social relational contexts for effective gender salience. This finding gives central concern to the self assessment of women in social relational contexts. Gender becomes effectively salient in contexts that are stereotyped in that the stereotypic traits and abilities of one gender or the other are culturally linked to the activities that are central to the context (Correl, Shelley J. 2001). In the context of displacement which is characterized by social, physical and economic insecurity women increasingly seeks the support of men to help them survive the context. Moreover, the shift from indigenous economy to formal economy which is a consequence of displacement widely noted by scholar rendered the role of men more prominent in this social relational context. Such factors cause effective salience of gender in the scenario of development induced displacement which in turn gives rise to the gender inequality. The perceptional ambience resulted contributes to the effective salience of gender.

The empirical observation drawn from ICTT Vallarpadam resettlement sites can evince this argument. In the wake of displacement, the evictees constituted a number of local protest committees to mobilize themselves and to organize mass protest campaigns against the authorities demanding fair compensation. These campaigns soon gained wide media attention because of the overwhelming presence of women displaces in it. These campaigns appeared as if lead by women evictees. In fact, none of the displaced

women were enjoying key positions in the protest committees. More importantly, they didn't care about their lower position in the protest committees and their exclusion from decision making processes in the committees. Most of the women were literate enough to understand the discrimination done against them. This situation can be explained by Correl's gender salience argument. When the protest committees are viewed as political organizations, the predominant position of men in its top ranks is culturally sanctioned. The women are well aware of the hierarchical position that men occupy in this social relational context. This tendency of women to stay away from colluding with the gendered structure is further explained by Kandiyoti using the concept Gender Bargain. He maintains that 'patriarchal bargains' offer women greater advantages than they perceive can be achieved by challenging the prevailing order. Such women are therefore reluctant to engage in empowering activities that may challenge their gendered bargain (Kandiyoti D 1988).

Conclusion

Internalization of need is a necessary condition for thoughtful actions. The internalization of the needs of modern society such as education, modern health care etc is greater among displaced women. But if these internalizations are to be materialized through actions, the gender stereotyping of economic functions of women by the dominant culture needs to undergo radical shifts that can open the vistas of formal economy to them. It should be noted that resettlement and rehabilitation action plans can well initiate the institutionalization of economic integration of women. For instance in Vallarpadam, the self-employment groups were active until the displacement occurred. But the planners of resettlement and rehabilitation of the displaced did not utilize the scope of a sustainable economic re-integration of the women through the revival of the then inactive and non-existent self-help groups. The finance needed for re-organizing them, training them in various enterprises with the help of the state, pooling the community resources, assisting them with initial investments and linking their products with the market would never have rendered the development project economically nonviable.

When the scopes of enabling the women displaces with more preferential access to properties, good education, and modest health-care through a well-conceived rehabilitation and resettlement framework is considered, it can be concluded that each displacement event in India is a missed opportunity.

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- Kavu is the term that indicates ecologically sensitive spaces that once were an inalienable part of the environs of traditional houses in Kerala. The space is abundant in flora and served as a conservative space for snakes. The wells nearby Kavu never dries up as the space makes the water bed in the vicinity richer.
- This is a vital ritual in the Urs which is an annually observed festival in the coastal Vizhinjam Region commemorating the birth anniversary of a saint. Devotees brings decorated earthen pots known as Chandanakkudams during the procession. The physical and mental attachment that the displaced people had with the eventful festival lost its charms once they were displaced.
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Self-Esteem and Spiritual Wellbeing among College Students with Respect to their Locus of Control

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Abstract

The present study was conducted to assess, compare and examine the inter relationship between the levels of self-esteem and spiritual wellbeing among college students with internal and external locus of control. The sample consisted of 60 college students with internal locus of control and the other 60 with external locus of control drawn from 4 districts in Kerala. Levenson's Scale for Locus of Control (Vohra, 1992), Self-esteem Inventory (Immanuel & Sadananda Raj, 1985) and Functional Assessment of Chronic Illness Therapy-sp (Bredle et al., 1990) were used for assessment. Data was analysed using independent sample 't'-test and Pearson's product moment correlational analysis.

Results revealed that the participants with internal and external locus of control differs significantly on the level of self-esteem indicating the group of internals possessed better level of self-esteem as compared to externals. A significant gender difference was identified between the male and female participants on their levels of self-esteem and spiritual wellbeing. The level of spiritual wellbeing is significantlycorrelated with the self-esteem of the participants.
***Keywords**:* Self-esteem, Spiritual wellbeing, Locus of control.

Locus of control is one's belief about whether the outcomes of our actions are contingent on what an individual do (internal control orientation) or events outside his/her potential control

(external control orientation) (Zimbardo, 1985). Gardner and Warren (1978) defined the term locus of control as the degree of acceptation of individual responsibility as a result of their own behaviour. The concept of locus of control was first put forwarded by Rotter (1966). He proposed that the degree to which people believe their lives to be under their own control is an important dimension of individual variation. Individuals who are believe that they can control or influence the outcomes through their own potentials, skills and efforts are labelled as individuals with internal locus of control. Those who perceives that outcomes are contingent upon external forces such as chance, luck, fate etc. they are of the belief that events are unpredictable because of many complexities in the environment are labelled as individuals with external locus of control. In a practical sense, no one has Cent percent external or internal locus of control. Instead, most people lie somewhere on the continuum between the two extremes.

In day to day life situations, individuals with internal locus of control are more likely to take responsibilities of their actions, may tend to be less influenced by other's opinion, often do better at tasks when they are allowed to work at their own interest, pace, tend to work hard to achieve the things they want, feel confident in the face of challenges, report being happier and more independent and often achieve greater success in the work place. Individuals having external locus of control blame outside forces for their circumstances, often credit luck or chance for any successes, do not believe that they can change their situation through their own efforts and frequently experience helplessness or feel powerless in the face of challenges or difficult situations.

Numerous studies were carried out in order to examine the importance of locus of control on different psychological variables from many years. Plares (1968) identified that individuals having internal locus of control are superior than those having external locus of control in the utilization of information in a problem even when both groups have learned the information equally. This indicates the difference between internals and externals on their thinking and

information processing styles. The study conducted by Hrycenko and Minton (1974) revealed that internals are more oriented towards high power whereas external towards low power. In a study conducted by Sayin (2000) states that internally controlled individuals tend to be more creative and effective in reaching their goals. Pannels and Claxton (2008) found that individuals with internal locus of control will possess a high degree of happiness than externally controlled individuals.

Usually, a difference in the degree of acceptation of individual responsibility due to their own behaviour may influence the person's evaluation, vision and expectation about his/ her life. Someone's attitude about himself / herself should bear some relation to locus of control. A person who feels insecure, lacking of self-worth and low in feelings of personal adequacy is expected to be oriented towards external control rather than internal control. The high self-esteem individual with his/ her positive sense of adequacy should feel more in control of what he /she does and what happens to him / her rather than under control from outside force. (Piskin, 1996).

Self-esteem describes a person's overall sense of self-worth or personal value. A person with high self-esteem is confident, proud and self-respecting. A person who is competent and who is loved, admired and accepted by others will almost possess high level of self-esteem (Baumeister et al., 2003). One who has low self-esteem is insecure, lacking in confidence and self-critical. Individuals with low self-esteem typically suffer from poor self-knowledge.

The term 'spiritual wellbeing' used throughout the study is operationally defined as one's mental state or state of wellbeing in the realms of meaning, peace and faith in one's life. Many studies raised the importance of spiritual wellbeing as a powerful factor that promotes patients' recovery from many diseases along with medicines. But few studies found by the researcher explaining the inter-relationship between levels of self-esteem and spiritual wellbeing. This study is also an attempt to understand the cultural

difference on self-esteem in relation to locus of control, since only a very few studies are carried out in this area.

Objectives

1. To examine the mean difference among college students with internal and external locus of control on their levels of self-esteem and spiritual wellbeing.
2. To verify the existence of any relationship between levels of self-esteem and spiritual wellbeing of the participants under study.

Hypotheses

Following 5 hypotheses were formulated to explore the differences on self-esteem and spiritual wellbeing among the college students with internal and external locus of control.

1. There will be a significant difference among college students on self-esteem with respect to their locus of control.
2. Participants with internal and external locus of control will show a significant difference on their level of spiritual wellbeing.
3. There will be a significant difference on self-esteem in relation to the gender of the participants.
4. The male and female participants will show a significant difference on their level of spiritual wellbeing.
5. There will be a significant relationship between self-esteem and spiritual wellbeing of the participants.

Method

Participants

The present study was carried out using descriptive research design. The sample for the present study was drawn from the population of college students consisted of 60 participants with internal locus of control and the other 60 with external locus of

control, from different colleges in Kollam, Thiruvananthapuram, Alappuzha and Kottayam districts in Kerala State by means of purposive sampling method. Prime factor was the locus of control, and due care was taken to include male and female students from government and private colleges, and also from science and humanities streams to have a representative sample. The age range of the participants is varied from 18-23 years. College students, who can speak, read and write either English or Malayalam, and who are reported lr having no physical or psychological illness for the past one year were selected for the study. The two groups were evenly matched based on their age, socio-economic status and area of residence.

Measures

Three psychological measures were mainly used to assess the locus of control, spiritual wellbeing and self-esteem of the participants.

Levenson's Scale for Locus of Control devised by Sanjay Vohra (1992) was used to measure the locus of control of the participants. The scale consists of 24 items and the items were constructed based on 3 dimensions namely powerful others, chance control and individual control. The response of each item was asked in a 5-point rating scale. Categorization such as person with external locus of control and internal locus of control was determined based on the score obtained for each dimension. The test-retest reliability of this scale was found to be 0.76. The present scale was validated against Rotter's locus of control scale and yielded a correlation coefficient of 0.54.

Functional Assessment of Chronic Illness Therapy- Sp (FACIT-Sp) developed by Bredle et. al. (1990) was used to assess the spiritual wellbeing level of the participants. This tool consists of 12 items and the items were constructed based on 3 dimensions namely meaning, peace and faith. The response of each subject was given in a 5-point scale. Higher scores indicate the higher level of spiritual

wellbeing. The reliability was found to be 0.81 and the internal consistency was 0.91.

The levels of self-esteem of the participants were assessed by using self-esteem inventory devised by Immanuel Thomas and Sam Sadananda Raj (1985). The scale consists of 20 items and all the items were constructed as descriptive statement in a 5-point scale. The items are intended for a self-evaluation of the participants from a wide variety of behavioural domains including academic, social, physical and emotional aspects. The maximum possible score that could be obtained by the participants for this scale was 100. The scale yielded a split-half reliability coefficient of 0.95 and the test-retest reliability was found to be 0.90.

Personal and demographic data were collected from each of the participant using a socio-demographic data sheet.

Procedure

The tests were administered in group settings to the sample, and were provided the instructions given in the instruction manuals of the test. Scoring was done through the guidelines given in the manuals.

Statistical Analysis

Data obtained from the responses of the participants was statistically analysed using SPSS. Independent sample 't'-test was done to compare the mean difference on levels of self-esteem and spiritual wellbeing between students with external and internal locus of control and other variables. Pearson's product moment correlational analysis was used to determine the significant relationship between the main variable such as self-esteem and spiritual wellbeing among the participants.

Results and Discussion

The present study was conducted to compare the difference among college students with internal and external locus of control on their levels of self-esteem and spiritual wellbeing and to examine the relationship between the levels of self-esteem and spiritual wellbeing.

Participants of the study were of the age range between 18 and 23. The sample was evenly matched on the basis of locus of control, gender and other demographic variables such as area of residence, socio economic status, etc. The self-esteem level of the students with internal locus of control ranged from 39 to 98 (M = 71.67) and that of the students with external locus of control ranged from 36 to 87 (M = 63.6). The spiritual wellbeing level of the students with internal locus of control ranged from 12 to 71 (M = 32.6) and that of the students with external locus of control ranged from 10 to 39 (M = 31.86). Level of self-esteem of the male students was found to be ranging from 36 to 98 (M = 74.28) and that of female students as between 39 to 89 (M = 67.05). Spiritual wellbeing level of the male students was found to be ranging from 10 to 48 (M = 30.5) and that of female students as between 16 to 71 (M = 34.46).

The study tested the significance of five hypotheses. In order to test the hypotheses, independent sample t- test and Pearson's product moment correlational analysis were used. Alpha level was set at p<.05 for all analyses.

Table 1: Comparison of the mean scores on self-esteem and spiritual wellbeing based on locus of control and gender difference of the participants. (N=120)

Variables	Comparisons	Mean	*SD*	*'t'*
Self-esteem	Students with internal locus of control	71.67	12.82	2.28*
	Students with external locus of control	63.6	12.84	
Spiritual wellbeing	Students with internal locus of control	32.6.	8.48	0.31

	Students with external locus of control	31.86	7.14	
Self-esteem	Male students	74.28	12.97	3.14**
	Female students	67.05	12.19	
Spiritual wellbeing	Male students	30.5	8.28	2.64**
	Female students	34.46	7.92	

(*significant at 0.05 level, ** significant at 0.01 level)

The first Hypothesis examined the mean difference on self-esteem among college students with internal and external locus of control stated that; 'there will be a significant difference among college students on self-esteem with respect to their locus of control'. Table 1 depicts the mean scores of students with external and internal locus of control on their level of self-esteem revealed a significant difference on self-esteem, with t (118) = 2.28, p = .024. Thus hypothesis 1 is accepted. By analyzing the mean score obtained by students with internal locus of control and external locus of control, it is clear that students with internal locus of control have high level of self-esteem as compared to students with external locus of control. The study conducted by Epstein and Komorita (1971) among Negro children is in consonance with the findings emerged from the present study. They identified that the children with internal locus of control showed a high level of self-esteem as compared to the children with external locus of control. The research study conducted by Saadat, Ghasemzadeh, Karami and Soleimani (2012) among Iranian University students revealed the positive and meaningful association between self-esteem components and internal locus of control. Another study conducted by Nwankwo, Balogun, Chukwudi, and Ibeme (2012) conducted among the secondary school students in Nigeria discovered a significant direct relationship between high self-esteem and internal locus of control of the participants. The above mentioned studies strengthen the ecological validity of the present finding despite in the changes in geographical location and culture.

The second hypothesis, which verified the mean difference on spiritual wellbeing based on the locus of control of the participants stated that; 'participants with internal and external locus of control

will show a significant difference on their level of spiritual wellbeing'. The t test failed to reveal the existence of any significant difference between the students with internal and external locus of control on spiritual wellbeing, with t (118) = 0.31, p = .75. Thus hypothesis 2 is rejected. This indicates that even though there is a difference exist in the orientation among individuals with internal and external locus of control, there is no statistically significant difference on their meaning, peace and faith in life; the sub dimensions of spiritual wellbeing.

The third hypothesis examined the existence of a mean difference on self-esteem based on gender stated that 'there will be a significant difference on self-esteem in relation to gender of the participants'. The mean scores of male and female students showed a statistically significant difference on their level of self-esteem, with t (118) = 3.14, p = 0.002. The result obtained from this study is in congruence with this pre-experimental hypothesis. Thus hypothesis 3 is retained. The results indicate that male students have higher level of self-esteem as compared to the female students. As per the findings emerged from the study conducted by Erol and Orth (2011) among adolescent and early adulthood participants of USA, there is no difference in the level of self-esteem identified among male and female participants. This fining is not in congruence with the present results. This difference may be due to the difference in culture and attitude of the society.

The fourth hypothesis tested the existence of a mean difference on spiritual wellbeing based on gender stated that 'the male and female participants will show a significant difference on their level of spiritual wellbeing'. Table 1 is indicative of the existence of a statistically significant difference between male and female students on spiritual wellbeing level with, t (118) = 2.64, p = 0.009. The results emerged from the present study is in line with the hypothesis. Thus hypothesis 4 is accepted. By analyzing the results, it is visible that female students have better level of self-esteem as than male students. The result is in consonance with the findings of Hammermeister, Flint, El-Alayli, Ridnour and Peterson (2005). The

study conducted by Jafari et al., (2010) revealed that spiritual well-being in females is significantly higher than in males.

Table 2: 'r' value between the levels of self-esteem and spiritual wellbeing of the participants under study(N = 120)

	Self-esteem	Spiritual Wellbeing
Self-esteem	1	0.253**
Spiritual Wellbeing	0.253**	1

(** significant at 0.01 level)

The fifth hypotheses which verified the association between self-esteem and spiritual wellbeing of the participants stated that; 'there will be a significant relationship between self-esteem and spiritual wellbeing of the participants'. The results of Pearson's product moment correlational analysis revealed the presence of a significant direct relationship between self-esteem and spiritual wellbeing of the participants with a correlation coefficient r = 0.253 at 0.01 level. The emerged result revealed the existence of a significant direct relationship between the levels of self-esteem and spiritual wellbeing of the participants. Thus hypothesis 5 is retained. These imply that the self-esteem level of the participants will increase with an increase in their level of spiritual wellbeing. This finding is highly beneficial to the trainers and clinicians in a way they can help their clients to increase their level of self-esteem by increasing their spiritual wellbeing level.

Conclusion

The results emerged from the present study reveals that the college students with internal and external locus of control are significantly differs on their levels of self-esteem. The present study reveals the gender difference in levels of self-esteem and spiritual wellbeing. The results also portrait the significance of the level of spiritual wellbeing in enhancing the self-esteem of the population and thereby creating a healthy and worth feeling society.

As per the findings of the study, the parents, care givers and educators can inculcate the of spiritual wellbeing among children through parenting, academic curriculum etc. This will help to develop a high self-esteem among children and thereby increase their general mental health and quality of life.

This study served its full purpose when more extensive researches would happen in the matching contextual area by including supplementary variables like socio-economic status, various personality traits, societal influence etc. not considered here, and across diverse cultures; and among varying age groups.

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Attitude of B.Ed. Students towards ICT and their Level of ICT Usage

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Abstract

Teacher education institutions are faced with the challenge of preparing a new generation of teachers to effectively use the new learning tools in their teaching practices. For many teacher education programmes, this daunting task requires the acquisition of new resources, expertise and careful planning. The present study is a normative type that analysed the data collected from 300 B,Ed. trainees from 3 colleges of education of different types of management qualitatively and quantitatively.

*The study has revealed the attitude of B.Ed. students towards ICT and the resources available in teacher education colleges. The present study has revealed that **a**ll the B.Ed. trainees have only moderate level of attitude towards ICT. Educational qualification and computer knowledge seems to influence the attitude of students towards ICT. There was no significant difference between male and female teacher trainees in their attitude towards ICT. It is also found that a large number of trainees (85%) were found to use ICT and Internet for their seminars and assignments. It is also evident that 92 % of trainees use Internet for 1-2 hours per week to for more than 8 hours in a week.*

Introduction

Information and Communication Technologies (ICTs) have brought new possibilities into the classroom. At the same time, they have placed more demands on teachers. Information and Communication Technologies are obviously of great significance for teachers. It needs to be effectively integrated in to the formal

classroom teaching and learning conditions. The integration of ICTs in teaching in general and teacher education in particular is the need of the day.The use of ICTs can make substantial changes both for teaching and training mainly in two ways. Firstly, the rich representation of information changes learner's perception and understanding of the context. Secondly, the vast distribution and easy access to information can change relationships between teacher and learner. ICTs can also provide powerful support for educational innovations.

Even though teachers may have mastered the traditional pedagogies in teaching their students, the changing world dictates that these are no longer sufficient. The teacher educators must acquire new knowledge of ICT before they can prepare their teacher trainees to meet the demands and challenges of the 21st century.

Das (2007) remarked that information and communication technology is an important instrument, which can transfer the present isolated, teacher-centred, book-centred learning environment into a rich student-centred environment. This new learning environment developed by ICT is called Interactive Learning Environment. According to Jaiswal (2011) the teacher education system empowered by ICT-driven infrastructure can have a great opportunity to come up to the centre stage and ensure academic excellence, quality instruction and leadership in a knowledge-based society.

Review of Related Studies

Anbazhagan, M (2001) Studied the "Attitude Towards Information Technology among the Teachers and Students of Bharathidasan University" and found that interest in learning and using computer in day to day work may lead to form positive attitude towards IT.

Raja and Joseph (2005) made a research work onthe attitude of teacher trainees towards information and communication technology. They found that 68% of teacher trainees possess high level of attitude towards ICT (male trainees 54% and

female trainees 77%). There was no significant difference between male and female teacher trainees in their attitude. Besides, the socio economic factors do not affect their positive attitude.

Goel (2006) conducted a study on the use of Internet in teacher education and found that a sizeable number of teacher trainees make use of Internet for email, surfing and research.

Amaladoss Xavier, S. &Vedhamnayagam, G (2010) studied the Attitude towards Learning Computers among High School Teachers, They found that the level of attitude towards learning computer and its dimensions of high school teachers was average (68.4), (64.9), (66.7). From the average values it was found out that the level of attitude towards learning computer and its dimensions among teachers having 10 years of experience was high. There was no significant difference between male and female teachers in their attitude towards learning computer and its dimensions anxiety, acceptance, e-mail and productivity. But there was significant difference between male and female teachers in the dimensions – enthusiasm and power point presentation. From the mean value, it was found that male teachers were better in their attitude towards learning computer than female teachers.

Need and Importance of the Study

The face of classroom teaching is changing. The teachers should prepare to keep up with technology utility in the classroom. ICT is not only an essential tool for teachers in their day to day work, but it also offers them opportunities for their own professional development. In conventional method of teaching, most of the time is consumed for input-output and less time is left for process, But, in teaching with ICTs, the input and output time is reduced and process time is increased. When the process time is increased, the time of student's activities, discussion, correlation with other subjects, learning etc. will increase. When teachers do teaching with the help of ICT, students get more time for the process which is more important in a period of 45 minutes or one hour.

In the new technology era, the role of teacher has changed and continues to change from being an instructor to a constructor, facilitator, coach and creator of learning situation. A teacher will be able to integrate the use of ICT into teaching effectively if he has acquired various competencies like creativity, flexibility, logistic skills, skill for project work, administrative and organizational skills and collaborating skills.

As the researcher is a teacher educator, she felt the need to assess the attitude of teacher trainees towards ICT and also the modes in which they use ICT. The study will reveal to what extent the prospective teachers are prepared to use ICT in their pre-service training.

Statement of the Problem

Nowadays, teaching is becoming one of the most challenging professions globally where knowledge is expanding rapidly and much of it is available to students as well teachers at anytime and anywhere. As teacher education is primarily directed towards preparing teachers, the quality of teacher education relies on the teacher trainee's abilities and skills. Teacher educators have to accept the demands of modern world and modify their old concepts and methods according to the needs of learners. Otherwise the teachers will become out-dated in the coming future and it will deteriorate the quality of teacher education. Keeping in mind the issues already discussed the investigator chose the problem for investigation that is stated as follows **"Attitude of B.Ed. Students towards ICT And their Mode of ICT Usage"**

Objectives of the Study

- To study the level of attitudes of the B.Ed. trainees towards ICT
- To find the significance of the differences in attitude towards ICT .between the sub-samples chosen

- To find the mode of ICT usage of teacher trainees,
- To study the internet competencies of the teacher trainees

Hypothesis of the study

The following hypothesis is formulated for the present study.

a. There is no significant difference in attitude towards ICT between the select sub samples

Method of the Study

In order to realize the above said objectives normative survey method is employed.

Sample of the Study

300 samples were selected for the study by stratified random sampling method, they were from two Government and two Private Aided Colleges of Education in Salem, Namakkal and Coimbatore Districts.

Tool Used

Attitude towards ICT cannot be measured directly since they are organizations of perceptual and emotional processes. In the present investigation, in order to measure the attitude towards ICT the investigator used self made standardised Likert Method. The scale had construct Validity as the items were selected having the t-value of more than 1.75 (Edwards, 1957). Its intrinsic validity was found to be 0.78. The reliability of this scale by split-half technique (consistency) followed by the use of Spearman-Brown prophecy formula was found to be 0.63.

The Likert-type scale calls for a graded response to each statement on a five-point scale ranging from “Strongly Agreement” to “Strong Disagreement”. The points are usually denoted by

"Strongly Agree (SA)", "Agree (A)", "Undecided (UD)", "Disagree (DA)" and "Strongly Disagree (SDA)".The different points on the scale are assigned arbitrary weights- for example 4, 3, 2, 1 and 0 in the order of "Strongly Agree " response to "Strongly Disagree" response for the positive statements. The scoring scheme is reversed for the negative statements. The total scores for an individual can be obtained by adding his/her scores for all the individual items (Summated Ratings).

Limitations of the study

The study has been restricted to B.Ed college students. Further, the area is restricted to Salem, Namakkal and Coimbatore Districts. Samples were from two Government and two Private Aided Colleges of Education.

Data analysis

Differential analysis and percentage analysis were used to analyse the data.

Hypothesis

There is no significant difference in attitude towards ICT between the select sub samples.

Table-1 Mean Attitude Scores Towards ICT

Sub-Sample	**N**	**Mean**	**S.D**	**'t' value**	**Level of significance**
Male	162	84.46	13.14	1.36	Not Significant
Female	138	86.42	11.53		
Rural	158	84.60	13.20	1.11	Not Significant
Urban	142	86.21	11.55		
Arts	173	84.26	12.89	1.80	Not Significant
Science	127	86.87	11.70		
Undergraduate	210	82.95	12.34	5.36	

Postgraduate	90	91.00	10.82		Significant at 5%
Computer course attended	210	83.15	14.06	2.35	Significant at 5%
Computer course not attended	90	86.64	11.25		
Government	124	84.34	14.25	1.19	Not Significant
Private	196	86.08	10.99		
English	132	84.53	14.02	1.02	Not Significant
Tamil	168	86.01	11.05		

Out of the seven cases, only in two cases significant differences were noted, Hence in these two cases the hypothesis is not accepted while in the other cases the hypothesis accepted.

Hence it is concluded thatthere is no significant difference in attitude of B.Ed. students towards ICT between the select sub samples (a) gender (b)locality (c) subject specialization(d)type of colleges (e)medium of study.

2. There is significant difference in attitude of B.Ed. students towards ICT between the select sub samples **a.** educational qualification **b.** computer knowledge

Data Analysis on Use of ICT in Teacher Education

Table-2 Use of Ict In Teacher Education

Sl.No.	Question	Yes	%
1	Have you created own e-mail Id?	240	80
2	Do you have an off-campus e-mail address?	150	50
3	Do you know how to make power point slides for presentation?	210	70
4	Do you browse the internet for collecting information to prepare for seminars and writing assignments?	250.	83

5	Can you prepare graphs by using MS Excel?	100	33
6	Have you used LCD projector?	150	50
7	Do you have access to a computer off-campus?	90	30
8	Do you use Web CT for any of your courses?	210	70
9	Do you use Campus Pipeline?	210	70
10	Do you know the campus home page?	250	83
11	Do you have Internet access at home?	90	30
12	Do you have ability in word processing tasks?	210	70
13	Do you know search engines?	215	72
14	Have you ever performed any function on the Internet?	250	83
15	Do you have familiarity with newsgroups, chat rooms, or search engines?	150	50
16	Do you chat on internet?	100	33
17	Are you "very skilled" in using this resource?	210	70
18	Do you seek help in using the Internet?	50	17

From Table 2.it is observed 83% trainees know the campus home page and browse the internet for collecting information to prepare for seminars and writing assignments and performed some functions on the Internet .80% of the teacher trainees were found to have created their email account and 72% know about different search engines. 70% Teacher trainees also started making PowerPoint presentations, "very skilled" in using ICT resource , use Campus Pipeline, use Web CT to few courses and have ability in word processing tasks. 50% are using the LCD projector, have an off-campus e-mail address and have familiarity with newsgroups, chat rooms, or search engines...33% of trainees are able to draw graphs to the given data using MS-EXCEL and chatting on internet.

Table -3 Extent of Internet Used by the Teacher Trainees

S.No.	Place	Count	%	Duration	Count	%
1	Home	**90**	**30**	0 hour	**24**	**8**
2	College	**126**	**42**	1 hour	**120**	**40**
3	Cyber Café	**60**	**20**	1-2 hours	**65**	**22**
4	Nowhere	**24**	**8**	3-4 hours	**45**	**15**
				5-7 hours	**36**	**12**
				More than 8 hours	**10**	**3**

It is evident from Table 3 that 30 % of the teacher trainees do surfing at home, while 42% at college and 20% at cyber café. A large majority of the teacher trainees use internet at the institution.

It is clear that 40% teacher trainees used Internet for at least one hour a day. 22 % teacher trainees used the Internet for 3-4 hours per week, 15% used it for 5-7 hours per week while 3 % used it for more than 8 hours. 8% did not use internet at all.

Table - 4 Use of ICT for Paper Presentations in Seminars / Assignments

S.No.	Frequency	Count	Percentage
1	Often	100	33
2	Sometimes	75	**25**
3	Occasionally	80	**27**
4	Never	45	**15**

From the Table.4, it is noted that 33 % teacher trainees usedICT for Paper Presentations in Seminars, Assignments often. 27 % teacher trainees used only sometimes, 15% used occasionally while 15 % never used at all.

Table - 5 Use of E-mail

S.No.	Frequency	Count	Percentage
1	Regularly	**120**	**40**
2	Often	**90**	**30**
3	Rarely	**66**	**22**
4	Never	**24**	**8**

From the above table it can be seen that 40% trainees were found to check their email regularly while 8% never check their mail.

Primary Reasons for Using the Internet by the Trainees

- To Update Knowledge -50%
- To Communicate With Friends -50%
- For Better Job Opportunity -25%
- Just For Time Pass - 15%
- No Particular Reason – 60%

Major Findings

- It is found that attitude of B.Ed trainees towards ICT is favourable.
- There is no significant difference in the attitude of male and female B.Ed. students towards ICT
- There is no significant difference in the attitude of rural and urban B.Ed. students towards ICT
- There is no significant difference in the attitude of B.Ed. students of different subjects towards ICT
- There is no significant difference in the attitude of B.Ed. students .of different type of Colleges towards ICT
- There is no significant difference in the attitude of English and Tamil medium B.Ed. students towards ICT
- There is significant difference in attitude of B.Ed. students with different educational qualification towards ICT

- There is significant difference in attitude of B.Ed. students with and without computer knowledge towards ICT between the select sub samples
- 83% trainees know the campus home page and browse the internet for collecting information to prepare for seminars and writing assignments and performed some functions on the Internet.
- 80% of the teacher trainees were found to have created their email account and 72% know about different search engines.
- 70% Teacher trainees also started making PowerPoint presentations, "very skilled" in using ICT resource , use Campus Pipeline, use Web CT to few courses and have ability in word processing tasks.
- 50% prospective teachers are using the LCD projector, have an off-campus e-mail address and have familiarity with newsgroups, chat rooms, or search engines...33% of trainees are able to draw graphs to the given data using MS-EXCEL and chatting on internet.
- 30 % of the trainees were found to do surfing at home, 42% of them do at college, while 20% surf at cyber cafés.
- 15% trainees use Internet for 3- 4hours per week, 12% of them uses it for 5-7 hours per week and 3% of them use the Internet for more than 8 hours in a week.
- Only 40% teacher trainees were found to check their email regularly
- 50% of trainees use internet to update knowledge and to communicate with friends -

Conclusion

- From the total and sub groups mean values, it is found that,Female students,students from Urban locality,Science subjects students,P.G. degree holders,students who have attended Computer Classes, students from Private unaided colleges and Tamil medium B.Ed. trainees have more favourable attitude towards ICT.

- All the B.Ed. trainees seem to have only moderate level of attitude towards ICT because their scores lay between Group Mean ± 1 Standard Deviation.

- The educational qualification and computer course knowledge do cause a significant difference in respect of their attitude towards ICT.

- In the present study it is evident that gender, locality, subject, type of institution, medium of B.Ed students do not cause any difference in their attitude towards ICT.

- 8% of trainees have no access to computers. Only 3% of trainees use computers to the maximum extent (more than 8 hours per week).

- Sizeable population of teacher trainees use ICT for Paper Presentations in Seminars, Assignments, know the campus home page and browse the internet for collecting information to prepare for seminars and writing assignments, performed some functions on the Internet,have created their email account and know about different search engines, started making PowerPoint presentations, "very skilled" in using ICT resource , use Campus Pipeline, use Web CT to few courses and have ability in word processing tasks.

- 44% use e-mail regularly while 8% have never used email. Only 40% teacher trainees were found to check their email regularly.
- 30 % of the trainees were found to do surfing at home, 42% of them do at college, while 20% browse at cyber cafés

- 15% use Internet for 3 to 4hours per week, 12% of them uses it for 5-7 hours per week and 3% of them use the Internet for more than 8 hours in a week. They use Internet to update knowledge and to communicate with friends.

Discussions

- The present study has revealed thatall the B.Ed. trainees seem to have only moderate level of attitude towards ICT. This finding conforms to **Anbazhagan, M (2001)** who found that interest in learning computer and the practice of using computer in day to day work lead to positive attitude of teachers and students of Bharathidasan University towards Information Technology and to the findings of **Amaladoss Xavier, S. &Vedhamnayagam G (2010)** who studied the attitude of High School teachers towards learning computers, They found that the level of attitude towards learning computer and its dimensions of high school teachers was average (68.4), (64.9), (66.7).
- The current study has found that educational qualification and computer knowledge seem to influence the attitude of students towards ICT which does not conform to **Xavier, S. &Vedhamnayagam G (2010)** who reported that there was no significant difference in the attitude towards learning computer and its dimensions of high school teachers with reference to their educational qualifications.
- The result of this study conforms to the findings of **Raja and Joseph** (2005) who made a research work onthe attitude of teacher trainees towards information and communication technology. They found that there was no significant difference between male and female teacher trainees in their attitude towards ICT, The study under discussion also found the same.
- It is found from the current study that a large number of trainees (85%) were found to use ICT and Internet for their seminars and assignments. It is also evident that 92 % of trainees use Internet for 1-2 hours per week to for more than 8 hours in a week. This result conforms to **Goel (2006)** who found that a sizeable number of teacher trainees make use of Internet for email, surfing and research.

Recommendations

- All the Colleges of Education should provide sufficient infrastructural facilities and trainings to use the ICT facilities, so that they will use them in their class rooms regularly in future.
- B.Ed. trainees of arts group, hailing from rural areas should be motivated to use ICT facilities to the maximum.
- Government and Managements should support teacher education institutes by giving more financial assistance to buy ICT equipment's.
- ICT based activities should be included in the curriculum of teacher education.

Suggestions for Further Study

Related to the current study, the following titles are suggested for future researches.

- Attitude of in-service teachers towards ICT
- Effectiveness of ICT in classroom teaching
- Impact of ICT programme in teaching at secondary level

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Summary

ICT has revolutionized the entire concept of education, teaching-learning process, and research activities by offering new opportunities and challenges in creation and dissemination of information by web-based education. It is really a challenging task to strengthen ICT in teacher education, which is found to be unavoidable.

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Tribal Unrest in Assam: A Sociological Analysis

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Abstract

Assam has a sizeable population of 31205576 people out of which 3884371 belong to scheduled tribe category as per Census 2011. At the same time, they have several problems which lead to tribal unrest. The problem of autonomy status, ethnic identity crisis, declaration of ST status, demarcation of tribal forest land, changing economy, interest of political leaders, underdeveloped education system, border-conflict are some of the issues paving the way for the occurrence of the unrest among the various tribes.

This paper highlights the tribal scenario in Assam, and identifies the key factors responsible for the present unrest prevailing among the major tribes in Assam.

Keywords: Tribal, Scheduled tribes, 5th schedule, 6th schedule, unrest

Introduction

There is no definite definition of tribe with standard explanation acceptable to all. Generally they are known by different names in India as jungle people, aboriginals, adivasis and primitive people etc. The constitution of India has referred to them as "Scheduled Tribes". They usually live in hilly regions, mountain places, forest areas and deep valleys.

Marshall (1944: 539) mentioned that the term tribe 'usually denotes a social group bound together by kin and duty and associated with a particular territory. Members of the tribe share the social cohesion associated with the family together with the sense of political autonomy of a nation'.

The Fifth Schedule attached to Article 244 (1) require a Governor to submit reports to the President whenever asked, on the administration of the scheduled areas and receive from the President instructions on the administration of these areas. It also provides for the appointment of Tribals Advisory council of not more than 20 members of whom three fourth, or as nearly, as may be representatives of the Scheduled Tribes in the Legislative Assembly of the State.

On the other hand, the Sixth Schedule attached to Articles 244 (s) 275 (1), deals with provisions regarding administration of the tribal areas in the state of Assam, Meghalaya and Mizoram, thus the creation of the autonomous districts and autonomous regions with District Councils and Regional Council respectively.

The word unrest means 'disturbed condition' and is a state of disillusionment and dissatisfaction. Ahuja (1992:163) says that 'Social unrest is the manifestation of collective disillusionment, discontentment and frustration of the group, community or society'. He also writes that by social unrest one means 'collective frustration and disillusionment on common issue of the groups in the society'. As for instance if there is any discontentment among some workers of one factory, it cannot be termed as industrial unrest but if it happens to many industries where all employees in the state or country or region are collectively dissatisfied on matters like wages, safety measures, security and so on. Such discontentment may be called as industrial unrest. Similarly, any collective frustration by tribals in the society is tribal unrest and if it happens with peasant then it is peasant unrest.

Objectives of the study:

- To study the tribal scenario in Assam
- To highlight the key factors responsible for unrest prevailing among the tribes in Assam.

The study is mainly based on secondary data from secondary sources like books, journals, official documents etc.

Scheduled Tribes population of Assam from census of India, 2011 and 2001

Table 1.1: Scheduled Tribe (ST) Population in State of Assam, 2011 Census

ST Category	Total Number	Percentage
Persons	3,884,371	12.45
Males	1,957,005	12.28
Female	1,927,366	12.63

From Table 1.1, it is clear that total ST population in Assam is 3,884,371, with a total of 12.45, percent, in which 1,957,005 are male and 1,927,366 are female with 12.28 and 12.63 percent respectively.

The total population of Assam in 2001 census has been 26,655,528. The Scheduled Tribes (STs) population is 3,308,570 persons consisting of 12.4 percent of the total population of the state. Also it is a fact that the state of Assam registered 15.1 percent decadal growth of ST populations in 1991-2001. There are total twenty three (23) notified STs in the state of Assam. Among STs, the Bodo represents 40.9 percent of the total ST population. Mishing 17.8 percent, Karbi 10.7 percent, Rabha 8.4 percent, Kachari that is Sonawal Kachari 7.1 percent and Lalung 5.2 percent, Dimasa 3.4 percent and Deori 1.2 percent. Besides this there are other notified STs in the state with small number of populations. There are two autonomous hill districts of Assam which are North Kachar hills and Karbi Anglong. The populations of North Kachar hills are dominated by the Dimasa tribe and Karbi Anglong is inhabited by Karbi tribe. According to 2001 census, the NC Hills has got the highest 68.3 percent population, followed by Karbi Anglong with 55.7 percent ST population. On the other hand, the Bodo tribe has the Bodoland Territorial Council (BTC). The BTC has 12 electorate members looking after certain specific areas which are called as somisthi. They are under the BTC Jurisdiction called the Bodo Territorial Autonomous District (BTAD). The BTAD which consists of four districts namely Kokrajhar, Baska,

Udalguri and Chirang is created under the sixth schedule of the constitution of India and has been opposed by some organizations.

Hailakandi, Karimganj and Cachar districts have a negligible presence of ST population. The chart of District wise ST population is given in the table 1.2

Table 1.2: District wise ST populations

Sl. No.	State/District	Percentage of STs to total popl^{n} of the state/district	Percentage of STs to total state's ST population
1	Assam	12.4	100%
2	Kokrajhar	33.7	9.2
3.	Dhuburi	2.0	1.0
4.	Goalpara	16.0	4.0
5.	Bongaigaon	12.2	3.3
6.	Barpeta	7.5	3.7
7.	Kamrup	9.9	7.6
8.	Nalbari	17.6	6.1
9.	Darrang	16.6	7.6
10	Marigaon	15.6	3.6
11.	Nagaon	3.9	3.7
12.	Sonitpur	11.6	5.9
13.	Lakhimpur	23.5	6.3
14.	Dhemaji	47.3	8.2
15	Tinsukia	5.8	2.0
16.	Dibrugarh	7.5	2.7
17.	Sibasagar	3.9	1.3
18.	Jorhat	12.3	3.7
19.	Golaghat	9.9	2.8
20.	Karbi anglong	55.7	13.7
21.	North Cachar Hill	68.3	3.9
22.	Cachar	1.3	0.6
23.	Karimganj	0.3	0.1
24	Hailakandi	0.2	0.0

Source - Office of the Registrar General, India, census of India 2001.

Factors responsible for Tribal unrest in Assam

After analyzing the tribal scenario in Assam, now let us look briefly at the key factors responsible for the present unrest prevailing among the major tribes in Assam.

Status of Autonomy: The different tribes of North-East are agitating for their demand of regional autonomy. Bodos in Assam are continuing their struggle to separate themselves from the state of Assam and create their own state as Bodoland. Similar agitations are envisioned by other tribal groups as well. It is also a fact that the states of Jharkhand and Chattisgarh were formed on the basis of similar agitations taken up by the tribal groups of Indian heartland. Pathy (2000: 109) remarks that 'A few Northeastern tribes have been granted statehood after a prolonged and protected struggle but many are still struggling for some administrative and political autonomy.'

Ethnic Identity Crises: The identity of various tribal groups is expressed on the basis of language, territory, religion, common origin and a host of other cultural elements. The issues of ethnicity and upsurge of identity movements among the tribals of Assam is gaining momentum day-by-day.

The constant changes in society due to the process of Sanskritization, Westernization, Modernization, Globalization and directed changes have created unrest among the tribal communities of Assam. Many of the tribal groups like Bodo, Kachari, Rabha, Karbi, Deori etc. are affected by the process of conversion into religions like Hinduism and Christianity and they are losing their indigenous specificity. It poses a threat to their identity. The conflict even furthers to the extent that as for instance, NDFB(National Democratic Front of Bodoland) chairman Ranjan Daimary 'claim themselves (Bodo's) to be the native or indigenous people of Assam and questioned the Ahom and others who had migrated to Assam

with different roots as invaders of the 13th century and again questioned whether they can be called as indigenous people.'

Pathy (2000:109) writes that 'The threatened socio-cultural tribal collectivities faced a formidable challenge from the dominant religion, culture and language. And sadly, they receive little protection from the State system, which has recently abandoned its role as an impartial arbiter for the citizens and instead become, often, a party to aggression. Only one of the Austro-Asiatic or Sino-Tibetan linguistic groups, namely Manipuri, has been recognized by the Indian state. Also new forms of religion accepted by the tribal people created an ethnic stratification among the indigenous tribes.

Declaration of Scheduled Tribe (ST) status:

In Assam new groups are demanding tribal status apart from the already notified twenty three STs groups. Now, six ethnic groups namely the Koch-Rajbongshi, Tai-Ahom, Chutia, Moran, Motak and Tea-Garden communities of Assam want ST status and have resorted to a unified agitation to fulfill their demand.

Forest and Tribal land:

Traditionally tribals lived in forest lands and they could manage their livelihood depending on the forest product. But, the forest laws of today restrict and prevent the tribals from utilizing the benefits of the forest. The laws of the nation-state deprive the tribals from their land and land based resources. Also non-tribal people have migrated to their places which create conflicts between tribal and non-tribal groups of people.

Nunthara (2000: 58) has mentioned that 'In Assam the repatriation of refugees and infiltrators by allocating settlement areas in tribal land, notably Bodoland, for example, in the past and during the British rule and after India's

independence, pose the same problem of ethnification and identity formation and ultimately a quest for nationality status'.

Political leaders:

Some politicians start taking an interest in some of the tribal agitations and they use the help of even the anti-social elements to keep these agitations alive. The hidden truth of Ethnic clash between Bodo Tribe and the Santhals in Assam in early 1996 is not only caused by restricting the movements of the Santhals into the forest which has destroyed their economy but the conspiracy and upper hand of some third party also cannot be denied.

Changing Economy:

The tribal economy is basically forest-centric. Now, the tribals have taken to agricultural production and they are bound to produce more than two or more crops in their limited land and also they have to think for growing commercial crops. Otherwise, they have to migrate to different urban areas in search of livelihood. But, in that case, it requires skills and education to get used to a new job. As many of them do not possess the required skills so they become unemployed and landless labourers. At the same time, the displacement is very painful for the tribals who are used to a particular way of life style.

Educational Infrastructure:

In some of the tribal areas of Assam, the educational infrastructure is not well developed. As for instance in Karbi-anglong, in the BTC (Bodoland Territorial Council) area no full fledged Universities and Technical Institutions are situated. The tribal youth is dissatisfied by such unconcerned Government attitudes towards their educational requirements.

Border-related conflict:

Borders between different territories have the history of disputes at different periods in this region. This has continued till the recent times. Das (2000: 94) writes that 'Sometimes the disputes over borders between two or more contiguous states of the Indian Union are so pronounced that they often turn into major border Skirmishes and the bordering villages as we have seen, are immediately evacuated at the initiatives of the contesting states. Merapani is just one instance of such border disputes'. Other border disputes regarding land conflicts has recently arisen in the border villages of Assam near Galeki in Sivasagar District and in Margherita as well as Doomdoma in the Tinsukia district of Assam.

Karna (2000: 93) writes 'In fact, [these] three major issues – institutional, economic and cultural-form part of regional demands in India today in most cases. But, the nature of articulation of the demands is not uniform in all such regions. It varies, depending on the specificities of the social structure and the historical conditions, and so also the character of regional movements. In some cases it may take the shape of constitutional or democratic struggles, in some others, it may assume a direct secessionist form. There is also the likelihood of the assertion of regional identity taking a communal turn in certain areas, leading to conflicts between 'tribals –non -tribals,' or 'insiders-outsiders'.

Conclusion

Problems of Tribal unrest in Assam is apparent in every place because of several factors like problem of autonomy status, ethnic identity crisis, declaration of ST status, demarcation of tribal forest land, changing economy, interest of political leaders, underdeveloped education system, border-conflict and so on.

We can say that the process of integration is a long drawn process. Scholars have different views on integration of the tribals with the mainstream. After analyzing the various factors leading to tribal unrest, it is perhaps necessary to have a proper integration of the tribals with the mainstream. But the choice should be left on the tribals to make their own cultural decision and provision should be made to help them retain their cultural tradition. At the same time the tribal people should also realize that the non-tribal residing in their localities should be given opportunities to survive.

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Prebiotics Incorporated Acidophilus Milk in Health Management

S. Mariammal& K.R. Narayanan

Abstract

The effect of addition of prebiotics namely inulin, fructoolgo saccharide (FOS), malto dextrin and honey on sensory and chemical characteristics and rate of survival of Lactobacillus ***acidophilus*** *in acidophilus milk samples was investigated. The addition of inulin, FOS and malt dextrin enhanced the physical quality of the samples such as appearance and body and texture. The addition of honey helped in enhancing the flavour. It also increased the iron content of the samples. The addition of prebiotics promoted the growth of* ***L. acidophilus*** *in the acidophilus milk samples.*

Keywords: *Prebiotics, Inulin, Fructooligosaccharide, Maltodextrin, Honey, Probiotics, Sensory quality, Viability.*

Introduction

Foods contributing health benefits beyond basic nutrition through the presence of physiologically active components are known as functional foods. Dairy foods can be included in the functional food category because of their content of specific health enhancing ingredients and probiotic cultures which may improve microbial balance in the intestine. Probiotics are live microorganisms which have multiple functions and effects on the human body play an important role in maintaining the precise balance of desirable and undesirable bacteria in the human digestive system (Fuller, 1992).Some examples for probiotics are ***L. acidophilus***, ***L. bulgaricus,Bibidobacterium bifidium***, etc . The prebiotics are defined as non-digestible food ingredients that beneficially affect the host by selectively stimulating the growth and/or the activity of one

or a limited number of bacteria in colon and thus improving the host health.

Consumption of probiotic bacteria via food product is an ideal way to reestablish the balance of intestinal microbiota. Among the fermented milk products, acidophilus milk is the most important vehicle for the delivery of probiotic organisms. The present study envisages the effect of incorporation of prebiotics namely inulin, fructooligosaccharide , maltodextrin and honey in acidophilus milk on quality in terms of sensory evaluation and chemical characteristics and the viability of the probiotic organism namely ***L. acidophilus***.

Materials and Methods

Acidophilus milk samples were prepared from skim milk as detailed by De (1983). Fresh cow skim milk was sterilized at 120^{o} C for 20 minutes and then it was cooled to 37^{o} C and added with 5% inoculum of ***L. acidophilus*NCDC 014** was used as control. The acidophilus milk samples prepared with incorporation of inulin (5% w/v) fructooligosaccharide (FOS) (5%w/v), maltodextrin (5%w/v) and honey (5% v/v) were marked as LAI, LAF ,LAM and LAH respectively and also inoculated with ***L. acidophilus*** culture (5%).All the samples were incubated at 37^{o} C for 18 hours. The acidophilus milk samples thus prepared were cooled and packed.

These acidophilus milk samples were evaluated for sensory quality by panel of judges using score card method recommended by Pearce and Heap (1974). The total sensory score was 20 which was obtained by summing up the scores for appearance (5 marks), body and texture (5 marks) and flavour (10 marks). The P^{H} was estimated using a digital p^{H} meter. The titrable acidity and total solids content of the samples were estimated as per the procedure described in IS:SP:18(Part XI)-1981. The protein content was estimated by Micro-kjeldhal method (Jackson,1958). The iron content was estimated as per the procedure detailed by Banerjee (1978). The enumeration of L. acidophilus was done on Lactobacillus MRS agar (De Man et. al.,

1960) medium by standard plate count technique. The coliform and yeast and mould count were estimated as per the procedure described in SP:18(Part XII)-1981.

Results and Discussion

The effect of incorporation of prebiotics on sensory quality of acidophilus milk is shown in Table 1.

Regarding appearance, the scores for control, LAI,LAF,LAM and LAH samples were 4.04±0.06, 4.80±0.04, 4.38±0.06, 4.36±0.13 and 3.48±0.14 respectively. Among them LAI samples secured the highest score and LAH samples secured the lowest score. Regarding body and texture the same trend was observed. The scores offered for LAI samples were 4.74±0.09 as against 3.80±0.08 for LAH samples. Regarding flavour the scores for control, LAI, LAF, LAM and LAH were 7.38±0.2, 8.44±0.11, 8.20±0.04, 8.06±0.09 and 9.34±0.11 respectively. The LAH samples were rated to be superior than other samples. This may be attributed to the sweetness contributed by honey. From the study, it was revealed that the total scores for sensory quality were higher for LAI. This may be attributed to its characteristic features for improving the rheological behaviour or the thickness or hardness of the product in addition to smoothness and other agreeable mouth feel attributes (Coussement, 1999). LAF,LAM, LAH and control samples follow the order of preference by exhibiting slighter reduction in total scores. This differences in scores is not statistically significant ($p<0.05$).

Table :1 Effect of Incorporation of Prebiotics on Sensory Quality of Acidophilus Milk

Sensory parameters	Control	LAI	LAF	LAM	LAH
Appearance (Max.Marks.5)	4.04±0.06	4.80±0.04	4.38±0.06	4.36±0.13	3.48±0.14
Body and texture (Max.marks. 5)	3.94±0.05	4.74±0.09	4.44±0.09	4.40±0.12	3.80±0.08
Flavour (Max. marks. 10)	7.38±0.26	8.44±0.11	8.20±0.04	8.06±0.09	9.34±0.11

Values are mean ± S.D of five determinations

LA - Inulin incorporated acidophilus milk
LAF - FOS incorporated acidophilus milk
LAM - Maltodextrain incorporated acidophilus milk
LAH - Honey incorporated acidophilus milk

Table 2 explains the effect of incorporation of prebiotics on the chemical characteristics of control, LAI, LAF, LAM and LAH samples. The P^H value of control, LAI, LAF, LAM and LAH were 4.44±0.09, 4.14±0.09, 4.34±0.13, 4.32±0.06 and 4.20±0.04 respectively. The p^H value observed was slightly higher in control and the values were lower in LAI samples.

The titrable acidity of control sample was found to be 1.01±0.06. The titrable acidity values were found to be higher in LAI, LAF, LAM and LAH than control. Among the prebiotics added samples, LAI sample recorded the highest value (1.22±0.06). This may be attributed to the better utilization of lactose for production of lactic acid by the organism ***L .acidophilus***. Though the titrable acidity values were higher than the control they were lying within the range (1.23-0.88) of acidity reported by Zeynab Rattani Amiri *et.al.*, (2010). The differences in titrable acidity was not statistically significant ($p<0.05$).

Table: 2 Effect of Incorporation of Prebiotics on Chemical Characteristics of Acidophilus Milk

Parameters	Control	LAI	LAF	LAM	LAH
p^H	4.44±0.09	4.14±0.09	4.34±0.13	4.32±0.06	4.20±0.04
Titrable acidity (%)	1.01±0.06	1.22±0.06	1.06±0.09	1.04±0.09	1.03±0.04
Protein (%)	3.67±0.38	4.15±0.31	3.96±0.35	3.86±0.42	4.05±0.31
Total solids (%)	10.37±0.16	12.20±0.14	12.37±0.10	12.27±0.09	12.37±0.13
Iron (mg/100g)	0.075±0.003	0.076±0.002	0.076±0.002	0.077±0.003	0.112±0.005

Values are mean ± S.D of five determinations

The protein percentage of control sample was 3.67±0.38. The values recorded for LAI (4.15±0.31), LAF (3.96±0.35), LAM (3.86+0.42) and LAH (4.05+0.31) were slightly higher than the control samples. This may be due to the presence of a bioprotein contributed by culture organisms. Among the probiotic treated samples LAI had higher value than other samples. This differences in protein was not statistically significant ($p>0.05$).

Among the samples, the total solids content of control sample (10.37±0.16) was lower than prebiotic treated samples which are obviously due to the exogenous addition of prebiotics. Among the prebiotic incorporated samples, LAI samples recorded slightly lower value(12.20±0.14) than others and the reduction in total solids content of prebiotic treated samples may be due to better utilization of lactose present in the samples. This differences in total solids content was statistically significant ($p>0.05$). Regarding Iron content of acidophilus milk samples, the value was noticed to be higher (0.112+0.005 mg/100 g) in LAH than other samples. The values of control, LAI, LAF and LAM were found to be practically similar. The higher value of LAH may be attributed to the contribution of iron by honey.

Table: 3 Effect of Incorporation of Prebiotics on Microbial Quality of Acidophilus Milk

Parameters	Control	LAI	LAF	LAM	LAH
L. acidophilus Count ($x10^8$cfu/ml)	40.6±3.3	64.4±4.1	63.4±2.7	63.0±3.2	61.0±2.4
Coliform count(ml)	NIL	NIL	NIL	NIL	NIL
Yeast and mould count(ml)	NIL	NIL	NIL	NIL	NIL

Values are mean ± S.D of five determinations

Table 3 shows the effect of incorporation of perbiotics on the microbial quality of acidophilus milk. The mean ***L. acidophilus*** count ($x10^8$cfu/ml) was 40.6±3.3 for control, 64.4±4.1 for LAI, 63.4±2.7 for LAF, 63.0±3.2 for LAM and 61.0±2.4 for LAH. The count was higher in prebiotic treated samples than control. This may be attributed to stimulating property of prebiotics. Among prebiotic treated samples LAI samples recorded the highest count. According to Kurmann and Rasic (1991) the consumption of probiotics at a level of 10^8-10^9cfu/day is a commonly quoted figure for adequate probiotic consumption equating to 100g of a food product with 10^6 -10^7cfu/g. The acidophilus milk samples developed in this study contain more higher number of ***L. acidophilus*** than the above recommendation.

No coliform count and yeast and mould count appeared inferring that the products developed were of good quality.

Conclusion

Now a day's people need instant food with taste and therapeutic value. The addition of prebiotics namely inulin, fructooligosaccharide, malt dextrin and honey to acidophilus milk encouraged the growth of valuable probiotic namely ***L. acidophilus*** in the samples. Thus the incorporation of these prebiotics to the acidophilus milk samples makes them more acceptable through its better access as an excellent medium to deliver probiotic bacteria to the consumers.

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