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FROM THE EDITOR 'S DESK

The Home Science Association of India held its Biennial Conference at The College of Home Science, Maharana Pratap University of Agriculture and Technology, Udaipur from 1-3 February, 2018. The theme was "Family and Community Science: A Catalyst for Sustainable Development Goals". It received an overwhelming response, as reflected through the number of participants and paper presentations.

It was a great moment for the Association when the Indian Journal of Home Science was launched as e-journal at the Inaugural function of the conference on the First of Feb, 2018. The change was welcome and cheered by all.

This is the second issue of the e-journal. A brief report of the conference and the award winning papers are incorporated in this issue along with regular research papers.

It is hoped that the researchers in Home Science across India will strengthen their cooperation by way of increasing the number of research papers sent for publication in their own "The Indian Journal of Home Science."

The Editor

PROF. MANEESHA SHUKUL

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ECOFRIENDLY DYEING OF SELECTED NATURAL AND SYNTHETIC FABRICS USING WASTE TEAK LEAVES (*TECTONA GRANDIS LINN.*) – A STEP TOWARDS SUSTAINABILITY

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ABSTRACT

It is a common practice to prune the tree branches to improve wood quality thus leaves are easily available as by product from pruning and also from wood harvesting. In the present study, waste teak leaves (*Tectona grandis linn.*) were utilized for the extraction of dye. The conditions of application of extracted dye have been optimized on wool, silk and nylon fabrics. In the present study, the characterization of the inorganic component of teak leaf was done in terms of moisture and ash content. Extraction of dye was carried out in aqueous medium at acidic, neutral and alkaline pH. The extracted dye was also characterized in terms of yield%. Dyeing was carried out using pre-mordanting method followed by post-mordanting with 10% (owf) of ten selected mordants. The dyed samples were analysed for their colour values in terms of K/S and L*c*h*/L*a*b* values and were assessed for their fastness properties such as wash, rub, light and perspiration fastness as per the ISO and ASTM standards. Various combinations of the mordants result in obtaining pleasing and harmonious colours which were used to create designs using mordanting and printing with extracted dye. A design catalogue of combinations of dyed and printed stoles and dupattas of silk were prepared and from this catalogue some designs were chosen for development of some prototypes.

Keywords:- Ecofriendly Dyeing, Teak leaves, Sustainability

INTRODUCTION

Growing consciousness about organic value of sustainable products has generated renewed interest of consumers towards using textiles dyed with eco-friendly dyes. Waste utilization has become an effective way for the promotion of sustainable technologies and processing methods.

Teak is a valuable tropical timber species produced in industrial plantation in more than 43 countries. National and international demand for teak timber exceeds the sustainable yield from plantations. In India about 2,76,000 hectare area is involved in the cultivation of Teak trees and every year around 400 million of trees are being cut for the wood to be used for furniture and the leaves get wasted. These waste leaves can be used in various ways and we can get wealth from waste material. Flavonoids in teak leaves are responsible for its medicinal properties such as antibacterial, antioxidant, cytotoxic, antifungal, hypoglycemic, anti-inflammatory, diuretic, anti-asthmatic, anti-bronchitis, analgesic, anti-pyretic, anti-diabetic, anthelmintic and many more (Aradhana, 2010).

Dye can be extracted from waste teak leaves and the residual portion can be used as bio-fertilizers. These dyes are eco-friendly and have no allergic action on skin like synthetic dyes. More over the procedure is very cost effective and can be a good idea for a small scale industry or a medium scale industry.

Natural dyes are similar to disperse dye in terms of relatively low molecular mass, low solubility and no strong solubilizing groups (Richardson, 2016). The literature review showed a similar structure of teak

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leaves and that there is a possibility of extraction of colour from teak leaves but not much work has been done on its application on synthetic textile material. The antimicrobial of the dyed fabrics have also not been assessed so far. The focus of recent researches is also on finding ways of making the processing as sustainable as possible.

The present study is an attempt to optimize the procedure of extraction of dye and apply it on selected natural and synthetic textile substrates viz. wool, silk and nylon. The effect of various natural and synthetic mordants was studied on the colour uptake and the fastness properties.

With the knowledge that certain natural products, along with colour can give simultaneous desirable properties such as antimicrobial resistance on selected substrates, this aspect was also be studied.

Therefore the study was envisaged with the following objectives.

1. To extract the dye colourant from Teak leaves using different mediums
 - Aqueous- Alkaline, Neutral and Acidic
 - Organic- n-Hexane
2. To characterize the dye in terms of:
 - Yield %
 - Ash content and moisture content
3. To standardize the conditions of application of dye extracted from Teak leaves on selected natural and synthetic fabrics.
4. To standardize the conditions for application of selected natural and chemical mordants using pre mordanting method and then dyeing followed by post mordanting with same mordant.
5. To assess the colour value (K/S, L*, c*/ h*, a*, b*) and fastness properties of the dyed samples in terms of wash, rub, light and perspiration fastness.
6. To develop dyed and printed designs using combinations of mordant and extracted dye.
7. To develop range of eco-friendly dyed and printed stoles and dupattas of silk.
8. To study the antimicrobial properties of the dye and selected dyed samples against gram positive (* staphylococcus aureus*) and gram negative bacteria (* Escherichia coli*)

METHODOLOGY

EXTRACTION OF DYE

Teak leaves were dried in oven at 105°C for 1 hour. 25 gm of oven dried leaves were then crushed to the least possible form and then added to 500 ml of distilled water in a beaker pH was maintained at 7 (for neutral extraction), 4 using acetic acid (for acidic extraction) and 9 using sodium carbonate (for alkaline extraction). The extraction was done at 100°C for 1 hour. The water was replenished throughout the extraction process to maintain at 500 ml.

The extracted dye was filtered through nylon mesh and then it was strained through nylon cloth in order to remove any suspended particles.

Characterisation of the Inorganic Component of Teak Leaves

For the characterization of the dye, the following parameters were tested using ASTM and TAPPI standards.

a) Estimation of Colour Yield

The colour yield was estimated on the basis of dry weight as:

$$\text{Yield (\%)} = \frac{\text{Weight of extract (grams)}}{\text{Weight of dried leaves (grams)}} \times 100$$

b) Moisture Content

Moisture content of raw material was determined according to ASTM D 629-99. The percentage moisture content was calculated as given below:

$$\text{MC} = \frac{w - d}{w} \times 100$$

Where,

w = weight of raw material in moisture equilibrium state at 20°C and 65% relative humidity

d = Weight of raw material dried at 105°C for 1 hour

c) Ash Content

TAPPI Standard T-211 m-58 was used for the determination of ash content. Ash content was calculated as follows:

$$\% \text{ Ash} = \frac{(A - B)}{W} \times 100$$

Where,

A = Weight of crucible after ashing

B = Weight of empty crucible

W = Initial weight of the sample

DYEING OF SILK, WOOL AND NYLON WITH EXTRACTED DYE

The dyeing of silk, wool and nylon was done using dye extracted in all the 4 mediums-aqueous (neutral, acidic and alkaline), and n-hexane. Dye extracted using n-hexane did not show adequate colours on the three substrates therefore only aqueous extracts were chosen for further experiments. The dyeing was carried out under acidic (pH 4) neutral (pH 7) and alkaline (pH 9) conditions. Fabric pieces measuring 10"x10" were cut. The required MLR (1:80 for silk and 1:30 for wool and nylon) was taken. 100% dye concentration was taken on v/v bases. Dye liquor was stirred well. The pre-soaked samples were added. After dyeing, the samples were removed, rinsed in running water, soaped in Lissapol N, rinsed again and dried.

EFFECT OF MORDANTING METHODS ON DYEING OF SILK, WOOL AND NYLON – PREMORDANTING FOLLOWED BY POST MORDANTING

Natural and chemical mordants used:

- Alum
- *Harda*
- Eucalyptus leaves
- *Supari*
- Iron filings and jaggery
- Pomegranate
- Tamarind
- *Amla*

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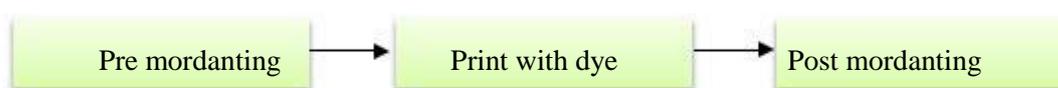
- Copper sulphate
- Ferrous sulphate

Pre-mordanting with the above mentioned mordants was carried out for the three substrates. Mordant at 10% owf and MLR 1:80 (for silk and nylon) and 1:30 (for wool) was taken and pre-soaked fabric sample was added. Mordanting was done at 100°C (for wool and nylon) and 80°C (for silk) for 20 minutes. Pre-mordanted samples were later dyed with the dye extracted in aqueous mediums- alkaline (pH 9), neutral (pH 7) and acidic (pH 5) followed by post mordanting with the same mordant. After 20 minutes samples were removed, soaped at 50°C for 20 minutes with 0.5 g/l Lissapol N to remove the unfixed dye, and dried at room temperature.

COLOUR MEASUREMENT AND FASTNESS PROPERTIES

The colour yield (K/S) values with selected mordants were calculated from reflectance measurements using the Kubelka-Munk equation. Colour fastness properties of dyed samples with mordant were evaluated using standard procedures. Wash Fastness of all samples was evaluated using a laundrometer as per the ISO-2 specifications. Light fastness of the dyed samples was determined using the MBTF Light Fastness Tester. For perspiration fastness ISO-2 standards using perspirometer was followed. Fastness to rubbing of the dyed samples was determined by using a Crockmeter.

The process followed to prepare the printed designs was as follows:



After application of the mordant by exhaust method, the dye was printed followed by steaming for fixation

RESULTS AND DISCUSSION

The present study was carried out to systematically explore the feasibility of dyeing silk, wool and nylon with teak leaves. The aim of the study was to extract the dye in different mediums and dye the fabrics with the extracted dye using selected natural and synthetic mordants. The dyed samples were assessed for colour value and fastness to washing, perspiration, rubbing and light. The antimicrobial properties of the selected dyed fabrics were also evaluated.

EXTRACTION OF DYE

Dye was extracted from the waste Teak leaves in aqueous medium at varying pH (5, 7 and 9) and in n-hexane. Non-sticky dye residue was obtained on removal of the solvent. Yield % of the dye obtained was determined and results are presented in Table 1

Table 1: Yield% of Dye Residue Obtained from Teak Leaves by Extraction in Various Extraction Mediums

Medium of Extraction	Yield %
Aqueous, pH 5	31%
Aqueous, pH 7	28%
Aqueous, pH 9	40%
n-Hexane	1.6%

CHARACTERISATION OF THE INORGANIC COMPONENT OF TEAK LEAVES

- a) **MOISTURE CONTENT**- The leaves were air dried at room temperature and their initial weight was taken. The leaves were oven dried and weight was taken again to calculate the moisture content according to the standard procedure. The moisture content for the teak leaves was found to be 70%.
- b) **ASH CONTENT**- The ash content for the teak leaves was found to be 8.2%.

STANDARDISATION OF DYEING METHOD

Dyeing of wool, silk and nylon was carried out with aqueous mediums only for the final sample preparation using acidic, neutral and alkaline extracts. M.L.R. was maintained at 1:30 for wool and 1:80 for silk and nylon. Dyeing was carried out on v/v basis. Temperature of dyeing for wool and nylon was kept at 100°C while for silk it was 80°C.

EFFECT OF PH OF EXTRACTION ON COLOUR VALUE OF UNMORDANTED FABRICS DYED USING TEAK LEAVES

Wool, silk and nylon were dyed with the dye extracted in aqueous medium at different pH. The colour value and L*, a*,b* values were measured for the dyed samples. **Table 2** shows the results for unmordanted dyed wool, silk and nylon.

It was observed that a range of colours i.e. from pinks to purples to browns could be obtained on unmordanted samples.

It was noted that maximum K/S value was obtained when the unmordanted fabrics were dyed with the dye extracted at pH 5 (acidic) and minimum K/S value is obtained when the unmordanted fabrics were dyed with the dye extracted at pH 7 (neutral).

It was also observed that L* value of the fabric decreased with the decrease in pH of the extract thus indicating that the samples became darker in colour. At the same time, a* value increased with the decrease in pH, thus supporting the fact that the samples became redder. Maximum c* value of the samples dyed with the dye extracted at pH 5 and minimum value of the samples dyed with the dye extracted at pH 9 showed that the fabrics became brighter as the pH of extraction moved from alkaline (9) to acidic (5). Lower b* value of the sample dyed with dye extracted in alkaline medium (pH 9) and neutral medium (pH 7) signifies that the sample hues were more towards blue.

Table 2: K/S and L* a* b* values of Unmordanted Dyed Textile Substrates

Fabric	pH of Extraction	K/S	L*	a*	b*	c*	h*	Sample
Wool	5	4.161	47.70	14.01	9.85	17.13	35.10	
	7	2.793	48.24	11.88	2.73	12.19	12.94	
	9	2.654	51.16	8.14	3.49	8.86	23.21	
Silk	5	2.831	56.67	11.11	14.91	18.59	53.29	
	7	1.938	59.32	10.09	2.13	10.31	11.93	
	9	1.668	60.90	9.93	2.05	10.14	11.64	
Nylon	5	1.773	25.31	20.36	26.13	33.12	52.06	
	7	2.30	21.40	16.44	03.34	16.78	348.51	
	9	1.410	32.85	12.26	1.57	12.36	352.72	

STANDARDIZATION OF PARAMETERS FOR APPLICATION OF SELECTED MORDANTS

In order to obtain variety of shades and to study the effect of mordants, pre and post mordanting was done with mordants such as alum, *harda*, eucalyptus leaves, *supari*, pomegranate peel, *amla*, tamarind, iron filings with jaggery, ferrous sulphate and copper sulphate. In the premordanting method, mordant application was followed by dyeing with the dye extracted in different pH. Dyeing was followed by a post mordanting treatment with the same mordant (Table 3).

ASSESSMENT OF COLOUR FASTNESS PROPERTIES OF DYED SAMPLES

Unmordanted and mordanted wool, silk and nylon fabrics were dyed with aqueous dye extract obtained at neutral, acidic and alkaline pH. These samples were evaluated for their colour fastness properties in terms of light, wash, perspiration and crock/ rub fastness.

a) Light Fastness

The unmordanted dyed wool and silk had shown light fastness readings in the range of 3/4 - 4/5 which is moderate to good light fastness and for nylon was in the range of 4-8 which is good to excellent. When fabrics were post mordanted after dyeing, the light fastness was found to be improved. This could be because of the complex formation between the mordant and dye which results in the improvement of light fastness. This trend though was not seen for all mordants. When the fabrics are mordanted with *supari*, their light fastness seemed to be reduced. Nylon showed excellent light fastness rating of 7-8 but with some mordants such as *amla* and *supari*, its light fastness reduced slightly.

b) Wash Fastness

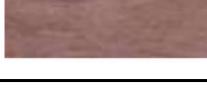
Wash fastness of all the samples was evaluated according to the ISO-2 test method. The samples were qualitatively rated using the standardized grey scale for assessing change in colour and staining.

The result obtained for unmordanted dyed samples showed good to excellent wash fastness for wool, silk and nylon dyed with acidic extract, moderate to very good wash fastness when dyed with aqueous alkaline and neutral extracts.

All samples showed excellent wash fastness rating for staining on white fabric. Even though there was some change in colour from the original samples but the dye which comes out does not seem to be staining the adjacent fabric.

Table 3: Mordanted Dyed Textile Substrates

Mordant	pH of Extraction	Silk	Wool	Nylon
Alum	5			
	7			
	9			
<i>Harda</i>	5			
	7			
	9			
<i>Amla</i>	5			
	7			
	9			
Iron filings with Jaggery	5			
	7			

	9			
<i>Supari</i>	5			
	7			
	9			
Eucalyptus leaves	5			
	7			
	9			
Pomegranate peel	5			
	7			
	9			
Ferrous Sulphate	5			
	7			
	9			
	5			

Copper Sulphate	7			
	9			
Tamarind	5			
	7			
	9			

c) Perspiration Fastness

The dyed samples were tested for their perspiration fastness according to BS 1006. The samples were assessed using the standardized grey scale for change in colour and staining.

It was observed that the unmordanted wool, silk and nylon dyed with acidic extract showed very good perspiration fastness with both acidic and alkaline perspiration solutions while the ones that were dyed with alkaline and neutral extract show fair to good perspiration fastness. Perspiration fastness of samples mordanted with *amla*, tamarind, pomegranate peel, *harda*, iron fillings with jaggery showed very good perspiration fastness but the samples mordanted with alum, *supari*, copper sulphate, ferrous sulphate and eucalyptus leaves showed slightly reduced fastness to perspiration.

d) Fastness to Rubbing

The rub fastness of unmordanted dyed samples and mordanted dyed samples was tested under dry and wet conditions. In both the cases, most of the samples showed good to excellent fastness results and the ratings were between 4/5 to 5. Results were better for dry rub fastness as compared to wet fastness. Both unmordanted dyed as well as mordanted dyed samples showed excellent dry and wet crock fastness for both colour change and staining.

ASSESSMENT OF ANTIMICROBIAL ACTIVITY

Samples were qualitatively assessed for their antimicrobial activity against gram negative bacteria, *E.coli* and gram positive bacteria, *S.aureus*. The extracted dye samples (in powder form) were assessed by disc diffusion method and the dyed samples were assessed by parallel streak method.

Different concentrations of extracted dye were taken viz. 1%, 5% and 10% v/v. There was a complete lack of bacterial growth observed underneath the disk in both *E.coli* and *S.aureus* whereas bacterial

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growth was observed around the disc wherever bacteria was applied [**Plate I, Figure a, b, c and d**]. This, indicated that the dye extracted was bactericidal and not bacteriostatic.

The qualitative assessment of the antimicrobial activity against gram negative (*E.coli*) [**Plate II, Figure a, b, c, and d**] and gram positive (*S.aureus*) [**Plate III, Figure a, b, c, and d**] showed restricted bacterial growth on unmordanted dyed fabric surface as compared to control sample. Whereas, mordanted dyed wool samples showed excellent antimicrobial property against gram negative bacteria (*E.coli*) but there was little microbial growth on the surface of mordanted dyed wool samples in the presence of gram positive bacteria (*S.aureus*).

The results for antimicrobial activity against gram negative (*E.coli*) [**Plate IV, Figure a, b, c, and d**] and gram positive (*S.aureus*) [**Plate V, Figure a, b, c and d**] bacteria for unmordanted dyed and mordanted dyed silk fabric were further assessed. There was some bacterial growth of gram positive as well as gram negative bacteria underneath the unmordanted dyed samples whereas, mordanted samples showed complete lack of growth against both gram positive and gram negative bacteria.

Therefore selected mordants in combination with the dye seemed to further improve the antibacterial activity as hardly any bacterial growth was seen in these samples for silk and wool. The results were slightly better for silk though.

COMBINATION OF DYEING AND PRINTING WITH EXTRACTED DYE AND SELECTED MORDANTS

Different combinations of mordants were tried for printing. Samples were pre mordanted using exhaust method, printed with the extracted dye followed by post mordanting by exhaust method.

Table 4 gives the range of shades and prints obtained for various combinations. The samples were washed using ISO-II method and the ratings for both change in colour and staining on white have also been presented in Table 4.

The catalogue of designs prepared is seen as **Plate VI**.

Table 4: Combinations of Dyeing and Printing with Selected Mordants and Extracted Dye

Mordant	Wash Fastness			Samples
	CC	SC	SS	
<i>Harda</i>	4	5	5	
Pomegranate peel	4	5	5	
Tamarind	5	5	5	
Copper sulphate	5	5	5	
Ferrous sulphate	4/5	5	5	
<i>Supari</i>	4/5	5	5	

QUALITATIVE ASSESSMENT OF ANTIMICROBIAL ACTIVITY OF DYE
EXTRACTED TEAK LEAVES IN NEUTRAL MEDIUM (pH 7)

Gram negative bacteria (*E.coli*)



Figure (a): Control

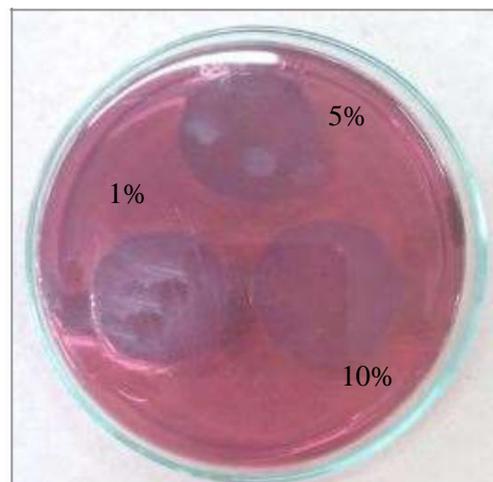


Figure b: 1%, 5% and 10%

Gram positive bacteria (*S.aureus*)



Figure (c): Control

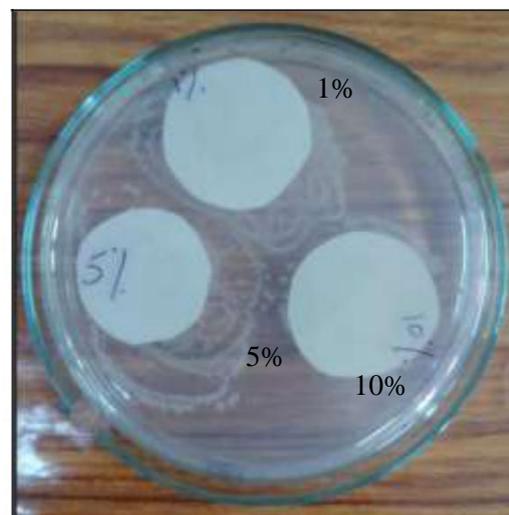


Figure (d): 1%, 5% and 10% dye

QUALITATIVE ASSESSMENT OF ANTIMICROBIAL ACTIVITY OF UNMORDANTED DYED AND MORDANTED DYED WOOL FABRICS DYED WITH THE DYE EXTRACTED FROM TEAK LEAVES IN NEUTRAL MEDIUM (pH 7)

Gram negative bacteria (*E.coli*)



Figure (a): Control



Figure (b): Unmordanted Dyed Wool fabric



Figure (c): Iron Filings with Jaggery

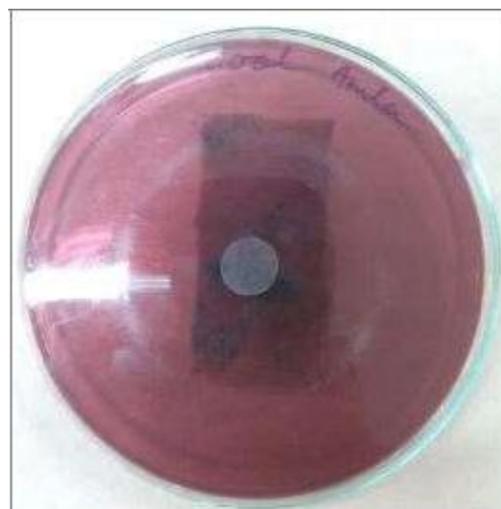


Figure (d): Amla

QUALITATIVE ASSESSMENT OF ANTIMICROBIAL ACTIVITY OF UNMORDANTED DYED AND MORDANTED DYED WOOL FABRICS DYED WITH THE DYE EXTRACTED FROM TEAK LEAVES IN NEUTRAL MEDIUM (pH 7)

Gram positive bacteria (*S.aureus*)



Figure (a): Control

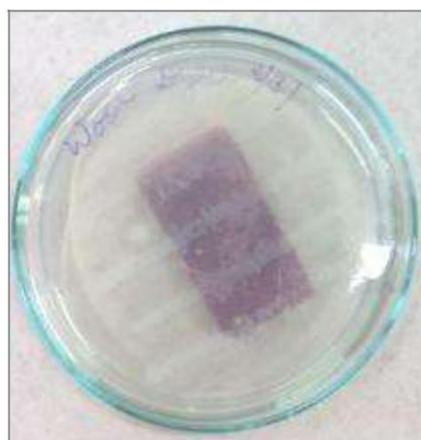


Figure (b): Unmordanted Dyed Wool fabric

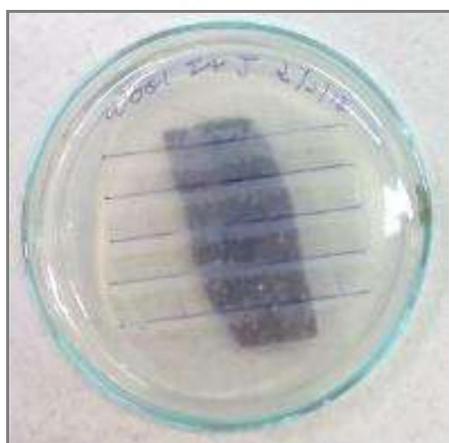


Figure (c): Iron Filings with Jaggery

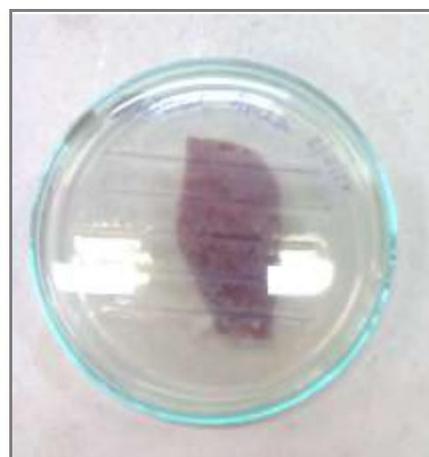


Figure (d): Amla

QUALITATIVE ASSESSMENT OF ANTIMICROBIAL ACTIVITY OF UNMORDANTED DYED ANDMORDANTED DYED SILK FABRICS DYED WITH THE DYE EXTRACTED FROM TEAK LEAVES IN NEUTRALMEDIUM (pH 7)

Gram negative bacteria (*E.coli*)



Figure (a): Control



Figure (b): Unmordanted Dyed Silk fabric

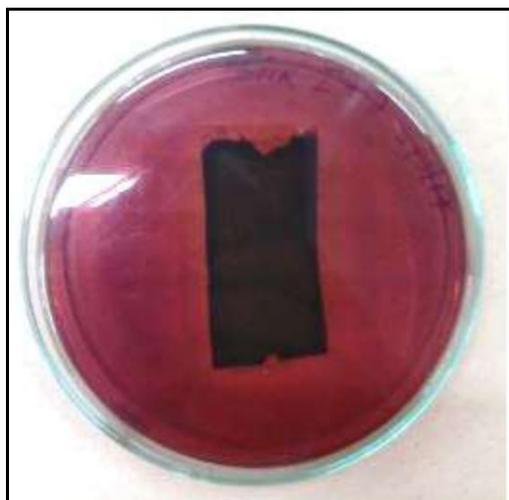


Figure (c): Iron Filing with Jaggery

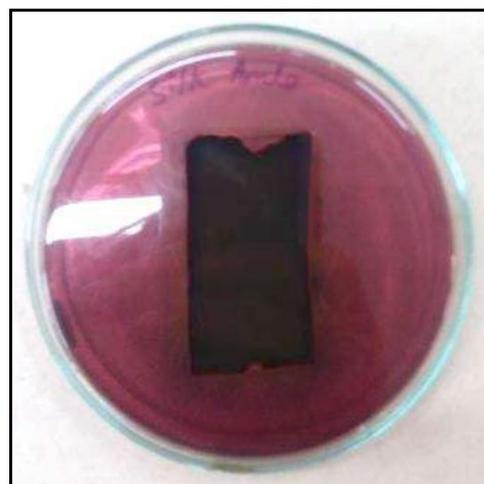


Figure (d): Amla

QUALITATIVE ASSESSMENT OF ANTIMICROBIAL ACTIVITY OF UNMORDANTED DYED AND MORDANTED DYED SILK FABRICS DYED WITH THE DYE EXTRACTED FROM TEAK LEAVES IN NEUTRAL MEDIUM (pH 7)

Gram positive bacteria (*S. aureus*)



Figure (a): Control



Figure (b): Unmordanted Dyed Silk fabric

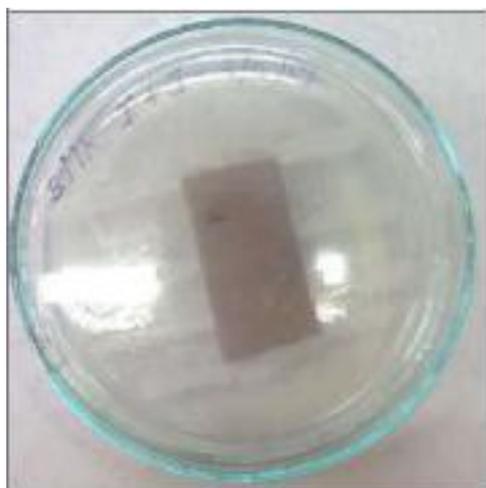


Figure (c): Iron Filing with Jaggery

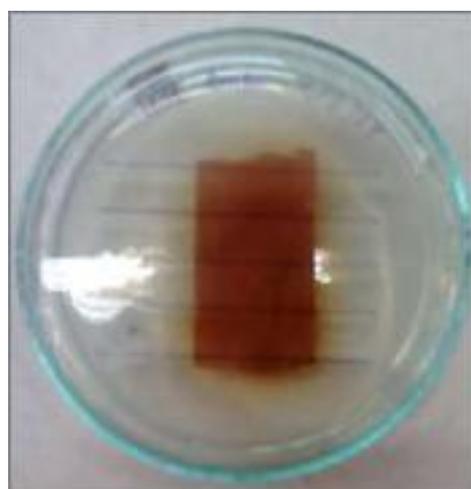


Figure (d): Amla

CATALOGUE SHOWING DYED AND PRINTED STOLES AND DUPATTAS OF SILK



CONCLUSIONS

The findings of the study show that waste Teak leaves can be used as an effective dye for natural as well as synthetic fabrics giving a wide range of colours on wool, silk and nylon. The maximum relative colour strength of the extracted dye on unmordanted dyed samples was found to be at pH 5 on wool and silk and at pH 7 on nylon. A range of shades was obtained with the use of different mordants. The extracted dye showed moderate to good fastness properties in terms of light, wash, rub and perspiration on wool and silk and excellent on nylon. Fastness properties were found to improve with the application of mordants both as pre and post method. Results of the study also revealed that the extracted dye possesses excellent antimicrobial properties. Dyeing using Teak leaves is a step towards sustainability and effective waste utilisation with promising potential for application on natural as well as synthetic fabrics. Good colour with added antimicrobial properties will provide excellent solutions for eco-friendly methods of dyeing.

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COMMUNITY CORRESPONDENTS AND MICRO-LEVEL SHIFTS: A STUDY OF VIDEO VOLUNTEERS' INITIATIVE

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ABSTRACT

Community communications seek to bridge the gap between the scientific knowledge of the experts and traditional knowledge of the people about a specific issue. The audiences are not merely the consumers of media; they also have the opportunity to partake in the production process. In this regard, ICTs have immense potential to amplify the voice of the poor. Similarly, Video Volunteers emphasizes on increasing capacities by making people agents of their own development. Further, it uses community media processes, which enable faces from within the community to reflect their collective perspectives, increasing the relative connection of the viewers with the issue of concern, at least at a micro level. At a macro level, however, self-sufficiency of an intervention is determined in terms of its sustainability, which depends on financial, social and institutional viabilities. This purpose of this paper is to understand how Video Volunteers is raising issues of marginalized groups and snowball processes of change in communities.

Keywords:- Community, Correspondents, Video Volunteers, Micro level shifts

INTRODUCTION

Communication processes are fundamental in enabling people change the societies they live in, specifically communication strategies which not only inform but also amplify the voices of those with most at stake and address the structural impediments to achieve larger developmental goals (UNDP, 2006). Dagon (2009) notes that change happens when marginalized people take communication processes into their own hands and make their voices heard, establish horizontal dialogues and take decisions on development issues that affect their lives and for the benefit of their community. This type of participatory approach to communication gives voice to different stakeholders within a community to negotiate complex problems, where no single party can have a solution that works for all (Figueroa, Kincaid, et al., 2002).

Fairbairn (2009) notes 'participation is the defining feature of community media; it is what places community media outside of traditional media models in which audiences are passive receivers of messages. In the community media model, senders and receivers are together engaged in creating messages and meaning. Through participation, media are demystified and communities develop valuable communications skills and media literacy skills and understandings' (p. 10). Moreover, community media aids in capacity building of, and knowledge sharing amongst the people, especially those living in backward regions. This provides an equal opportunity to all, and enables them to exert power and control over their surrounding environment, and discover what is best for them, thereby, contributing to the process of empowerment. Thus, through its processes, it enhances the experience and

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competence of communities, their structure and capacity, removes socio-environmental barriers prevailing within them, and strengthens environmental support and resource availabilities (Melkote & Steeves, 2015). By providing a platform that counters caste and class dynamics, gender differentials and other social inequities, community media instills greater confidence in people to challenge local power structures whilst voicing their issues (Rodriguez, 2001).

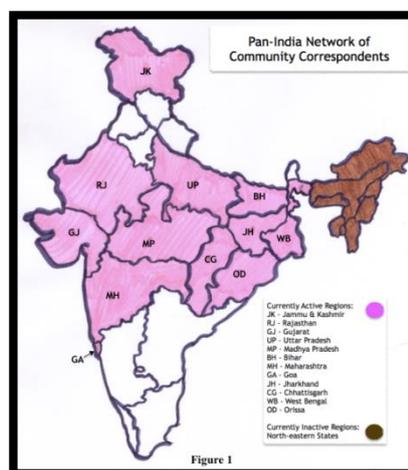
Further, Bebbington (1999) argues, “assets are not simply resources that people use in building livelihoods, they are assets that give them the capability to be and act.” Harris (2008) supports the statement portraying the interdependence of community with its dynamic environment as the members within in use media for development. In a way, this instigates the trust within the displaced community as video inspires and persuades people to take collective action and enable responsive governance.

Media has a pivotal role in nation building and increasing social cohesion; the mainstream media fail to achieve the two goals. Revenue generation becomes its ultimate goal, therefore neglecting the issues of the poor who constitute the majority of the world’s population. On the contrary, community media revolves around the element of social capital, which consists of a framework within which social networks as well as participative action can be discussed and a link to local norms and practices can be offered. Rural women use their relationships and social network as key element in video production for bringing community needs and linkages into limelight (Crocker, 2003), thereby enabling community mobilization. In a globalizing world of multiple complexities, community media serves as a forum of the people to share their cultural expressions and views, and their shared identities to the outside world.

Video Volunteers

‘Video Volunteers’ is a non-profit human rights organization working with community video as a tool to empower communities and give voice to the voiceless. The essence of the success of any development intervention comes from people’s participation at all stages, significant in achieving one’s identity, chart their life course, experience freedom and reach human potentials with dignity and respect. Participatory video is one such medium where we also get to look at an issue from local people’s perspective. Thus, realizing the value of video as a tool for empowerment and knowledge development, the present study would majorly content analyze the videos (including impact videos) produced by the Video Volunteers in terms of the priority and importance given to different development concerns and the urgency to resolve the same.

Video Volunteers produces two major types of videos – primary issue videos i.e. videos that are made when a problem is perceived by the community correspondent native to the community, and their impact videos i.e. videos that describe the change brought about in the community with the help of the correspondents. However, for the present study, a representative sample of community impact videos has been assessed through a content analysis framework because primary issue videos



are essential to the production of impact videos, constituting the process depicted in them, along with other advocacy activities.

METHODOLOGY

The present qualitative research aimed to study the role of community videos, produced by the local producers of Video Volunteers, as a tool for change, and gain insights about the scope of community video for bringing the community together for advocating certain issues. The study endeavored to understand how the community correspondents, especially women, use video as means for community mobilization, hence triggering change for the development of their community.

It sought to understand the microcosm of VVs program i.e. the Community Correspondents (CCs), and understand their work and perceptions about their activities with VV. The study strived to map the change at the grass roots brought about through VV processes, gain holistic insights about aspects contributing to change and understand the centrality of VV processes to micro level changes in the community.

A sample of seventy impact videos produced in the last three years in Hindi or English were selected (uploaded on VV's website) and their content was analyzed. This sample only included the impact videos as they document the process of change of which primary issue videos, along with other advocacy activities are a part. A comprehensive framework was developed to comprehend the treatment of videos as an advocacy tool, and deduce the factors that lead to change. In-depth interviews were conducted with twenty-six CCs (equal number of women and men) who had produced at least two impact videos. Event-based sampling for the selection of CCs was done, and all CCs participating in a training program in New Delhi were selected. This enabled sampling of variation within the group of CCs i.e. set of individuals from diverse geographic regions, and with varied backgrounds and experiences, who were interviewed face-to-face and telephonically. Interviews were also conducted with key informants to supplement the data. Most Significant Change Technique (MSCT) was used and stories of change were collected from all twenty-six CCs to gain a holistic understanding. Analysis of stories to determine attributors of change was also done (Ichplani, 2017).

Profile of Community Correspondents

Although the annual reports do not consist of any gender disaggregated data, efforts are made by the organization to recruit equal number of females and males, as CCs. The production and field guide states that 50% of VV network comprises of women – both as local producers and staff. This is reiterated by the overall statistics of the Community Correspondents, 56% of whom were females while 43% were males. However, this equality has not been easy to accomplish as it requires significantly more time and resources but VV has never compromised with women's empowerment (Video Volunteers, 2015). Moreover, the organization does not hesitate to recruit transgender individuals as well. Table 1 shows socio-demographic profile – education level, marital status and occupation – of the sampled community correspondents.

Table 1: Socio-economic determinants of Community Correspondents (N=26)

Education				
Upto 10th pass	Upto 12th pass	Graduate	Post-graduate	
5 (19.2%)	1 (3.8%)	13 (50%)	7 (26.9%)	
Marital status				
Unmarried		Married	Divorced	
12 (46.1%)		13 (50%)	1 (3.8%)	
Occupation				
Unemployed	Agriculture/ Laborer	Social Work	Jobs	Others
8 (30.8%)	3 (11.5%)	9 (34.6%)	4 (15.4%)	2 (7.7%)

Majority of CCs (76.9%) were at least graduates, which implies they had attended college and some of them were still pursuing higher studies. However, VV also encourages the less educated individuals (23%) to join their network if they seem to have a desire to learn and serve their communities.

Half of the correspondents interviewed were married i.e. they had additional responsibilities of their families and they bear more costs in order balance their personal and professional lives. Following is an excerpt from story of Tanju Devi, a Community Correspondent from Champaran district of Bihar, where she talks about her family and the challenges they faced due to lack of money.

“I have one girl and a boy, and my husband is unemployed. My only source of livelihood are the incentives of VV. Food and clothing is somehow managed, but paying for the education of kids becomes really difficult at times. Then when the children do not find me home after school, they become upset as they want to spend time with me. I always tell them it is for their good that I work over time, and this is also something I love doing.”

Almost one-third (30.8%) of the CCs were unemployed i.e. they had no other job other than volunteer work with VV while 34.6% of the CCs were involved in activism/social work.

Capacity building of Community Correspondents

CCs are the fulcrum of IndiaUnheard program. Belonging to different socio-economic and cultural backgrounds, they are usually characterized by a deep sense of perseverance. CCs understand their community; this richly contributes to their comprehension of community issues, which enables them to innovate as they interact and negotiate with different stakeholders. Communication skills remain crucial to CCs work. Meeting new people, networking, mobilization, persuasion and cutting across power hierarchies and gender differentials require proficiency to communicate effectively.

“Trainings always encourage us all to speak our minds when we know we are right, and not see who is in front of us, whether it is a fellow villager or someone in police or a government official. Following this, I became confident enough to talk to the Block Officer, when the school was not functioning because of funding constraints by the government.”

Capacity building of CCs is a continuous and incremental process. Recruited individuals are exposed to an initial set of trainings that focus on basics of video production, journalism and

community mobilization. These trainings familiarize the correspondents about their various roles and about the concept of community media and video for social change. Capacities of CCs are built to identify deep-rooted issues, collect facts and evidences about them as well as negotiate and network with its stakeholders. CCs also learn about collaborations, especially with external media and social organizations for effective action. Skills required for various stages of video production are also imparted. Use of social media for carrying out their multiple tasks is one of the major components of training program. Technological proficiency of correspondents is central to the CCs work as they use various technologies like mobile phones/internet and their features for performing a range of tasks like shooting video clips, uploading photos and videos, sharing videos, messaging, creating WhatsApp groups, etc. Increasingly Social media has become a key medium of dissemination and awareness, used by CCs, for mobilization of stakeholders. VV trainings keep them up-to-date with the changing technological environment, enabling the CCs to work efficiently, quickly network with people and devote time and resources accordingly. Following is an excerpt from a CC who testifies the contribution of trainings in building his skills.

“Recent trainings have taught us to share our raw videos to VV through drop box that saves time. I have also started to use the built-in software in my mobile to edit the videos I shoot for screening it for the officials.”

Content Analysis of Impact Videos

Content analysis of the impact videos provided a broad understanding about the CCs work and emerging commonalities amongst their varied efforts. VV, in its program, has maintained a gender affirmative approach, encouraging women to come forward and take up the role of CCs. Correspondingly 70% of the impact videos sampled were produced by women CCs, while the rest 30% were made by male correspondents.

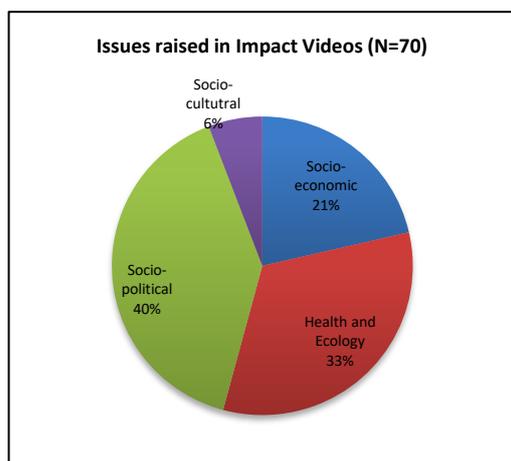


Fig. 1: Pie chart depicting issues raised in impact videos

Issues raised in impact videos: The videos were found to be raising several interconnected themes. Videos were analyzed for the central issue they raised and addressed. It was seen that socio-political issues (40%) related to poor physical infrastructure, corruption in government schemes, education and PDS system were the most prominent in the videos. Issues of health and ecology (32.8%) around diseases, malnutrition, toxicity due to pollution, hazards of environmental degradation and economic issues (21.4%) related to poverty, unemployment and wage inequalities were also covered in the videos. Interestingly, very few videos directly focused on socio-cultural issues (5.7%) like gender violence, caste, religious groups and other social inequities, however they were cross cutting in most others.

Apart from the theme of issue raised, the videos were seen to vary in the magnitude of the issue and the number of people affected by the problem. Videos were observed to be largely focusing on problems/issues of a specific group of people within a community (43%) or those that were affecting a specific geographical community or a village (39%). Few videos focused

upon problems affecting a specific individual (14%) or those that were widespread and affected several communities in a geographical region or a block (4%) i.e. a problem is affecting people inhabiting more than one village. Another emerging aspect related to the issues raised in the videos was their focus upon legal dimensions. Government laws or schemes; norms and regulations and their violations, Human Rights perspectives were inbuilt into the issues raised by the CCs in their videos.

Functions performed by people in videos. 257 people appear in the 70 videos that were analyzed. Thus on an average, 3 to 4 people appear in each video. More than half (53%) of the people that appear in the video are males, and (47%) females. The people in the videos were seen to perform a variety of functions. 41% of the people appear in impact videos provided popular opinion i.e. testimonials of the problem and the effects of the CCs video campaign. Over one-third (38%) of the people shared personal experiences, and were those directly affected by the problem. Few other people (14%) were spokespersons of government officials and village council members. 5% of people were experts like medical professionals who provide additional information on the issues addressed in videos, due to their credibility.

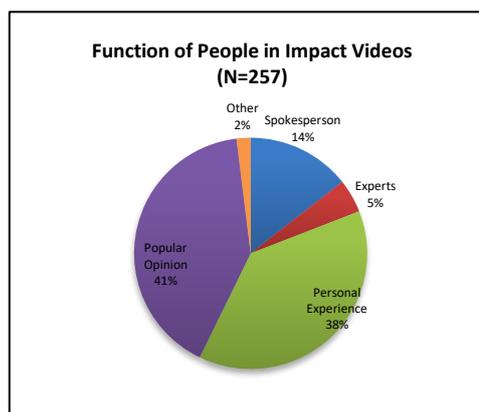


Fig. 2: Pie chart depicting function of people in impact videos

Catalysts for change: Impact videos documented the perceived catalysts that facilitated the processes of change in the communities. Interestingly, in many cases, the specific persons or groups, who were earlier a deterrent, or a negative factor later recorded a turnaround due to the efforts of the CC, and became positive influencers. Support of two groups - government officials and community members - was seen to be most crucial to the accomplishment of CCs' goal and a vital turning point in catalyzing change processes. Orienting government officials and obtaining their support and cooperation was an essential trigger in 84.2% cases while 20% impact videos showed their negative perspectives and activities deterring change, which were altered by the CCs efforts in some cases. Similarly, community members' support, of people from both lower and higher caste groups was vital for change processes in 74.2% cases while the community was a prominent negative factor in 27% impact videos and the CCs had to actively orient them to

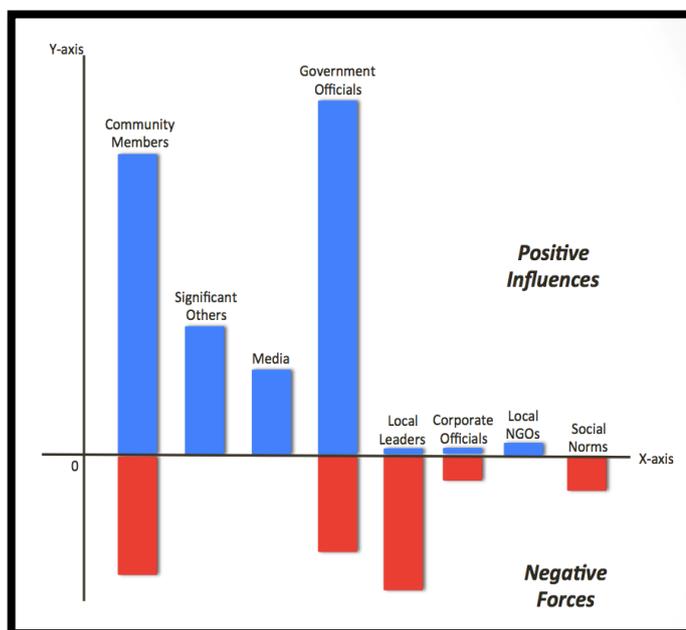


Fig. 3: Bar graph showing positive and negative forces in process of change

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the desired direction for sustained mobilization. Local leaders not from the government, such as religious leaders, frontline community workers, among other individual opinion makers from within the community were seen to be negative influencers (28.5%) who were difficult to convince and rarely supported the CCs (1.2%) in their endeavors. Other positive influencers emerging in the videos were local and mainstream media support (17.2%) and the support by significant persons and/or groups (27.2%), which had a positive effect, reinforcing the CC work to catalyze change processes in the communities.

Activities conducted by CCs: The impact videos documented the activities of Community Correspondents, which were essentially advocacy efforts, mainly focusing on two levels: the community, and the policy makers and government departments. Efforts at both levels were synergistic in mobilizing different stakeholders and triggering change in the community.

Amongst the community level advocacy activities, most commonly organized by the CCs were community meetings (68.5%) conducted to discuss the prevailing problems amongst the community at-large and bringing consensus to a desired plan of action and also screenings of primary videos (37.2%). Other activities like publishing of the story on local, mainstream media platform (18.6%), organizing protests and rallies for mass mobilization (5.7%) were activities some of the CCs used. Activities adopted for advocacy with Policy makers/government department mostly involved having meetings with government officials (87.2%) and writing formal letters (24%) to concerned persons. Petitions, filing FIRs to the police were also documented as reinforcing activities in 8.6% videos, while others (4.3%) included short film screenings for better sensitization for issue of concern amongst people. The community level effort helped the CCs center stage the issues and mobilize the community around them while advocacy efforts with people from government and other organizations help build pressure on them especially with increased community level awareness and support to the CCs.

Key aspects of change emerging from narratives

Mobilization of key stakeholders: Key stakeholders include the afflicted group of people, the community members and others known in position of power. In addition to screenings, building rapport with them and establishing formal and non-formal communications with them was a key aspect of the CC mobilization work.

Following is an excerpt by Sulochna, a 40-year old PhD Scholar at Goa University, also working as a CC, explaining how she found support to fight against the spread of piggery effluents.

“Although the issue of piggery was raised by one member of community living in its neighborhood, but I noticed a school in its vicinity. So I decided to approach the school headmistress and listen to her perspective. When I screened the issue video at school, I found that the problem of stinking in sewer had actually existed for the last 30 years, and it affected the school children when they walked to and from school. Hence, I was able to gather the support of the school management in addition to the local people.”

Local media involvement: Stories focused upon the CCs' use of the local media organization present in the area. The correspondents readily capitalized upon the glocalised features of the local media for garnering support, which was found to be a distinctive reinforcement in the change process. The merger of different media is only an effort to expose the issue on a

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relatively larger scale by reaching out to more groups, hence maximizing the support. Local media includes local TV channels, newspapers, radio, which provide their time and space to a story. However, involving local media did not always happen smoothly and requires a strong basis for the story.

Following is an excerpt from story of Sunita Kasera (Rajasthan), describing how she was able to use the platform of local media for giving due spotlight to the issues arising in her community.

“If people from outside my village get to know about an issue, it will help me gather more support. More often the issues that I raise through my videos are related to caste dynamics, which affect the whole of Rajasthan. That is why I make sure my stories are also published in Bedhadak, which is Karauli’s local press. My husband’s friend works in the press, so he helps me with the formalities. This way most of my stories get an extra attention. This is how one story could bring change in 400 villages of Rajasthan.”

Effective use of social media: Social media was seen to make successful in-roads in the lives of the rural people despite skepticism, with the correspondent steering them towards this change. The social media’s features of providing quick communications, a platform for discussion transcending geographical boundaries in no time, are often blended with the community media so that all its predominance is used for maneuvering the process towards the desired positive change.

Following is an excerpt from story of Abid Salaam War, a CC in Baramullah, Jammu & Kashmir, who shared how he was able to use social media to his advantage.

“We (all CCs in Kashmir) have made a separate page called ‘Kashmir Unheard’ on Facebook for greater awareness about issues that we raise. For my community, I also have a group on WhatsApp with all community members and the village head. It is only to keep the village head posted about what is happening in the community. This saves so much of my time to visit him regularly, and I can focus on meeting the key stakeholders of a problem.”

Visions and values: According to Rodriguez (2001), a key aspect of any community media intervention is its value system. Video Volunteers stands on the pillars of community ownership, sustainability and scalability. This impacts their decisions about the type of programs, funding, approaches, etc. The correspondents in their stories were seen to refer constantly to the value system that VV inculcated in their trainings to the CCs, and how much it all related to their lives and their work.

Following is an excerpt from the key informant interview with Ms. Jessica Mayberry, the founding director of Video Volunteers.

“Just because we engage in fundraising activities, or look at profit making crucial to our functioning, does not mean we have forgotten our primary objective of community development. We do have to think about sustaining our organization as well. Providing incentives to our correspondents is integral to the model we follow.”

Policies and provisions: The provisions Video Volunteers enabled a smoother functioning of the CCs. The organization provides financial and physical security to their correspondents, which the CCs also acknowledge. VV, in turn, realizes that CCs are key to their program; hence their policies and programs have been designed keeping in mind not only the communities’ context, but also their needs and interests and the correspondents’ safety.

Following is an excerpt from story of Amarjeet Kumar working in Rohitas district of Bihar, explained how VV was able to always ensure his safety and security.

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“While working to bring peace between caste groups, I was threatened by some dominant people. We call them ‘Dabangg Jaati’ here. VV never wanted me to keep my life in danger, so I was always in touch with Goa headquarters, and they would guide me how to tackle such death threats. In a way, I was fully secure as VV asked different organizations in my area to support me at the time of need, also pressurizing the authorities for my safety. The issue was resolved, and there was no single casualty.”

Ownership over media: Being the most backward regions, issues concerning people of those communities are not given a space in the mainstream media. However, on behalf of the community, CCs take upon the onus to raise the issues that concern them the most. Along with the community, the CCs then discern what issues ought to be reported through the community-owned media. They exercise their right to use video to represent the problems in the way the community perceives it.

Following is an excerpt from Devidas’ story, working in Goa, shared how he has started to understand how it feels to own media.

“The mainstream media often puts its own perspectives and angles into a simple story, only to sensationalize the news. With Video Volunteers providing the valuable platform to us to own and for broadcasting the real news to the world, I feel I now have the chance to be the reporter I was supposed to be.”

Collective efficacy: Working closely with the correspondents and being involved in a number of redressal processes, the community members feel confident in their ability to address their own issues without the guidance of the correspondent. This is perceived as the ultimate goal by the CCs in the larger context of development.

Following is an excerpt from the story of Sanjay Kumar, a Community Correspondent from Uttar Pradesh, which points out the self-reliance of the community.

“I was working on an issue when something came up with the job cards for NREGA. Due to urgency, the community members asked me what they could do. They wrote a letter, and met the block officer without me. Now I know they are easily able to deal with simple problems themselves, which makes me happy and proud of them.”

DISCUSSION

World Health Organization (2017) defines community empowerment as enabling the members of the communities to have an increased control over their lives. Empowerment can be documented at two levels: Self and Community. The stories portray the empowerment of community correspondents, as explained in context of Rowlands (1997) empowerment framework: (a) *Power to* i.e. Video Volunteers provide the correspondents with communication and technical skills required to lead the community to change; (b) *Power over* i.e. Video Volunteers direct the correspondents to responsible journalism and provide them with a control over the issues raised through the video; (c) *Power within* i.e. Intrinsic motivation to learn new things of the individuals is an important factor for the perseverance in the process of change; and (d) *Power with* i.e. Community members and Community Correspondents are made aware of their right to collectively hold the government accountable for the problems that they face. Therefore, they are able to negotiate with those in power and persuade them to take the needful action.

Video Volunteers, by involving local correspondents, opens up a window for the

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marginalized populations to uplift their status. When they assist the correspondents, they are able to gain insights into the process of video production, which serves as the first-level empowerment for these individuals. The mobilization of the community after the screenings are held gives rise to the collective action, which is a significant form of empowerment.

Video Volunteers promotes the participation of local people in its processes. The key agents of change still remain its Community Correspondents, but the community mobilization is what their goal is. Moreover, the association of the rural poor with VV has been evolving gradually, by transforming from participation for material incentives i.e. initially, they desired to work with the organization for a source of livelihood, to self-mobilization i.e. their intrinsic motivation to work for the community development. Involving them to raise the issues those concern them the most is the kind of participation it expects out of those people. It provides a platform for the poor to raise their voices in a world where mainstream, commercial media remains silent as far as bringing their issues out in the open is concerned. This not only enables these populations to voice their stories but also present them through their perspectives, hence maintaining the objectivity of reporting.

However, community video used by Video Volunteers as a technological intervention was only able to make an impact when complemented with the participation of people. This lies in congruence with Toyama (2011) where he emphasizes the role of technology as an amplifier. In this study, frequent use of social media in the process of change has been able to amplify what already existed i.e. the capacity and intent of the people to act. Also, Video Volunteers could address the mechanism of amplification – *differential access, differential capacities and differential motivation* – as it not only increases poor people's access and ownership over technology but builds their capacity to utilize it to their needs, enhancing their competencies and perceived self-efficacy.

Dagron (2001) points out three heads of sustainability i.e. Financial, Social and Institutional. Framing the sustainability of the Video Volunteers initiative under the three heads would help examine a clear account of its contribution to the welfare of the marginalized communities.

The active, voluntary participation of Community Correspondents in the process of change is retained by the livelihood opportunities provided to them by the Video Volunteers, and also the recognition that their community gives them in return for their contribution to the community welfare. But incentivization requires consistent funding without compromising the needs and interests of the community. Autonomy of Video Volunteers has still not diminished in terms of the intended objectives it had set during its conception, but have been flexible to adapt them according to the community context. Still, the organization has not yet received community support in monetary forms for investing in the hardware component of the intervention. Further, at a macro-level, there are still some challenges that the organization continues to face in maintaining its *financial sustainability* as it depends on its funders and donors.

Also depicted is the multiplicity of approaches, which enables the correspondents to garner support from the major stakeholders of the problem while the various community processes those the CCs partake in while mobilizing the community to not only engage in constant dialogue but also in decision-making. In this context, *social sustainability* implies owning the media and controlling the coverage of its content i.e. communicating their problems keeping

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in mind their own socio-cultural context, thereby contributing to the democratization of communication, which remains the core aspect of Video Volunteers. Production of news reports in their ethnic language is another contributing factor.

Video Volunteers as a participatory video organization has been a successful community media intervention due to its provisions and policies, which enables the Community Correspondents to work smoothly, whilst exercising control over the issues raised, and giving them space to work in accordance with their personal circumstances and community dynamics. Video Volunteers also converges with other media and social organizations to capitalize on their expertise. Still, the conceptualization of the training programs is a top-down approach with the community having little to no say at the planning stage and the correspondents do not possess complete editorial control, hence they depend on the core team to make decisions during post-production of videos. This puts *institutional sustainability* in question.

Thus, participation is not only the end but also an integral component for any horizontal, democratic communication process. It is through participation that collective voices are strengthened. This is why sustainable community media experiences depend on the internal democracy of communities.

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ORGANIC FOOD PREFERENCES IN BUYING BEHAVIOUR OF WOMEN CONSUMERS OF URBAN, BHOPAL

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ABSTRACT

Women play a pivotal role in the decision making process of organizations and within the family. Indian culture bestows on women the role of care taker of the family. Women are increasingly moving out of their homes and into the work environment. A greater number of women are also entering the workforce of restricted industries. Thus women play the dual role of housewives and working women. The role conflict and dual role of working women has resulted stress, tension, anxiety, obesity, etc and consequently, working women are facing frequent ill health, both psychological and physical. Food safety, human health and environmental concern along with sensory attributes such as nutritive value, taste, freshness and appearance influence organic food consumer preferences. Premium price continues to suppress organic food consumption. Understanding the grounds of increasing level of organic food consumption such as motivation are most critical in understanding the potential of the organic food to become a genuinely mainstream market.

Like any purchase, buying organic food is a personal choice. While some organic products may be higher in a few nutrients and have lower amounts of some pesticide residues, what's most important is that one eats a variety of healthy organic foods having important nutrients.

The women working in unorganized sector have more physical health problems and women working in organized sector have more psychological health problems due to role conflict, dual role and stress. The objective of this research paper is to identify the factors determine that influence women's preferences and buying behavior towards organic food in Bhopal city. For this purpose the present study has been conducted with a sample of 100 female organic food consumers of Bhopal city and their responses were gauged through a structured questionnaire, administered personally. Data have been analyzed with help of standard deviations and factor analysis. The results from the present study investigating factors influencing the women preferences towards organic food products indicate that health and price are the major factor which influences the buying behavior of women towards organic food products. This is followed by another factors such as 'taste', 'mood', 'influence' and familiarity'.

Keywords: Organic food, food preferences, buying behavior, factors influence

INTRODUCTION

Food consumption patterns are rapidly changing nowadays as a result of environmental issues, concern about the nutritional value of food and health issues. Issues such as quality and safety in food attract consumer interest in organic food that is free from pesticides and chemical residues. Organic products are obtained by processes friendly to the environment, by cultivation techniques that consider both the attributes of the final product and the production method. Thus, increasing demand for organic food is expected to continue in the future.

India produced around 1.34 million MT of Certified organic product which includes all varieties of food product namely sugarcane cotton Basmati rice, pulses, Tea, Spices coffee, oil, seed, fruits and their value added products. Among all the states Madhya Pradesh has covered largest area under organic certification followed by Rajasthan and Uttar Pradesh. Today, consumers prefer to buy products that do not involve modern synthetic inputs and will

be beneficial to them in the long-term. That's why organic product stores are continuously growing.

Today's woman is still the designated chief operating officer of the home. Women are increasingly moving out of their homes and into the work environment. A greater number of women are also entering the workforce of restricted industries. Thus women play the dual role of housewives and working women. The fact is, no matter how progressive they are, Motherhood will always distinguish most women from men and put them at the center of home and family life. Women have a major responsibility of family health and for this they are always concern for food security and healthy diet for their family and very particular to purchase food products that's why they are more interested to buy organic food products. Some factors which influence urban women preferences and buying behavior are health, family needs, knowledge and awareness, food safety, family and other influence, social environment etc.

Urban Women Consumers are more concerned about the health, nutrition and the food quality and healthiness has become as the most important measure and quality parameter among the food purchasers. They hold positive attitudes toward organic food products because they conceive that organically grown foods are healthier and safer than conventional alternatives.

Consumer buying behavior is the result of the attitudes, preferences, intentions and decisions made by the consumer s in a market place before buying a product. Urban Women Consumer preference on organic products is based on the general perception that organic products have more desirable characteristics than conventionally grown alternatives. Apart from health, food & environmental considerations, several other characteristics such as nutritive value, taste, freshness, appearance, colors and other sensory characteristics influence consumer preference.

GREEN TEA

Organic Certification means that the green tea you are drinking has met certain standards for consumer safety and environmental friendliness. Synthetic pesticides, herbicides, and fertilizers are not used in organic tea farming which relies instead on natural processes. Organic green tea has the antioxidant, catechin, polyphenols and other content, it has many healthy benefits. It lowers the risk of diabetes, cardiovascular problems, obese etc. Green tea catechin proved to be very versatile in providing health benefits. This means that there are potential health benefits for everyone in the consumption of organic green tea. Even moderate amounts of consumption (drinking 1–2 cups of tea per day) may have benefits.

Composition of Green Tea

Contents	% Dry weight
Proteins	15–20
Amino acids	1–4
Fiber	26
Carbohydrates	7
Lipids	7
Pigments	2
Minerals	5
Phenolic compounds	30
Oxidized phenolic compounds	0

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The green tea polyphenols (GTPs) are flavonols, commonly known as catechins. Green tea catechins could also act as anti tumorigenic agents and as immune modulators in immune dysfunction caused by transplanted tumors or by carcinogen treatment .Moreover, green tea, its extract, and its isolated constituents were also found to be effective in preventing oxidative stress and neurological problems .

Objectives of the study

The objectives of the study are:

- 1) To identify demographic profile, health consciousness and factors that influence the women consumers buying behaviour regarding organic products.
- 2)To study urban women consumers preferences on consuming organic food products in Bhopal city.

METHODOLOGY

A self administered questionnaire survey was conducted in the Bhopal market. A non-probability quota sample of 120 women consumers is used. Personal interviews were conducted. Women were the basic sampling unit for the present study as they are seen to be mainly responsible for food shopping and food preparation in their households. Data were collected through a structured, pre-tested questionnaire. Women were asked about the various determinants which influence their organic food consumption behavior, in order to find out the various factors responsible for organic food consumption. The women who were consumers of organic food were termed as women organic consumers.

Sampling Design

This study was conducted to assess the women consumer buying behavior towards organic food in Bhopal city. After preparing questionnaire data were collected from different samples. Sample of women organic consumers were collected from market of Bhopal city. Survey was conducted for collecting samples from Supermarket, Malls, Retail shops, Health stores of Bhopal market. The samples were collected from two main market areas first is New Market(Ward no.54,53) which comes under the area of old Bhopal coded with N and second is Mp Nager (ward no.03,04)which comes under the area of new Bhopal coded with M .Consumers were selected through Purposive Sampling for data collection in this study. Sample of 120 consumers are used to collect data but due to type two error some data were not appropriate and after excluding inappropriate data, 100 women consumers are used. Selection of sample units in this method is free from bias.

Hypotheses

The data were collected to test following hypotheses –

Hypothesis1: There is a positive relationship between health consciousness and women Consumer's buying behavior towards organic foods.

Hypothesis 2: women consumers in Bhopal city have different preference on consumption of organic food products.

RESULT AND DISCUSSION

Before analyzing the data collected it is better to understand various organic food products available in Bhopal city. Table 4.1 shows the list of organic products mostly available in Bhopal city market. There are products listed in the table.

Table 1: Main organic food products available in Bhopal market

S.No	Products	S.No	Products
1	Vegetables	15	Spices
2	Fruits	16	Oils and Fats
3	Cereals	17	Mustard
4	Pulses	18	Til
5	Kholar	19	wheat
6	Maize	20	Milk
7	Ginger	21	Meat
8	Soyabean	22	Mustard
9	Large Cardamom	23	Beverages
10	Passion fruit	24	Ragi
11	Dry fruits	25	Green tea
12	Bajra	26	Rice
13	Multi grain flour	27	Sugar
14	Flex seeds	28	Egg

Area

The following table 2 shows the area wise classification of women consumers of Bhopal city.

Table 2: Area wise classification of women organic consumers of Bhopal city

Market Area	No. of women Consumers	Percentage
N market area	35	35
M market area	65	65
	100	100

{*N for New Market and *M for Mp Nager Maket}

The table 2 reveals that the 35% of consumers were belonging to the N market area of old Bhopal remaining of the 65% of consumers was belonging to M market area of new Bhopal. Therefore majority of new Bhopal women consumers purchased organic product.

Age

The table 3 shows the age wise classification of the women consumer of Bhopal city.

Table 3: Age wise classification of women organic consumers

S.No.	Age	No of Consumer	Percentage
1	25-35	15	15
2	35-45	45	45
3	45-55	30	30
4	55 and above	10	10
	Total	100	100

It is clear from table 3 that 45 per cent of the consumers are in the age group of 35 to 45 years, 30 per cent of the consumers in the ages between 45 to 55 years, 15 per cent of the consumers in the age between 25 to 35 years and 10 per cent of the respondents are in the age group of above 55 years. It is evident from table that majority of the respondents are in the age group of 35 to 45 years.

Type of Family

The following table 4 shows the family type of respondents.

Table 4: Type of Family of women organic consumers

S.No	Nature of Family	No of consumers	Percentage
1	Nuclear Family	70	70
2	Joint Family	30	30
	Total	100	100

Table 4 exhibits that 70 per cent of the consumers belonged to nuclear family and 30 per cent of the consumers belonged to joint family. Majority of the respondents belong to nuclear family. Thus joint family system is gradually getting abolished and nuclear family system is highly appealing among the generation in the present era.

Marital Status

The following table 5 shows the marital status of women consumers in Bhopal city.

Table 5: Marital Status of consumers

S.No	Marital Status	No of Consumes	Percentage
1	Married	76	76
2	Unmarried	24	24
	Total	100	100

Table 5 shows that 76 per cent of the consumers were married and 24 per cent of the women consumers were unmarried. It is evident from table that majority of the consumers are married. It is clear from the study that majority of married consumers prefer organic food products in the study area.

Occupation

Table 6 depicts the occupation wise classification of women consumers of organic product in Bhopal city.

Table- 6: Occupation wise classification of women consumers of organic food.

S.No	Occupation of women consumers	No. of consumers	Percentage
1	Working women	Government	16
		Private	25
		Business	10
		Others	5
2	Non working women	44	44
	Total	100	100

Result shows that majority of the working consumers are were working women.

Sources of Information

The following table 7 shows the sources through which the urban women came to know about the Organic food products in Bhopal city.

Table 7: Sources of Information

S.No	Sources of Information	No of Consumers	Percentage
1	Friends	35	35
2	Relatives	08	08
3	Advertisement	26	26
4	Colleagues	29	29
5	Any other	02	02
	Total		

Table 7 shows that 35 per cent of the women consumers came to know about the organic food through friends, 08 per cent of the consumers came to know through relatives, 26 per cent of the consumers came to know through advertisement, 29 per cent of the consumers came to know about the organic food through colleagues and 2 per cent of the consumers came to know about the organic food through other sources.

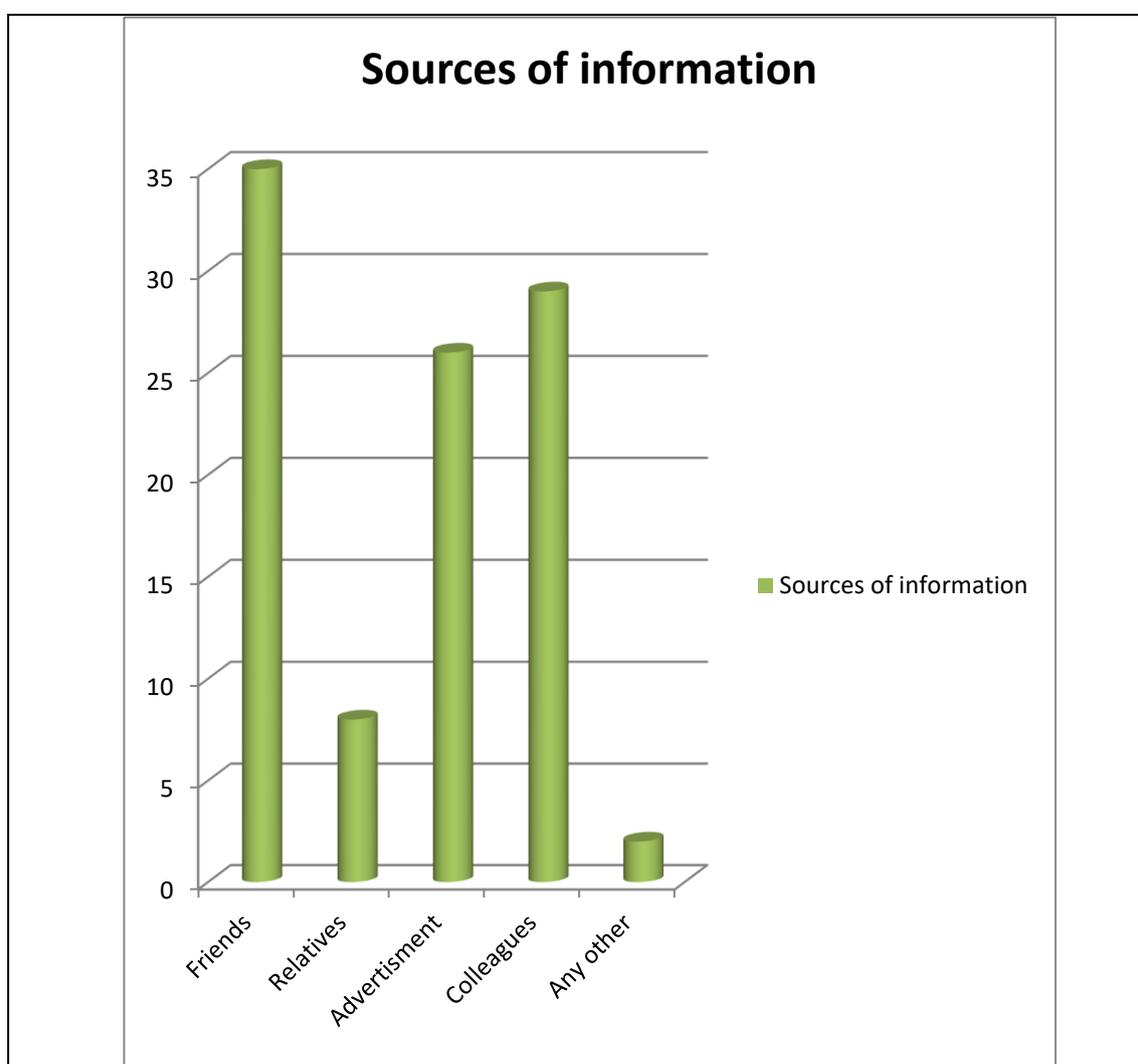


Fig-2: Sources of information

Factors influence organic consumer buying behavior

The following table 8 shows that factors that influence urban women to buy organic food products.

Table- 8: Factors influence urban women consumer to buy organic food products in Bhopal city.

S. No	Factors (variables)	No. of Non working women consumers					No. of working women consumers					Total
		S.A	A	N	D	S.D	S.A	A	N	D	S.D	
1	Health Consciousness	30	10	4	-	-	38	12	5	1	--	100
2	Environmental Concern	25	10	7	2	--	27	15	10	2	2	100
3	Price	20	12	10	1	1	25	12	8	6	5	100
4	Knowledge	22	15	4	3	--	30	20	3	3	--	100
5	Purchase Intension	10	6	15	2	1	28	17	5	4	2	100
6	Beliefs and Attitudes	15	10	10	5	4	27	18	5	4	2	100
7	Family and others influence	20	15		5	2	22	18		105		100

(S.A represented strongly agree,A for agree,N for neutral,D is disagree,S.D for strongly disagree.)

Analysis:

In terms of Health consciousness factor, working and nonworking both of the women consumers (68per cent) considered organic products to be healthier. Almost 42 percent of them believed organic foods to be of better quality since they are free of pesticides and chemical residues. Other factors that influence women consumer buying behavior towards organic food products are environment concern (52 per cent) ,price(45 per cent),knowledge about organic products (42per cent)and family and others influence also (42 per cent).

Statistical Analysis: Descriptive statistics and chi square test, respectively are used in order to identify statistical significance to demographic variables, factors influencing women consumers buying behavior towards organics food products. The level of significance is set at $\alpha=0.05$.

In order to verify the result, hypotheses were tested. For the first hypothesis:

Hypothesis1: *There is a positive relationship between health consciousness and women Consumer behavior towards organic foods*

Table 9

S.No	Consumers Ranking	No. of consumers	Percentage
1	Strongly agree	68	68
2	Agree	22	22
3	Neutral	9	9
4	Disagree	1	1
5	Strongly Disagree	--	--
Total		100	100

Chi-Square 0.05

P-value	Df	X ²	S/Ns
0.00001	4	179.2	5

Table 9 shows that health is a major factor influence to women consumers to buy organic food products. The scores obtained were statistically analyzed by Chi –Square test. The p – value is 0.00001. This result is significant at $p < 0.05$ indicates that the independent variable affect the dependent variable and regression analysis statistically reliable. Therefore hypothesis 1 is confirmed.

Preferences of women consumers on organic food products:

The following table 10 shows women consumer’s preference on organic food.

Table 10: Preference of women consumer on consumption of organic food products

S.No	Particular	No of Working Women consumers	Percentage	No of Non working women consumers	Percentage	Total (%)
1	Cereal& Pulses	12	12	14	14	26
2	Fruits& Vegetables	6	6	4	4	10
3	Dairy Products	4	4	3	3	7
4	Green Tea & Beverages	24	24	17	17	41
5	Oils & Ghee	6	6	4	4	10
6	Other food products	4	4	2	2	6
	Total	56		44		100

The table 10 shows organic product purchase wise classification of women consumers out of the total 100 women consumers. From the above table it is inferred that 26 per cent of the women consumers purchased cereal and pulses , 10 per cent of the consumers purchased fruits and vegetables, 7 per cent of the women consumers purchased dairy products, 10 per cent of the women consumer purchased oils and ghee , 6 percent of women consumers buy

other food products and 41 per cent of women consumers prefer to buy green tea and beverages . Mostly women consumers are taking green tea regularly.

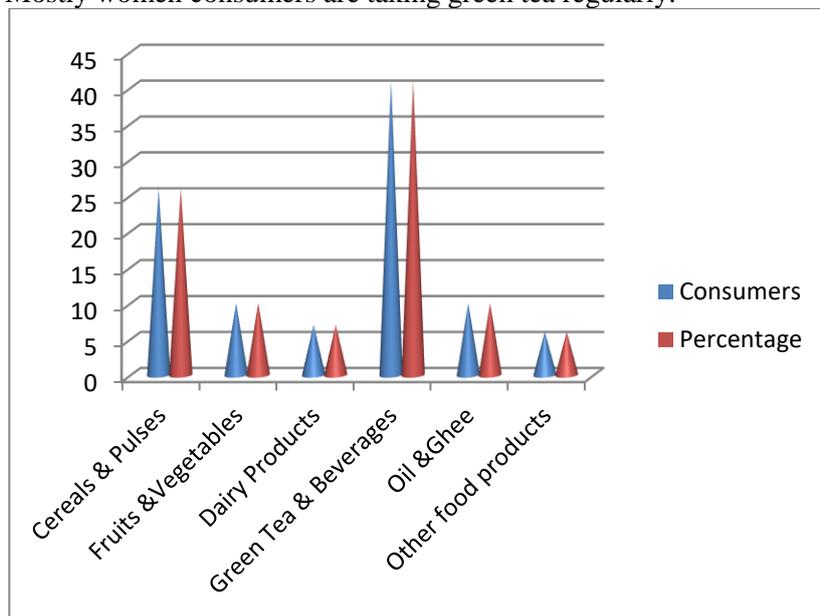


Fig 3. Preferences of women consumer on consumption of organic food products.

Statistical analysis

Descriptive statistics and chi square test, respectively are used in order to identify statistical significance to demographic variables, women consumer preference on organic food . The level of significance is set at $\alpha=0.05$.

In order to verify the result, hypotheses were tested .

Hypothesis 2: Women organic consumers in Bhopal city have different preference on consumption of organic food.

Table 11

S.No	Organic food products	No of women consumers	Percentage
1	Cereal & Pulses	26	26
2	Fruits & Vegetables	10	10
3	Dairy products	7	7
4	Green tea & Beverages	41	41
5	Oils & Ghee	10	10
6	Other food products	6	6
	Total	100	100

Chi-Square 0.05

P-value	Df	X ²	S/Ns
0.00001	5	58.73	6

Table 11 shows that women consumers have different preference on buying behavior of organic food products. The scores obtained were statistically analyzed by Chi –Square test. The p – value is 0.00001. This result is significant at $p < 0.05$ indicates that the independent

variable affect the dependent variable and regression analysis statistically reliable. Therefore hypothesis 2 is confirmed.

CONCLUSION

- The results shows that majority of the women consumers prefer to buy organic food products from the MP Nager market area of new Bhopal which coded by "M" in this study.
- Working women consumers are more interested to buy organic food products instead of nonworking women consumers.
- Women consumers between 35 to 45 years prefer more to buy organic food and mostly women consumers are belonging to the nuclear family.
- Married women consumers are more interested to buy organic food products probably because they have more responsibility of their family health.
- A relationship between health consciousness and women consumer behavior towards organic foods and this hypothesis was accepted.
- Health is always an important factor in human life. The organic ingredients can indeed help to improve cancer problems. Health consciousness was being indicated to be the most important factor in shaping behavior of women consumers towards organically produced food.
- Women consumers get information about the organic food products mostly through their friends and colleagues.
- It is found that preference of organic food is high among the working women .working and nonworking both the women consumer are concerned for health factor and they are more interested to buy organic green tea because of their health benefits.
- Most of the women takes green tea regularly .Green tea helps to reduce oxidative stress, obesity and prevent diabetes and hypertension.
- Women play a lead role to buy food for their family and they always prefer to buy food which are healthy and help to improve their family lifestyle.

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A STUDY ON IDENTIFICATION OF LIFELONG LEARNING NEEDS OF RURAL WOMEN

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ABSTRACT

Lifelong learning is the continuous building of skills and knowledge throughout the life of an individual. This paper discuss about the lifelong learning needs of rural women. The data was collected from the rural women of Ankodia village of the Vadodara district. The major objective of the study was to identify the lifelong learning needs of this village. Questionnaire was used as tool for the collection of the data. The major findings of the study revealed that women from Ankodia village wants to learn to operate new technology to upgrade themselves. They were ready to attend the related courses, if lifelong learning centrebe started in their village. Little more than half (53%) of the respondents reported that to remain updated about recent development in relation to household responsibilities and own makeover were the motivational factors for learning. The finding revealed that they want to learn not only for performing their household activities but also for their own self-development., the need for lifelong learning centre was realized by women residing in rural areas.

Key Words: Lifelong learning, Rural Women, Needs of Women

INTRODUCTION

Learning should never end in fact it should be a lifelong activity for a very simple reason that it engages the mind in healthy pursuits, like learning new skills, being part of a team, or perhaps an interaction with a tutor or an expert who could guide an individual in the right direction. Women, especially, need to find a way forward, to empower themselves if they wish to change, and develop their own lives and those around them.

Instead of submerging themselves in unnecessary addictive patterns and sometimes self-defeating attitudes, when faced with life's problems, lifelong learning can steer them away from such self-deprecating behaviour. It can put a woman or any person on a constructive path and can be one of the sources of emancipation and empowerment. Freedom from ignorance and other vices are the prime advantages of lifelong learning.

Lifelong learning is the continuous building of skills and knowledge throughout the life of an individual. It occurs through experiences encountered in the course of lifetime. These experiences could be formal or informal. Lifelong learning also known as LLL, is the "lifelong, voluntary and self-motivated" pursuit of knowledge for either personal or professional reasons. As such, it not only enhances social inclusion, active citizenship and personal development, but also competitiveness and employability. (Dewan K, 2012)

According to Harper Collins Dictionary: Lifelong learning is the provision or use of both formal and informal learning opportunities throughout people's lives in order to foster the continuous development and improvement of the knowledge and skills needed for employment and personal fulfilment. It shares mixed connotations with other educational concepts, like Adult Education. (Dewan K, 2012)

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“Lifelong Learning” is, officially, learning that happens after formal education is complete. It is a process whereby additional know-how is gained and improvisation of skills continues to periodically occur through time. This kind of training is formally available in continuing education departments or extension schools, in universities around the world; it is also present and known in the form of adult education, knowledge work, homeschooling.

Learning does not only mean gaining scholarly information, but it could also mean empowering oneself by learning any constructive ability, which is of help to an individual. Women, especially, benefit, in developing nations, because ongoing studies—could be in the form of continuing research, or any learning process—gives them a chance to enhance the talents they already have and encourages personal growth.

There are encumbrances in any developing nation, which women face, but it is truly continual training, which has thrown open the doors of empowerment to them. Irrespective of age, women should come forward and acquire new skills and experiences, at any stage of their lives. It is definitely in the hands of women, to decide whether they want to stay where they are, or if they want to walk on the right path—moving toward emancipation and empowerment.

The different ways in which lifelong learning is currently accessible to women in India and to women of the world, is through:

- On-campus Learning
- Online Learning
- Courses
- Books
- Newspapers, Journals and other Reading Material
- Skills passed from one generation to another (Show and Tell)
- Specific learning programs on Radio and Television

Status of Rural women in India

India is a country of villages as the majority of its population lives in villages and far-flung remote areas. The interesting aspect is that every region of the country though connected with the cities now; however, still possesses its own peculiar traditional ethos. Also, most of the rural communities are still devoid of modern facilities like education, electricity, proper drinking water, health care, ample transportation, etc. But the lack of education in many of the rural belts of India is proving fatal and acting as the breeding ground for social vices, evils and paving the way for anti-social/national activities.

Women emerged as a distinct interest group in the 19th century primarily because of the bourgeoisie democratic revolutions of the 17th and 18th century that excluded women from their concept of equality. This distinction was based on gender. Since then women as a commune had waged of struggle for recognition of their rights as a human being. Women’s execute multilateral role in the society i.e. as a mother, wife, daughter and service provider to the society. In spite of the fact that the women’s contribution to the country’s development is equal to that of man, still, they experience a number of limitations that restrain them from comprehending their potential for expansion. It was against this background that the government’s all over the world felt the need to prioritize the interests of women and their participation at every stage of the development process. UN stated that ‘Gender Equality and Women Empowerment’ as one of the Millennium Development Goals to be attained by the year 2015. The term Women’s empowerment implies the ability of the women to take all the important decisions independently related to her throughout her lifespan that will ensure her

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success in all aspects of life. A woman is a person who accepts the challenging role to meet her personal needs and become economically independent. In fact, often women in India are deprived of their fundamental right to dignity also leave alone the question of gender equality. (<http://lexquest.in/women-rural-india-prospects-challenges/>)

Women in India consistently lag behind the men in terms of access to education, health care, jobs etc. Apart, from the economic and social inequality, women in India are victims of heinous crimes such as, dowry deaths, rape, molestation and immoral trafficking. As per the latest statistics;

- The female child sex ratio (0-6 years) is 914 per 1000 males
 - Rural female literacy rate only 58% while rural male 78%
 - A woman employment in urban areas is only 13.9% while in rural areas is 29.9%. With the rise in poverty, many women are forced to work in very low end and low paid jobs.
 - Employment of women in organized sector is less than 8%.
 - Women especially in the child-bearing age often deficient in nutrition due to poverty. As a result the number of maternal deaths in India is one of the highest in the world and 87% of all pregnant women in India are anaemic.
- (<http://www.icharity.in/causes/women-empowerment.html>)

Education is considered one of the medium to bring about positive changes in the development of society and women, in particular, their awareness and understanding level has to be updated for life skills hence, and life skill education was a way eminent place in the development agenda of the courses.

On one side when administration, social societies, and education consider it most important agenda for development. It is necessary on the other side to find out the need of women for their lifelong learning

Research Questions

- Is there need for lifelong learning in rural women?
- Which type of lifelong learning courses are attended by rural women?
- From where the rural women had attended the courses of lifelong learning?
- What are the motivational factors affected to the rural women for lifelong learning?
- If rural women are aware of about any centre operating in Vadodara providing lifelong learning opportunities to women?
- What are the suggestions obtained by the rural women regarding lifelong learning?
- What are the preferred modes of learning for rural women?
- Dorural women have the willingness to join lifelong learning courses?

To find out the answers to questions it was necessary to carry out the study on identification of lifelong learning needs of rural women of Ankodia village of Vadodara district.

Statement of the Problems

A study on the identification of lifelong learning needs of rural women residing in villages of Vadodara district.

Justification of the study

Most people associate learning with formal education at school, college, university etc. from an early age that we should 'get a good education'. It is true that a formal education and the qualifications are important. Education may maximise our potential to find better, more satisfying jobs, earn more and, perhaps, become more successful in our chosen career. However, 'schooling' is only one type of learning. There are many other opportunities to develop the skills you need throughout life.

Knowledge can be acquired and skill-sets developed anywhere – learning is unavoidable and happens all the time. However, lifelong learning is about creating and maintaining a positive attitude to learning both for personal and professional development. Lifelong learners are motivated to learn and develop because they want to: it is a deliberate and voluntary act. Lifelong learning can enhance our understanding of the world around us, provide us with more and better opportunities and improve our quality of life.

There are two main reasons for learning throughout life: for personal development and for professional development. These reasons may not necessarily be distinct as personal development can improve your employment opportunities and professional development can enable personal growth.

Women can play a great role in the development of any country and have suffered the most. They have to cope up with day-to-day basic needs such as fetching water, collecting fodder and fuel, grinding food grains and raising their children and sick, apart from attending to livestock and agriculture chores. Most of the rural women have been suffering from various problems like lack of sanitation, lack of family support. They are deprived of basic education and restricted to their houses. Their role in supporting the family, women in many regions have no status in the society. They are treated as idle, their rutting work stretching throughout the day. They are not expected to participate in decision making and even to express their opinion concerning themselves.

The important role of women in the welfare of the family is being realised gradually. The development programmes for women are receiving greater attention, but still, women are not attending any kind of programmes, because of lack of family support and deprived of basic education restricted to their house, therefore, in this study we want to focus on rural women and to identify their need of lifelong learning.

Justification of the Sample of the Study

Keeping in mind the above discussion, it was determined to study the identification of lifelong learning needs of the rural women. Women are generally not perceived to have any meaningful income generation capacity, and hence, they are mainly selected to do some household duties and cheap labour. Without the power to work and earn a good income, they do not have right to express their opinion. Even do not have the ability to oppose their wishes of their men. So it is very much important to concentrate on the rural women, and to study their learning needs and ways through which they gain knowledge and skill acquired and also get their suggestion for satisfying their further need.

Objectives of the Study

1. To study the profile of women living in Ankodia village of Vadodara district.
2. To study the sources of learning adopted by selected women of Ankodia village of Vadodara district to gain information.

3. To find out the motivational factors for lifelong learning of selected women of Ankodia village of Vadodara district.
4. To find out informal ways for lifelong learning of selected women of Ankodia village of Vadodara district.
5. To study need of lifelong learning education of women of Ankodia village, Vadodara district.
6. To obtain the suggestion regarding the lifelong learning center from selected women of Ankodia village of Vadodara district.

METHODOLOGY

Selection of the Sample and Tool for Data Collection

For the present study researcher selected rural women both working and non-working from Ankodia village of Vadodara district. The questionnaire was prepared for data collection. The women who were willing to fill up the questionnaire were selected as sample of the study. Thus purposive sampling was used to draw the sample. The women were contacted personally and they were oriented about the purpose of the study. On a whole 30 rural women, from Ankodia village of Baroda district were selected as sample. Researcher personally visited their homes and got the questionnaires filled up. The total sample size for the study was 30.

MAJOR FINDINGS

Table 1: Percentage distribution of the respondents according their age.

(N=30)

Age	Percentage
Young (25-31)	46.66
Young middle (32-45)	53.33

- More than half (53%) of the respondents were from middle age group while, forty six percent of the respondents were from younger age group.
- The high majority (82%) of the respondent were married and sixteen percent of the respondents were unmarried.
- The high majority (80%) of the respondents' had education till secondary level whereas twenty percent of the respondents were graduates.

Table 2: Percentage distribution of the respondents according their occupational status

(N=30)

Occupational Status	Percentage
Hose Wife	70
Service	20
Business	10

- The majority (70%) of the respondent was housewife and twenty percent were doing service whereas ten percent of the respondent had their own small scale business.
- Sixty-six percent of the respondents belong to joint family and thirty three percent of the respondents belong to nuclear family.
- The majority (70%) of the respondent had undergone course related to beauty parlour and more than sixty six percent of the respondents did the course on arts and crafts.

Sixty percent of the respondents attended spoken English course .Very few (26.67%) did the course related to embroidery and dance. (refer figure 1)

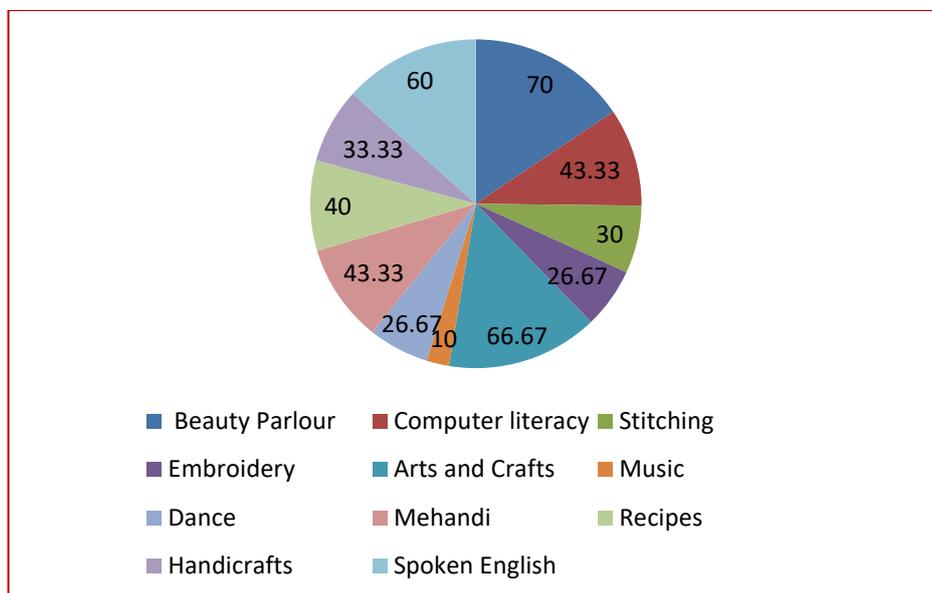


Fig. 1: Percentage Distribution of the Women according to the courses attended by them (N=30)

- High majority (77%) of the respondents preferred private classes as a source of learning and gaining information, whereas forty three percent of the respondents preferred government institution as a source of learning and information. (refer figure 2)

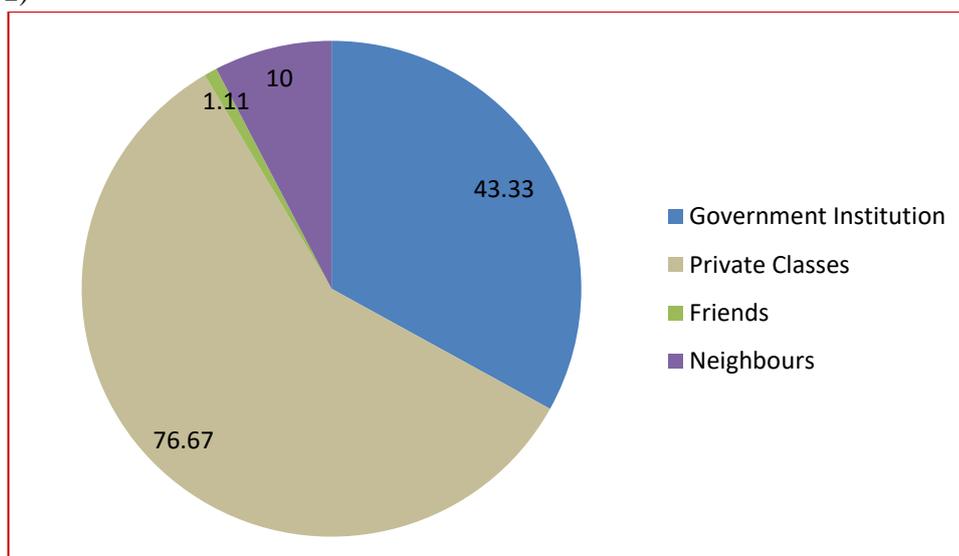


Fig.2: Percentage distribution of the women according to the sources adopted for learning (N=30)

Table 3: Percentage distribution of the respondents according the informal ways used for learning (N=30)

Ways of Learning	Percentage
Mobile	83.33
Internet	76.67
Family members	70.00
Newspaper	60.00
TV Programmes	56.67
Lifelong Learning Centres	40.00
Books	36.67
Radio	23.33
Magazines	6.67

- Table 3 shows that a very majority (83%) of the respondents used mobile as source for learning, seventy six percent and seventy percent of the respondents used internet and took help from family members for informal way of learning respectively whereas only twenty three percent of the respondents preferred to learn through radio as a informal way of learning. Majority of them also learned through reading Newspapers and little less than majority viewed TV Programmes to update themselves.

Table 4: Percentage Distribution of Respondents According to the Motivational Factors of Learning. (N=30)

Motivational Factors	Percentage
a. To learn new technology	76.67
b. To remain mentally and physically active	73.33
c. For child rearing	70.00
d. To keep oneself busy	70.00
e. Maintain relationship	56.67
f. Info about recent development	53.33
g. For Household Responsibilities	53.33
h. For own makeover	53.33
i. To learn new recipes	50.00

- Above table shows that the motivational factor behind learning amongst women from rural area was to learn new technology as per seventy six percent of the respondents. Nearly seventy percent of the respondents reported that to remain mentally and physically active, keeping oneself busy and to learn about child rearing practices were the motivational factors for learning. More than half (53%) of the respondents reported that to remain updated about recent development, learn about performing

household responsibilities effectively and for their own makeover ,were the motivational factors for learning.

- A very high majority (87%) of the respondents suggested for lifelong learning center as were learning through informal ways and mainly with the support of mass media. The lifelong learning center can plan and organize the need based programme specifically required by women in rural setting. The mass media like newspapers, radio and television are largely information driven with urban population in focus. Rural folks have very few areas from which they can learn as their needs and requirements of life learning skills. Hence, while interacting with these rural women from Ankodia village the need for lifelong learning center was strongly emerged and recommended.
- Eighty seven percent of the respondents suggested that they need lifelong learning center in their village. A very high majority (97%) of the respondents suggested that they were ready to learn the courses related to operation of mobiles and uses of home based technology in future at lifelong learning center besides other lifelong learning skills.

CONCLUSION AND SUGGESTIONS

The findings of the study reveal that rural women showed interest to learn about the new technology. They are using this technology such as mobile and internet at maximum level to upgrade themselves. The finding also reveals that they want to learn not only for performing their household activities but their own self-development also. Therefore, the need for lifelong learning centre is also derived.

The government and even corporate bodies should provide more opportunities for women, such that training programs are provided free of cost or at a discounted rate. In fact, women themselves should come forward, and form collective associations, which could collaborate with specific funding organizations and government bodies so that learning varied skills, acquiring knowledge could be made easily available to everyone in the vicinity, be it in cities, suburbs or villages. One of the best ways to transfer knowledge is by setting up more community radio stations across the country because they are low-cost, and radio has a grassroots reach in India.

The similar study should be conducted in other villages of Vadodara district to the lifelong learning needs of other rural women as well as in urban area also similar study can be conducted. A comparative study of lifelong learning needs of rural and urban women can also be conducted.

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ENVIRONMENTAL EDUCATION –WEALTH FROM WASTE

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ABSTRACT

India is facing a grave challenge in waste management in recent times. Swachh Bharat Abhiyan (Clean India Mission), a national campaign launched on 2 October 2014 by the Government of India also echoes this concern. There is an urgent need for Indians to adopt eco friendly best practices by using improved sustainable development methods to reduce natural waste into organic manure for sustaining the quality of life on earth.

The present study was envisaged with an aim to develop effective education modules as a tool to promote, sensitise and create awareness among college students for the protection of the environment through vermicomposting. The objectives were to assess the level of knowledge, attitude and practices of respondents regarding vermicomposting; to train respondents to take up vermicomposting as an entrepreneurial activity; to motivate students to utilize natural waste from the college and to teach students to document the process of converting organic waste into organic manure at various stages. The research design of the study is Quasi Experimental method. Sixty respondents who were the members of Srusti Eco Club, Smt.V.H.D Central Institute of Home Science, Bengaluru city were selected for the study by purposive sampling method. The researcher formulated a questionnaire and standardized it to facilitate data collection. The questionnaire comprised of 2 sections. Section 1 was designed to elicit socio-demographic data and Section 2 focused on assessing Knowledge, Attitude and Practices about environmental education and vermicomposting. The standardised tool was administered to the respondents for pre-test which was followed by intervention programme. The intervention program spanned for one month during which the respondents were exposed to five specially designed modules on environmental education and vermicomposting. The post-test was conducted after the completion of the intervention program.

The data was systematically compiled, tabulated and subjected for statistical tests. The results revealed that there is statistically significant improvement in the Knowledge, Attitude and Practices of respondents with regard to vermicomposting. This indicates that the modules used for environmental education and vermicomposting enhanced the respondents' knowledge, attitude and practices. The findings of the present research will serve as a valuable benchmark in designing similar environmental intervention programs for the benefit of different target groups.

INTRODUCTION

“Environment is sum total of water, air and land interrelationships among themselves and also with the human being, other living organisms and property”. EPA United Nations Environmental Protection Agency, Environmental education is a process that allows individuals to explore environmental issues, engage in problem solving, and take action to improve the environment. As a result, individuals develop a deeper understanding of environmental issues and have the skills to make informed and responsible decisions⁸.

The concept of environment education emerged only in the seventies from the Stockholm Conference organized by the United Nations in 1972¹¹. During that period the world realized

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that environmental concerns and awareness could be spread only through mass environment education programme. Recommendations of the conference emphasized organization of the conference emphasized organization of Formal and Mass educational programmes. This period (Seventies) has been called as the decade of environmental education. Environmental education like general education is concerned with change in knowledge, attitude and behavior, exposure, motivation and best practices on environmental education for college students helps them to develop positive attitude with transformation in environmental friendly behavior and adopting a healthy lifestyle.

Environmental education enhances critical thinking, problem-solving, and effective decision-making skills, and teaches individuals to weigh various sides of an environmental issue to make informed and responsible decisions. Environmental education does not advocate a particular viewpoint or course of action. It also emphasized the pre-service and in-service training of teachers in environmental education. The basis of such a training program would be the preparation of teaching-learning materials and adoption of interdisciplinary approach. Use of mass media to disseminate information was also emphasized (UNESCO, UNEP - 1977).

One of the threats to global environmental health is solid waste generation. Solid waste management is becoming a major public health and environmental concern in urban areas of many developing countries. Cities in both developed and developing countries generally do not spend more than 0.5 per cent of their per capita gross national product (GNP) on urban waste services, which covers only about one-third of overall cost (World Bank, 2001)²⁰. The situation in India, particularly in the metropolitan cities is severe.

Dey, (2015), states that according to the estimate of Ministry of Environment & Forest, India, 7.2 million tonnes of hazardous waste is generated. One Sq km of additional landfill area is covered every-year. A total Rs 1600 crores for treatment & disposal of these wastes is spent. In addition to this industries discharge about 150 million tonnes of high volume low hazard waste every year, which is mostly dumped on open low lying land areas.

The Energy and Resource Institute (TERI)¹⁸ stated that Bangalore City produces 2000 tonnes of waste per annum which puts pressure on hygiene condition of the city. Improper solid waste management leads to substantial negative environmental impacts (for example, pollution of air, soil and water, and generation of greenhouse gases from landfills), and health and safety problems (such as diseases spread by insects and rodents attracted by garbage heaps, and diseases associated with different forms of pollution). Municipal (or local) authorities charged with responsibility of providing municipal solid waste management services (together with other municipal services) have found it increasingly difficult to play this negative role. The difficulty has been aggravated by lack of effective legislation, inadequate funds and services, and inability of municipal authorities to provide the services cost-efficiently (Begum).²²

Justification for the study

India is facing a grave challenge in waste management in recent times. “Swachh Bharat Abhiyan” (Clean India Mission), a national campaign launched on 2nd October 2014 by the Government of India, also echoes this concern. There is an urgent need for Indians to adopt eco-friendly best practices by using improved sustainable development methods to reduce natural waste into organic manure for sustaining the quality of life on earth. UNDP is also promoting sustainable development and initiated a theme for the year 2015 for the celebration of the World Environment Day on 5th June. The theme is ‘Seven Billion Dreams, One Planet,

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Consume with Care' this slogan also encourages the global communities to lead resourceful life and promoting sustainable development.

Solid waste is a discarded / rejected material by the society generated from different sources is the major burning issue all over the world. Waste is an unavoidable byproduct of human activities. Economic development, urbanization and improving living standards in cities, has led to an increase in the quantity and complexity of generated waste. Rapid growth of population and industrialization degrades the urban environment and places serious stress on natural resources, which undermines equitable and sustainable development inefficient management and disposal of solid waste is an obvious cause of degradation of the environment in most of the cities of the developing world. Municipal corporations of the developing countries are not able to handle increasing quantities of waste, which results in uncollected waste of roads and in other public places. There is a need to work towards a sustainable waste management system (Gidde *et al.*, 2008). Vermicomposting is one process through which much of the waste management can be done.

According to Srinivas Hari (2015), there is a need for a complete rethinking of "waste" - to analyse if waste is indeed waste. A rethinking that calls for: WASTE to become WEALTH; REFUSE to become RESOURCE; TRASH to become CASH is the need of the hour. There is a clear need for the current approach of waste disposal that is focussed on municipalities and uses high energy/high technology, to move more towards waste processing and waste recycling that involves public-private partnerships, aiming for eventual waste minimization - driven at the community level, and using low energy/low technology resources. Some of the defining criteria for future waste minimization programmes will include deeper community participation, understanding economic benefits/recovery of waste, focusing on life cycles (rather than end-of-pipe solutions), decentralized administration of waste, minimizing environmental impacts, reconciling investment costs with long-term goals.

Waste is an unavoidable byproduct of human activities. (Gidde *et al.*, 2008)³, There is a need to work towards a sustainable waste management system. Waste management is considered as an integral part of a sustainable society, thereby necessitating diversion of biodegradable fractions of the societal waste from landfill into alternative management processes such as vermicomposting. Vermicomposting is a bio-conversion process which is widely being used for solid waste management. In this bio-conversion process, earthworms feed on the organic waste to produce more earthworms, vermicompost and vermiwash as products. It is a method of using worms to transform organic waste into a nutrient-rich fertilizer. It is a healthy and clean way to eliminate wastes going into our landfills, Which improves the environment (Shinholster).

A leachate is any liquid that, in the course of passing through matter, extracts soluble or suspended solids, or any other component of the material through which it has passed. Water is released during the composting process. It dissolves humic compounds from the compost to form a dark brown liquid. This liquid is commonly called leachate. Compost leachate is a bio stimulant which exlir the growth of plants. Due to this quality the leachate has an entrepreneurial potential. Compost tea does not have high amounts of nutrients, but contain many bacteria which help plants increase their defenses to fight diseases.

Vermicomposting has been recently universally accepted as eco friendly technology for sustainable development and abatement of pollution caused by municipal; garbage, sewage, sludge, agricultural waste (Chellachamy and Dinakaran, 2015)¹. Vermicomposting is one

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process through which much of the waste management can be done in educational institutions (Gidde *et al.*, 2008).

The Present Research

The aim of the study was to develop through experimentation, effective educational modules for imparting environmental education and vermicomposting to college students. The study also examined the effect of education modules on the respondents' Knowledge, attitude and practices. The respondents were involved in the step by step process of vermicomposting which involved transforming the organic waste in the college campus into valuable organic manure. They were also sensitized to the entrepreneurial potential of vermicomposting.

The specific objectives of the study were to:

- 1) To assess the level of knowledge, attitude and practices of respondents regarding Vermicomposting;
- 2) To train respondents to take up vermicomposting as an entrepreneurial activity;
- 3) To motivate students to utilize natural waste from the college;
- 4) To teach students to document the process of converting organic waste into organic manure at various stages.

The following hypotheses were formulated and tested:

1. The education modules will not have a positive effect on the respondents' knowledge on vermicomposting.
2. The education modules will not have a positive effect on the respondents' attitude on vermicomposting.
3. The education modules will not have a positive effect on the respondents' practices on vermicomposting.

METHODOLOGY

The design of the study was Quasi-Experimental study (Pre-Test and Post-Test with effectiveness of education module). The study was spread over a period of one and half years.

The researcher chose the college campus as an implementation site because they are small areas producing relatively small amounts of organic material. As on November, 2014, no research study had been conducted in the college campus on vermicomposting. Yasmeen (2013)²¹ states that according to Katy Rustom, Environmental Education is a compulsory subject in schools and colleges of Mumbai, in Maharashtra, but, the question is 'Does the curriculum actually educate children about environment issues?' The answer is negative. For example, the prescribed curriculum will not help a student in getting the huge amount of rubbish outside a house or college cleared as students are being taught mere facts and figures. One has to make our students realize that they are part of the problem, and therefore they have to be part of the solution.

Identifying the Problem

Through extensive literature review and the researcher's personal observations, specific information was gathered on the needs of the institution in the area of solid waste management. Three areas namely, environmental education, vermicomposting and entrepreneurial potential of vermicomposting were chosen as the thrust areas for intervention in the present research. Interactions were held with subject experts in these areas to formulate the research design.

Formulation of Research Design

When the setting is small and sequential studies needed, as in this study, field experiments are more appropriate. Hence, the researcher opted for a field experiment design. This experiment has been designed on two basic parameters-Action program and Research. During the action program, data was collected and records maintained, which were used for Research. The research program had two components:

- 1) Research, which was fed into the action program and
- 2) The pre-test and post-test to measure the impact of the action program.

Selection of Sample

Purposive Sampling method was adopted for the selection of the respondents. The sample size comprised of 60 respondents (N = 60). The student members of Srusti Eco Club, Smt. V.H.D. Central Institute of Home Science, Bangalore, Karnataka, India, were the respondents for the present study.

Formulation of tools

The tools were formulated by the researcher based on an extensive review of literature and in consultation with subject expert's and a statistician. The factors influencing environmental education and vermicomposting were categorised under different aspects for assessing knowledge, attitude and practices of the respondents.

After the formulation of the tools, they were given to subject experts for face validity and content validity. Their feedback was obtained and the tools were standardized. They were revised and the reliability co-efficient was established using split half method developed by Brown Prophecy. The internal consistency of the measure for various components is obtained. The reliability co-efficient obtained for the knowledge was 0.9167, attitude-0.8976, and for practice -0.9019 respectively.

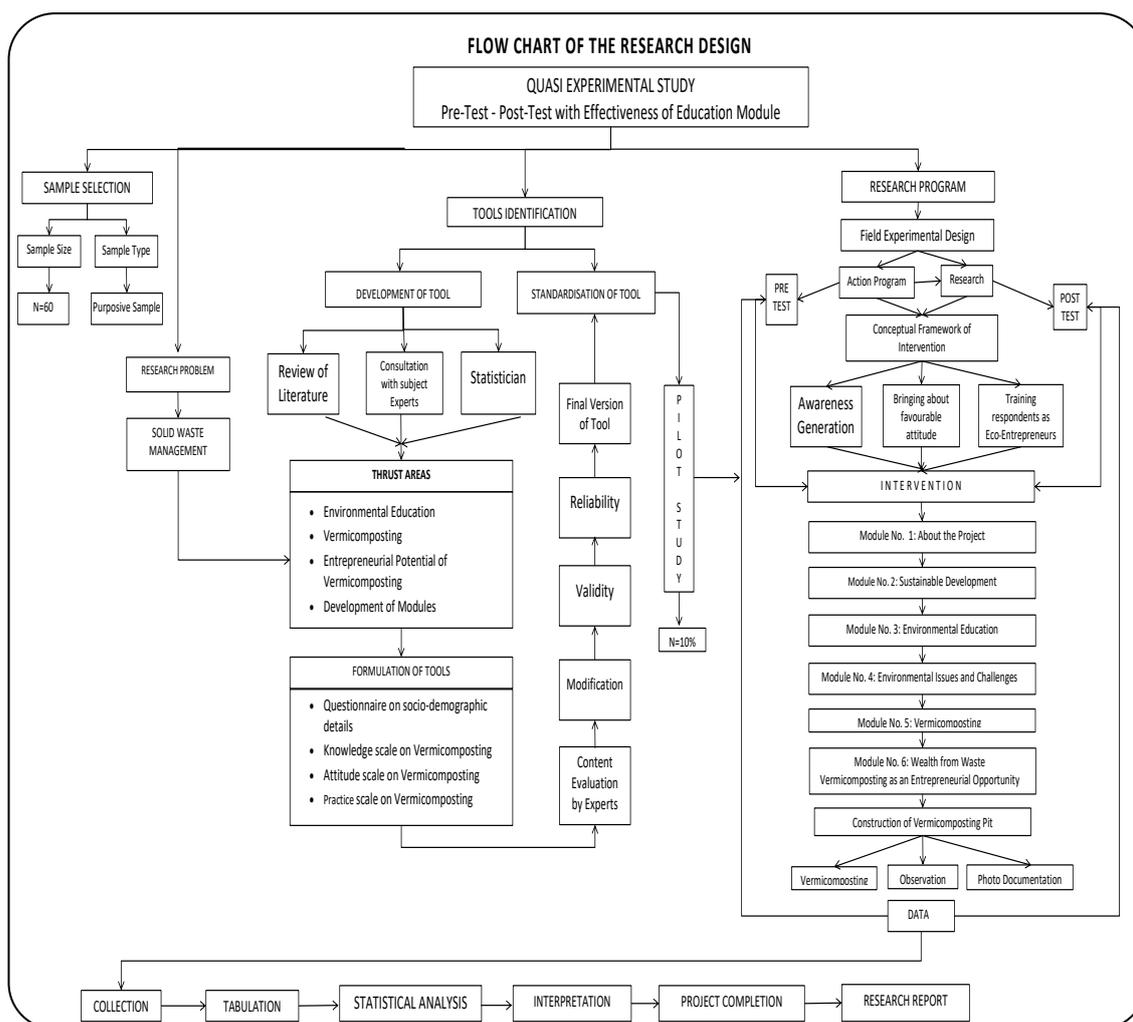
Pre test

The pretest was administered to the respondents using the given below tools formulated by the researcher.

- a) Questionnaire on Socio demographic details
- b) Knowledge on Vermicomposting
- c) Attitude on Vermicomposting
- d) Practices on Vermicomposting
- e)

Intervention Programme

This research has focused on the use of conceptual model that can be used to produce a desired behavior. The methodological goal was to have the respondents achieve discreet behavioral objectives on these aspect namely; knowledge, attitude and practices on the topic of vermicomposting. The intervention programme was conceptualized, planned and implemented by the researcher with expert inputs from subject experts from one of the premier agricultural institutes in the state, namely 'Gandhi Krishi Vignaana Kendra', University of Agricultural Sciences, Bangalore.



The intervention was implemented spanned for one month and it was conducted during November 2014. Sessions were conducted for six days in a week. Each session was conducted for one hour. A total of twenty four hours of intervention was imparted to the respondents.

The conceptual framework for the intervention was conceived in three parts relating to:

- Awareness generation
- Bringing about favorable attitudinal changes and
- Training respondents as eco-entrepreneurs

Awareness Generation

Learning modules designed specifically to provide the knowledge and skills related to environmental education were used in the present research. The concepts chosen for module development were based on their relevance to the Environmental Education-Wealth from Waste research objectives. The following learning modules were developed by the researcher:

- Module-1: About the Project.
- Module-2: Sustainable Development
- Module-3: Environmental Education
- Module-4: Environmental Issues and Challenges
- Module-5: Vermicomposting.

Module-6: Wealth from Waste-Vermicomposting as an entrepreneurial opportunity
 All the modules were presented to the respondents with Power Point presentations. The sessions were highly interactive and activity oriented. Some of the sessions were conducted by experts in the field of environmental education and vermicomposting.

Bringing about favorable attitudinal changes

Attitudes are personal biases, preferences and subjective assessments that predispose one to act or respond in a predictable manner. They represent an individual’s evaluation of a particular topic. They characteristically provoke behavior that is favourable or unfavourable in response to challenging situations related to the attitudes. The most simple and straight forward method of bringing about a change in person’s attitude or knowledge is to address the issue with an appropriate communication strategy. In the present study, group discussions were held with the respondents to clarify their doubts. Such a communication strategy may explicitly advocate a change in a specific direction or may attempt to bring about the desired effect in a more subtle or indirect manner by influencing their attitudes in a positive manner (Madhumathy,2007)¹⁴.

Training respondents as eco-entrepreneurs

Entrepreneurial potential of vermicomposting was explained to the respondents during the intervention sessions. The products of the composting process were displayed and their marketability was discussed. The products like compost and leachate, which is now marketed as Black Gold, and has high commercial value was highlighted during the sessions. The respondents were oriented to the various brands available in the market and the entrepreneurial potential of vermicomposting was reiterated.

Post test

The post test was administered to the respondents. The tools used for pretest were readministered to collect post test data. The post test was administered after the span of one month.

RESULTS AND DISCUSSION

Section-1: Socio-demographic Profile of Respondents

Table 1: Classification of Respondents by Age, Educational Level and Number of Siblings

Characteristics	Category	Respondents	
		Number	Percentage
Age group (years)	17-18	16	26.7
	19-20	25	41.7
	21	19	31.6
Educational level	B Sc	44	73.3
	BA	10	16.7
	M Sc	6	10.0
Number of Siblings	None	5	8.3
	One	22	36.7
	Two	19	31.7
	Three	14	23.3
Total		60	100.0

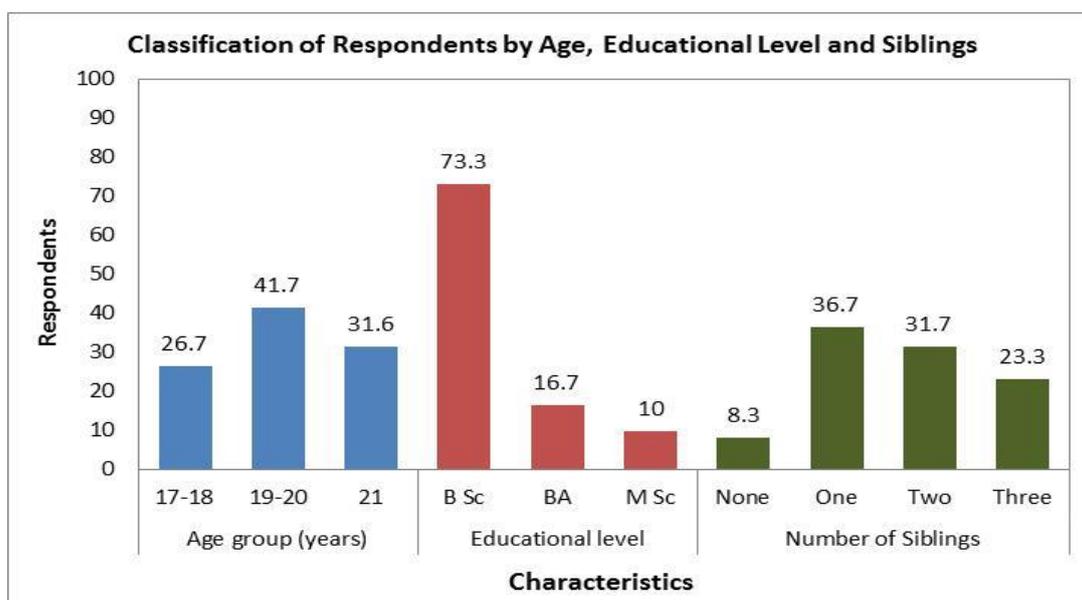


Fig. -1: Classification of respondents by age, educational level and siblings

India has the largest population of adolescents in the world being home to 243 million individuals aged 10-19 years. With 356 million 10-24 year-olds, India also has the world's largest youth population despite having a smaller population than China. The Indian higher education system is one of the largest in the world. It consists of colleges, universities, institutions of national importance and autonomous institutions with the status of deemed universities. Only ten percent of the age cohort is actually enrolled in higher education (India-Education-Report 2013)⁹. South India offers the best opportunities for socially inclusive access to higher education including technical education and education in English medium. National statistics have revealed that more than 78% students drop out after B Sc Thus only 21% of the science studying population opts to go to the next level of education; that is, M Sc level.

The sample for the present research was drawn from one of the prestigious colleges in Bangalore city with over five decades of service in the field of women's education. The socio-demographic profile of the respondents in the present research study is presented in Table – 1. The age range of the respondents was between 17 to 21 years. All the respondents were females. Majority of them that is seventy three percent of the respondents' educational level was B.Sc. Only ten percent of the respondents' educational level was M Sc. With regard to the number of siblings, a higher percentage (37%) of the respondents reported that they had only one sibling and twenty two percent of the respondents reported that they had two siblings.

Table 2: Classification of Respondents by Type of family, Family size and Family income

Characteristics	Category	Respondents	
		Number	Percentage
Type of family	Nuclear	38	63.3
	Joint / Extended	22	36.7
Family size (members)	3-4	27	45.0
	5-6	23	38.3
	7+	10	16.7

Family income/month	Below Rs. 20,000	30	50.0
	Rs.20,000-40,000	18	30.0
	Above Rs.40,000	12	20.0
Total		60	100.0

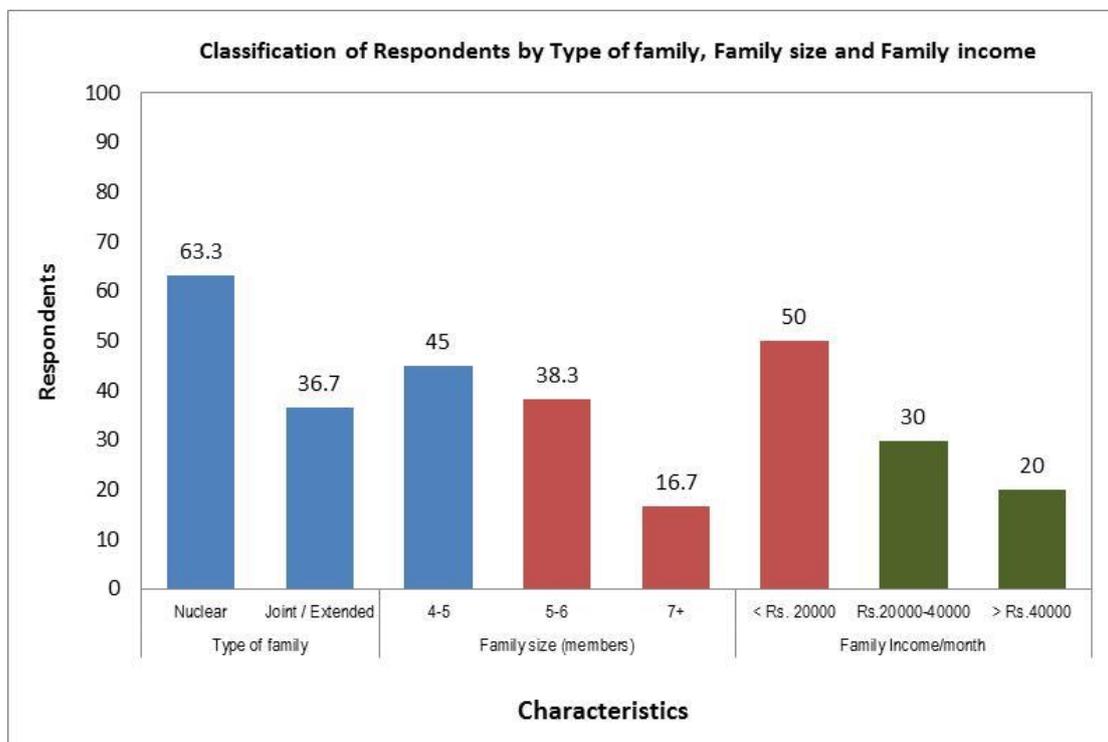


Fig. -2: Classification of respondents by type of family, family size and family income

Type of Family: The nuclear type of family had the highest representation with sixty three percent of the respondents and the remaining thirty seven percent of the respondents reporting that they belonged to joint families or extended families.

In urban India, the family size has been getting reduced because of urbanization, migration and employment. The nuclear family is a unit composed of husband, wife and their unmarried children. While discussing the nature of nuclear family in India, Pauline Kolenda has expressed that the size of the nuclear family is very small. It is free from the control of elders. It is regarded as the most dominant and ideal form of family in modern society. The nuclear family is based on conjugal bonds. The children get maximum care, love and affection of the parents in nuclear family. The nuclear family is independent and economically self-sufficient. The members of nuclear family also enjoy more freedom than the members of joint family¹³.

In India, The term extended family is used to indicate the combination of two or more nuclear families based on an extension of the parent-child relationships says Gore, (2005).⁴

According to Murdock, (2004)¹⁵ an extended family consists of two or more nuclear families affiliated through an extension of the parent-child relationship that is by joining the nuclear family of a married adult to that of his parents.

Family Size: National Family health survey (NFHS)¹³ is a large-scale, multi round survey conducted on a representative sample of households throughout India by the International Institute of Population Sciences (IIPS), Mumbai designated by the Ministry of Health and

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Family Welfare (MOHFW), Government of India. According to the NFHS-3 which was released on 11 Oct 2007, the household size for the country was 4.8. The household size for the state of Karnataka, where the present research was conducted was 4.6. The findings of the present study indicate that majority of the respondents had an average household size of 4.5 having 3-6 members. This finding is supported by the NFHS data too.

It is evident from the data in Table 2 that fifty percent of the respondents belonged to the income category of below Rs. 20,000/- every month. Thirty percent of the respondents reported that they have a monthly income of Rs.20,000/- to Rs. 40,000/-. The remaining twenty percent of the respondents had a monthly income of above Rs. 40,000/-.

Table 3: Classification of Respondents by Education and Occupation of Parents

Characteristics	Category	Respondents			
		Mother		Father	
		N	%	N	%
Educational level	Middle	18	30.0	4	6.7
	High school	22	36.7	16	26.7
	Diploma	6	10.0	8	13.3
	Degree	14	23.3	32	53.3
Occupational status	Government	16	26.7	11	18.3
	Private	3	5.0	26	43.3
	Business	2	3.3	23	38.4
	House wife/Home maker	39	65.0	0	0.0
Total		60	100.0	60	100.0

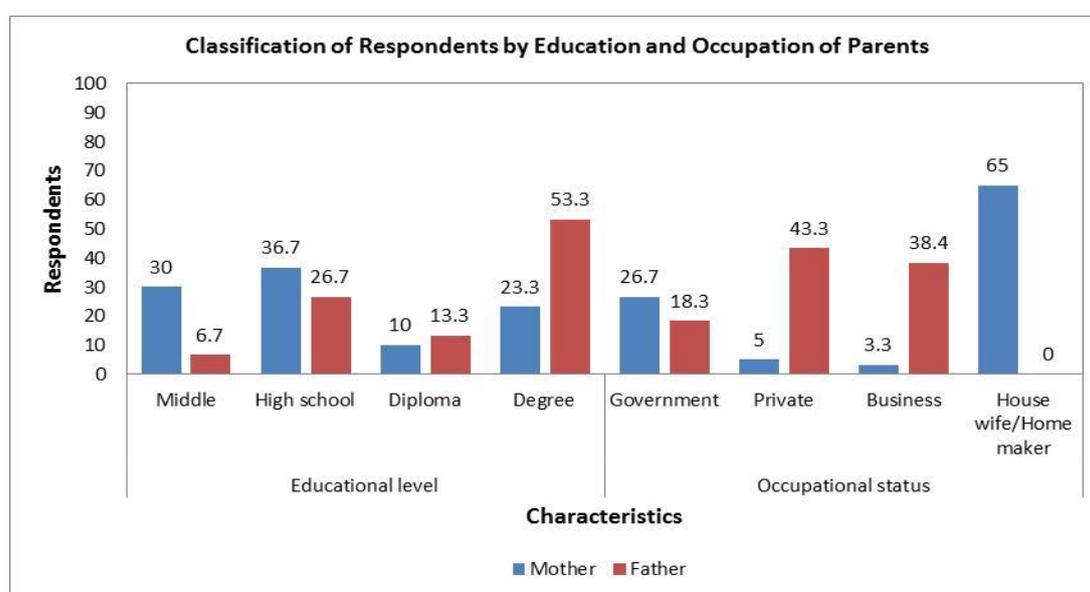


Fig. -3: Classification of respondents by Education and occupation of parents

Table-3 shows the classification of the respondents by education and occupation of parents. The educational profile of the respondents' parents throws light on the deep rooted gender bias which exist even in metropolitan cities of India. The educational level of thirty seven

percent of the mothers and twenty seven percent of the fathers of respondents was high school. Although it was heartening to know that fifty three percent of fathers and twenty three percent of mothers of the respondents had completed their degree, a closer look at the data in the table indicates that better opportunities were available to the fathers of respondents to continue their education. While sixty six percent of the respondents' fathers had completed degrees and diplomas, only thirty three percent of the respondents' mothers had completed degrees and diplomas. Hence, these findings indicate a deep gender bias in favour of males. It was interesting to note that ten percent of the mothers and thirteen percent of the fathers of respondents had completed their diplomas which are vocational in nature.

The occupational pursuits also reflected a disparity with majority (65%) of the mothers being home makers. However, more women (27%) than men (18%) were found to be working in Government sector. It was interesting to note that three percent of the mothers were engaged in business. Majority of the fathers of respondents (43%) worked in private sectors and thirty eight percent of them were engaged in business.

Section-2: Effectiveness of Educational Modules on Knowledge, Attitude and Practice on Vermicomposting

Section 2 presents specific data on effectiveness of educational modules on Knowledge, Attitudes and Practices on vermicomposting.

Knowledge refers to a range of information and the understanding of it. Early experiments with enhancing relied heavily on the delivery of information and facts. Gradually, educational approaches have turned more to skill development. In the present research, the researcher used a new strategy. Instruction on facts was combined with explanations of how these facts relate to one another to make the concepts clear to the respondents (Madhumathy, 2007)¹⁵.

For example, the researcher would describe the importance of water and then explain the effects of mild to severe deprivations of water, water scarcity, need for conservation of water as a natural resource and so on. The researcher then elicited responses from the respondents about their personal experiences. They were encouraged to think constructively and arrive at their own solutions to their problems.

Table 4: Over all Pre test and Post test Mean Knowledge of Respondents on Vermicomposting (N=60)

Aspects	Max. Score	Knowledge Scores				Paired 't' Test
		Mean	SD	Mean(%)	SD (%)	
Pre test	97	64.77	7.5	66.8	7.8	22.41*
Post test	97	85.80	5.8	88.5	5.9	
Enhancement	97	21.03	7.3	21.7	7.5	

* Significant at 5% level, 1.96

t (0.05,59df) =

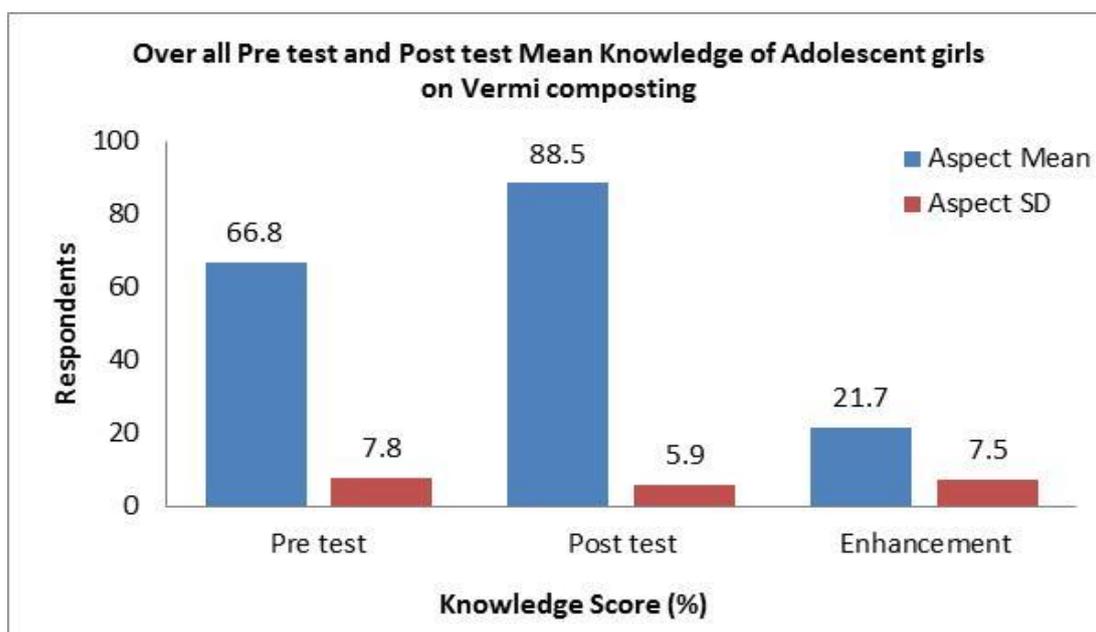


Table-4 depicts the results of overall pre test and post test mean knowledge of respondents on vermicomposting. The mean (%) and SD(%) for pre test are 66.8 and 7.8 respectively. The corresponding post test values were 88.5 and 5.9 respectively. Hence the enhancement recorded in mean and standard deviation of knowledge scores after intervention was 21.7 and 7.5 respectively. This enhancement was found to be statistically significant at 5% level with the paired ‘t’ test value being equal to 22.41.

Validation of Hypothesis:

Null Hypothesis: The education modules will not have a positive effect on the respondents’ knowledge on vermicomposting.

Alternate Hypothesis: The education modules will have a positive effect on the respondents’ knowledge on vermicomposting.

Since the calculated value is greater than the table value, the null hypothesis is rejected and the alternate hypothesis which states that the education modules will have a positive effect on the respondents’ knowledge on vermicomposting was accepted.

Table 5: Over all Pre test and Post test Mean Attitude of Respondents on Vermicomposting (N=60)

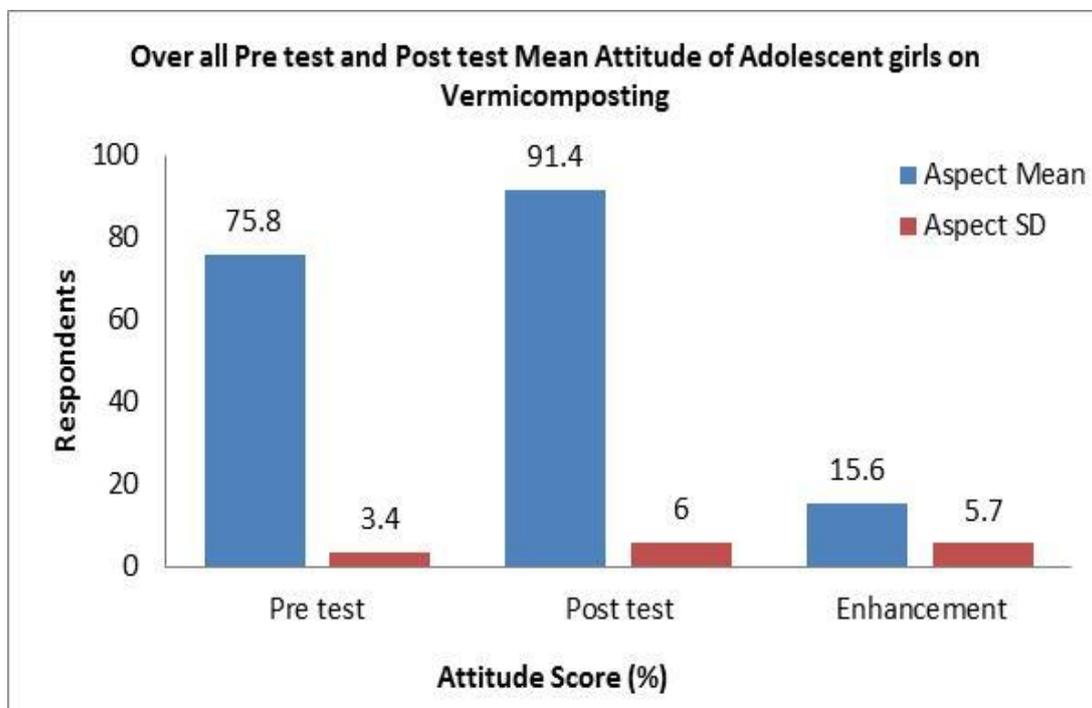
Aspects	Max. Score	Attitude Scores				Paired ‘t’ Test
		Mean	SD	Mean (%)	SD (%)	
Pre test	170	128.80	5.7	75.8	3.4	21.20*
Post test	170	155.30	26.50	91.4	6.0	
Enhancement	170	26.50	9.6	15.6	5.7	

* Significant at 5% level,
1.96

$$t (0.05,59df) =$$

Table-5 depicts the attitude of adolescent girls on vermicomposting. The respondents post test result on attitude towards vermicomposting is higher (91.4%), when compared to the pre test attitude scores (75.8%). From the statistical test it is evident that there is a significant

difference between pre test and post test at 5% level ($t=21.20^*$) with respect to adolescent girls' attitude on vermicomposting. This enhancement was found to be statistically significant at 5% level with the paired 't' test value being equal to 21.20*.



Validation of Hypothesis:

Null Hypothesis: The education modules will not have a positive effect on the respondents' attitudes on vermicomposting.

Alternate Hypothesis: The education modules will have a positive effect on the respondents' attitudes on vermicomposting.

Since the calculated value is greater than the table value, the null hypothesis is rejected and the alternate hypothesis which states that the education modules will have a positive effect on the respondents' attitudes on vermicomposting was accepted.

Table 6: Over all Pre test and Post test Mean Practice of Respondents on Vermicomposting (N=60)

Aspects	Max. Score	Practice Scores				Paired 't' Test
		Mean	SD	Mean(%)	SD (%)	
Pre test	30	12.37	4.9	41.2	16.2	19.43*
Post test	30	24.93	3.0	83.1	10.1	
Enhancement	30	12.57	5.0	41.9	16.7	

* Significant at 5% level,

$t(0.05,59df) = 1.96$

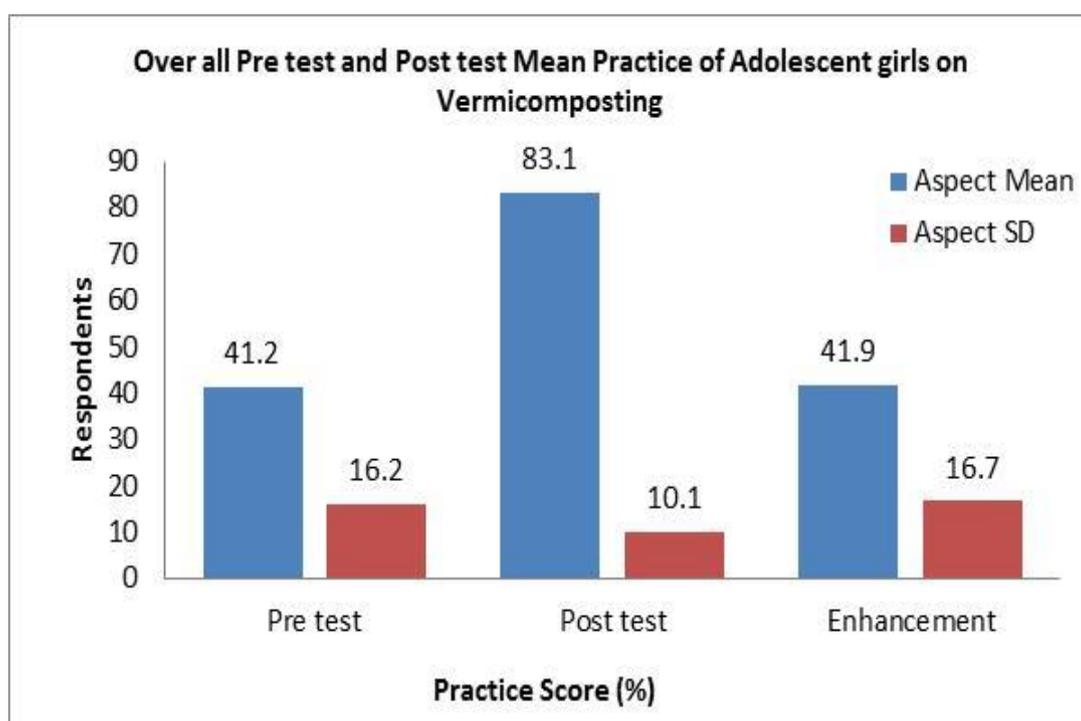


Table-6 reveals the respondents’ practices on vermicomposting. The respondents’ post test scores were found to be higher (83.1%) as compared with the pre test scores (41.2%) with regard to practices on vermicomposting. Further, the statistical test revealed that there is a significant difference ($t=19.43^*$), between pre test and post test scores with reference to improvement in practices of respondents’ on vermicomposting.

Validation of Hypothesis:

Null Hypothesis: The education modules will not have a positive effect on the respondents’ practices on vermicomposting.

Alternate Hypothesis: The education modules will have a positive effect on the respondents’ practices on vermicomposting.

Since the calculated value is greater than the table value, the null hypothesis is rejected and the alternate hypothesis which states that the education modules will have a positive effect on the respondents’ practices on vermicomposting was accepted.

Section-3: Aspect wise Effectiveness of Educational Modules on Knowledge, Attitude and Practice on Vermicomposting

Table 7: Aspect wise Mean Pre test and Post test Knowledge on Vermicomposting (N = 60)

No.	Knowledge Aspects	Respondents Knowledge (%)						Paired ‘t’ Test
		Pre test		Post test		Enhancement		
		Mean	SD	Mean	SD	Mean	SD	
I	Environment	70.5	11.0	88.8	9.4	18.3	9.1	15.58*
II	Waste segregation	71.1	22.3	93.3	13.3	22.2	20.8	8.27*
III	Waste management	72.4	13.3	91.2	9.8	18.8	12.2	11.94*
IV	Vermicomposting	61.1	11.8	85.4	10.2	24.3	13.7	13.74*

V	Advantages of Vermicomposting	66.8	11.7	86.8	8.3	20.0	12.2	12.70*
VI	Worms	66.4	17.4	90.1	12.1	23.8	17.3	10.66*
VII	Process of converting organic waste into organic manure	64.4	25.7	91.7	14.4	27.2	26.9	7.83*
VIII	Vermicomposting as an entrepreneurial activity	60.6	24.0	93.3	13.3	32.8	24.0	10.59*
	Combined	66.8	7.8	88.5	5.9	21.7	7.5	22.41*

* Significant at 5% level,

$t(0.05,59df) = 1.96$

Table-7 depicts aspectwise mean pre test and post test scores on knowledge for vermicomposting, among the eight pre test knowledge aspects, waste management recorded the highest scores with a representation of 72.4%, closely followed by waste segregation with a representation of 71.1%. The aspect pertaining to environment showed 70.5% representation and the aspect on advantages of vermicomposting showed 66.8%. Knowledge related to worms was found to be 66.4 % and the knowledge pertaining to process of converting organic waste into organic manure was 64.4%. The vermicomposting aspect notched 61.1% and the aspect on conversion process of organic waste into organic manure showed the least scores at 60.6.

In the posttest, all the aspects showed visible enhancement in the knowledge aspects on vermicomposting. Maximum enhancement of 32.8 was observed in the aspect related to knowledge on vermicomposting as an entrepreneurial activity. This was closely followed by the aspect related to the process of converting organic waste into organic manure which showed an enhancement of 27.2. Knowledge about vermicomposting and worms too showed considerable enhancement with 24.3 and 23.8 respectively. Knowledge about waste segregation and advantages of vermicomposting showed mean enhancement scores of 22.2 and 20.0 respectively. Waste management and environment aspects showed an enhancement score of 18.8 and 18.3 respectively.

Further, the statistical analysis revealed that there is statistically significant enhancement in all the aspects individually and when combined scores of all the eight aspects were considered too. The data in Table 8 clearly indicates this positive outcome of the present research.

Table 8: Aspect wise Mean Pre test and Post test Attitude on Vermicomposting(N = 60)

No.	Attitude Aspects	Attitude scores (%)						Paired 't' Test
		Pre test		Post test		Enhancement		
		Mean	SD	Mean	SD	Mean	SD	
I	Environmental best practice	75.7	4.4	93.1	6.7	17.4	6.6	20.42*
II	Waste segregation	73.8	5.6	90.5	7.3	16.7	6.3	20.53*
III	Waste management	76.7	3.7	90.4	6.8	13.8	7.0	15.27*
IV	Benefits	74.2	10.0	95.3	5.9	21.1	9.3	17.57*
	Combined	75.8	3.4	91.4	6.0	26.5	9.6	21.38*

* Significant at 5% level,
1.96

t (0.05,59 df) =

Table-8 depicts the aspect wise mean pre test and post test attitude on vermicomposting. It is evident from pre test attitude scores of the respondents that the aspect on waste management was ranked first with 76.7%, closely followed by the aspect namely, environmental best practices with 75.7%, benefits of vermicomposting with 74.2% and waste management with 73.8% respectively.

The post test attitude scores of the respondents revealed that maximum enhancement was observed in the aspect namely benefits of vermicomposting followed by environmental best practices, waste segregation and waste management aspects respectively.

Further the results were subjected to statistical analysis with a paired ‘t’ test and it was found that there was a statistically significant difference between pre test and post test scores (t- 20.42*) at 5% level in all the four aspects listed. The combined attitude scores of the pretest and post test also showed considerable enhancement, which indicated that the intervention program has been successful in creating awareness and bringing about an attitudinal change in the respondents.

Table 9: Aspect wise Mean Pre test and Post test Practice scores on Vermicomposting
(N = 60)

No.	Practice Aspects	Practice scores (%)						Paired ‘t’ Test
		Pre test		Post test		Enhancement		
		Mean	SD	Mean	SD	Mean	SD	
I	Environmental education	41.1	28.8	93.9	15.5	52.8	31.8	12.86*
II	Cleanliness	41.7	30.8	95.0	14.7	53.3	31.7	13.02*
III	Waste segregation	42.5	29.0	95.4	14.1	52.9	31.0	13.22*
IV	Waste management	42.5	25.1	85.0	15.9	42.5	25.9	12.71*
V	Best practice	40.5	12.4	75.3	13.0	34.8	15.2	17.73*
	Combined	41.2	16.2	83.1	10.1	41.9	16.7	19.43*

* Significant at 5% level,

t (0.05,59df) = 1.96

The mean pre test and post test practice scores on vermicomposting are presented in Table 9. It is evident that the combined post test score of 83.1 for practices was higher when compared with the combined pre-test score of 41.2. The results were subjected to statistical analysis and it was found that there was a significant difference between pre test and post test (t- 19.43*) at 5% level . The results indicate enhancement of post test practice scores of the respondents in all the sub aspects of practices on vermicomposting. The intervention program has been highly effective in empowering the respondents with the right knowledge and attitudes on environmental education and vermicomposting, which in turn has influenced their practices in a positive manner.

CONCLUSION

Overall the respondents have benefited to a great extent by the interactive intervention program. Modifying behavior through effective educational modules and favorable attitudinal changes is an essential aspect of improving the environment quotient of the respondents. In the present study, empowering the respondents through effective intervention strategies to achieve improvement in environment education and vermicomposting was considered as the

most logical approach to ultimately address the persistent waste disposal problems of our country. The findings of the present research also endorse the strong convictions of the researcher that in spite of the complexity of achieving behavior change, it is possible to identify certain effective communication strategies and deliver them to young women, who are future homemakers, career women and entrepreneurs of our country so that favorable changes in knowledge and attitudes are brought about, which can catapult into appropriate behaviors for entire communities.

Experts opine that providing knowledge is insufficient and effective education programs must promote critical thinking, decision-making, communication and interpersonal skills all of which support the adoption of healthy behaviors and the reduction of high risk behaviors. Hence, the researcher strived not only on delivering crucial information to safeguard their environment, but also on chipping away at the ignorance and myths, the attitudes and practices that perpetuate escalation of the problem of waste disposal. The study concludes that the educational modules developed in this research design proved effective in terms of bringing about a change in knowledge and attitudes and practices of the respondents.

For India to identify adolescent development as an important area for action, a need for a strategic framework of program should emerge. Such programs require a climate in which the urgency and value of action is recognized. **The case for young women's role in environmental education and vermicomposting is a powerful one.** There is an urgent need to implement effective, relatively low-cost, sustainable action on a scale large enough to meet the needs of the young women on a national level.

In this study the radical transformation of consciousness towards environment in which young women as resource people to change the negative trend to positive change in terms of human nature/kingdom to larger nature or environment has been established. The other outcome is the potential of vermicompost and leachate, the byproduct of vermicomposting which is of great significance as a bio stimulant. The researchers are now further motivated to take up this as another project to study the effectiveness of this bio stimulant. The environment or nature comprises human and plant kingdom; if these two components are friendly to the environment/nature the earth will be enriched. The study points out the potential of this reversal process both in human and plant kingdom.

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WHY SAFE MOTHERHOOD AND CHILD SURVIVAL ARE STILL A CHALLENGE IN MEWAT REGION OF HARYANA STATE, INDIA?

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ABSTRACT

This paper discusses the perspectives of women from villages of Mewat, Haryana on Mother and Child Health concerns to understand their community specific socio-cultural norms and practices related to pregnancy, child birth and child care along with identifying their information needs on the same. The study was carried out in two phases. In phase I, FGDs were conducted in four villages of Mewat and in phase II, knowledge tests were administered on the women who were either pregnant or were mothers of at least one child in 0-2 years. The content of discussions and knowledge test was about the core Mother and Child health issues like antenatal care, institutional delivery, diet during pregnancy and post-partum, breastfeeding, immunization, family planning, provisions under different government MCH schemes etc. Majority of women were unaware of the key issues due to their limited exposure, unavailability of authentic sources of information and inability to follow the right practices because of poor socio-economic status, overwork and pre-conceived socio-cultural norms which impede their health seeking behaviour. Patriarchal structure of their communities with resultant gender dynamics and religious norms seem to play a major role in suppressing women's voices for their health needs. They don't seem to exercise any agency over their own body, health and fertility.

Keywords: Mother and Child health, Gender, Socio-cultural practices, Mewat, Public health, Family Welfare.

INTRODUCTION

Health and healthy life is one of such areas in which women encounter more risks than men because of biological, socio-cultural, economic and institutional factors that reflect social inequality and affects women. The Women and Gender Equity Knowledge Network-WHO (2007) stated that gender relations of power constitute the root causes of gender inequality and are among the most influential of the social determinants of health. However, the health and well-being of women of any country represents as well as have an impact on development of that country but there are two most important issues- Maternal mortality and access to sexual and reproductive health which are being focused not only in the development agendas of all the countries but also have made to the Sustainable Development Goals.

Pregnancy and childbirth are normal events in the life of a woman. Though most pregnancies result in normal birth, it is estimated that about 15% may develop complications, which cannot be predicted. Some of these may be life threatening for the mother and/or her child. The Maternal Mortality Ratio (MMR), i.e. number of maternal deaths per 100,000 live births in India is very high i.e. 167 (SRS 2011-13). Like elsewhere in the world, the five major direct obstetric causes of maternal mortality in India are haemorrhage, puerperal sepsis, hypertensive disorders of pregnancy, obstructed labour and unsafe abortions. Maternal anaemia is a major contributor to the indirect obstetric causes. While most of these causes cannot be reliably predicted, early detection and timely management can save most of these

lives. About 830 women die from pregnancy or childbirth related complications around the world every day. Unequal access to information, care and basic health practices further increase the health risks for women (WHO, 2011).

First 1000 days of Window of Opportunity

The 1,000 days from the start of a woman's pregnancy until her child's second birthday offer a unique window of opportunity to shape healthier and more prosperous futures. The right nutrition during this 1,000 day window can have an enormous impact on a child's ability to grow, learn, and rise out of poverty. It is critical to break the inter-generational cycle of malnutrition otherwise under nourished girls will become under nourished women who give birth to low birth weight infants. Global evidence shows that timely nutritional interventions have proven to be effective in improving nutrition outcomes as well as decreasing IMR in children. These are:

- Timely initiation of breastfeeding within one hour of birth.
- Exclusive breastfeeding during the first six months of life. The infant is fed only breast milk and is not given any fluids, milk, or foods, not even water.
- Timely introduction of complementary foods at six months: By the 7th month, breast milk alone cannot meet an infant's energy and nutrient requirements. At this time complementary feeding should begin. Introducing complementary foods before is both unnecessary and dangerous.
- Age-appropriate complementary feeding adequate in terms of quality, quantity and frequency for children 6-24 months.
- Safe handling of complementary foods and hygienic complementary feeding practices.
- Full immunization and bi-annual vitamin A supplementation with de-worming.
- Frequent, appropriate, and active feeding for children during and after illness, including oral rehydration with zinc supplementation during diarrhea.
- Timely and therapeutic feeding and care for children with severe malnutrition (First 1,000 days, n.d.)

RATIONALE OF THE STUDY

Health is a priority goal in its own right, as well as a central input into economic development and poverty reduction. But at present, the health system of India is facing a number of challenges like shortage of public health care services, limited access and utilization of public health care services, limited reach to the regions where most needy and vulnerable sections of the population resides, out of pocket expenditure in accessing health care, poor implementation of the health programmes, substandard quality of services and lack of communication between the service providers and real beneficiaries of those services.

Mewat is one of the districts of Haryana state in India which was formed in year 2005 by taking areas from Gurgaon and Faridabad districts. Despite its proximity from capital of the country and a growing business hub like Gurgaon/Gurugram, it's poor development indicators are making it one of the least developed districts of Haryana. Analysis of available secondary data of health indicators from Census 2011, DLHS 3 & 4 and NFHS 3 & 4 portray a very grim picture of the health care services and their utilization, specially related to mother and child health in the district of Mewat. Jatrana (2005) reported in his study that the overall health outcome in Mewat is very low in comparison to the state's average and other districts

of the state. Analysis of available secondary data of health indicators from Census 2011, DLHS 3 & 4 and NFHS 3 & 4 portray a very grim picture of the health care services and their utilization, specially related to mother and child health in the district of Mewat. Jatrana (2005) reported in his study that the overall health outcome in Mewat is very low in comparison to the state's average and other districts of the state.

The comparative data given in following Table.1 clearly shows the Mewat district's poor performance in ensuring mother and child health care services even after implementation of government led schemes like Janani Suraksha Yojana (2005) and Janani Shishu Suraksha Karyakram (2011). Hence, it becomes very important to investigate the reasons behind this major fall off in the delivery as well as utilization of mother and child health care services in this district.

Table- 1 Comparative Health Indicators of India, Haryana and Mewat

S.No.	Health Indicators	India	Haryana	Mewat
1.	Mothers who had full Antenatal care (NFHS-4)	21%	19.5%	2.3%
2.	Institutional Births (NFHS-4)	78.9%	80.5%	37.7%
3.	Children with full immunization (NFHS-4)	62%	62.2%	13.1%
4.	Maternal Mortality Ratio (MMR) per 100,000 live births (SRS 2011-13)	167	127	480*
5.	Infant Mortality Rate (IMR) per 1000 live births (SRS 2016)	34	33	117*

*Source: Maternal and Infant Death Reporting System (MIDRS), NHM, April-June, 2015

This study was planned to understand the prevalent socio-cultural norms and practices related to pregnancy, child birth and child care from the community women along with identifying their information needs on MCH issues and related health programmes. The study also attempted to identify the barriers in accessing information and approaching health care services related to mother and child health by the community women.

METHODOLOGY

The study was carried out in five villages of Mewat, Haryana in two phases. In Phase I, FGDs were conducted in four villages (Papra, Guhana, Jahtana, Khedikala) with community women to understand the prevalent socio-cultural norms and practices related to pregnancy, child birth and child care. In Phase II, a knowledge test using a structured interview schedule was orally administered on the community women to test their knowledge

on MCH issues, related health programmes and also to find out the barriers in accessing information and approaching health care services.

For FGDs, four villages were visited, two were Muslim majority and two were Hindu majority villages. It helped to give a better understanding on the impact of both these religious perspectives on mother and child care related norms and practices. Knowledge tests were administered on the community women of five villages (Papra, Guhana, Dungeja, Khedikala, Uleta). Purposive sampling technique was used along with snow ball technique to approach the women in community. The criteria for selecting the respondents was that the woman should be married and belonging to the age group of 18-40 years, who was either pregnant or was at least the mother of a child in 0-2 years or both.

The probes for FGDs and knowledge test were broadly covered the following aspects of Mother and Child Health:

- Socio-cultural norms and practices followed during pregnancy and on child birth
- Importance of Antenatal Care, Intra-natal care, Post-natal care
- Registration of pregnancy and Antenatal care
- Nutrition and Diet during pregnancy and post-partum
- Importance of Institutional delivery
- Breastfeeding (early initiation and exclusive breastfeeding)
- Family planning
- Immunization
- Provisions and benefits under different Mother and Child health related government schemes

FINDINGS AND DISCUSSIONS

Early age marriages and education

In India, the legal age for marriage is 18 years for women and 21 years for men. But an alarming 30.2% of all married women, or 10.3 crore girls, were married before they had turned 18, as per Census 2011 data. Same was recorded from the women respondents of all four villages. In their communities, girls are married off in the age group of 13-15 years and some of them even become mother of 2-3 children by the time they are 18 years of age. Though they were aware that the legal age of marriage for girls is 18 but said that due to poverty, they are married off early. If there are more girls in family then to save the marriage expenses, elder and younger sisters are married off together.

Most of the girls and women in these villages were illiterate and if educated, maximum qualification was primary, only a few were high school pass. They don't value girl's education and hence don't send them to schools. They said that ultimately they have to do household chores and take care of the family, so there is no point getting them educated. Another reason was of their safety because of which they are not allowed to go to schools if the school is far away from their homes or community. Observance of veil was also seen in front of male members and elders that somehow limits their exposure and interaction with their surroundings to know and learn new things too. Rahman and Rao (2004) found in their study that restrictive cultural practices such as strictly enforced rules of seclusion or *purdah* (veil) for women are significantly associated with worse gender equity.

Dowry- a reason for child marriage and son's preference

Dowry was reported a common practice in these communities and was also found to be a reason for early age marriages and son's preference. They said that if girls are of more age then they are demanded more dowry and dowry amount varies with the educational level of the boy and financial status of his family. Despite having low economic standards, they take loans for their daughters' marriages to fulfill dowry demands. This is also one of the reasons for their son's preference too as their marriages would bring more dowry. It was reported that giving vehicle to the groom is compulsory, it can be a bicycle, most of the time a bike or a car if the boy is high school pass and belongs to a financially sound family.

Son's Preference

In Indian society, son's preference has always been there just as patriarchy and the onus of producing one is on women and if they don't, are blamed, taunted and tortured for the same. Due to unawareness of the fact that biologically, it's the father who is responsible for the sex of the child, women face all kinds of pressures and humiliation for not giving birth to a male child. Many a times it is seen that in case of not being able to produce a male heir for the family, they are either abandoned or are forced to live a gloomy life of neglected first wife after husband's remarriage.

According to them the ideal family in terms of number of children should have two boys and one girl or two boys and two girls but the real life situations were very different. Most of the families had 8-15 children irrespective of their religion. The ASHA worker in a village had 12 children. A traditional birth attendant (*Dai*) shared that her daughter-in-law wanted to get operated after six daughters but she didn't allow her for the sake of continuing family's name. Now she has three sons and in total nine children. This shows that the age long patriarchal structure existing in these communities not only limits most of the opportunities for women to become autonomous rational individuals but also takes away their right on their bodies and controls their fertility. Bagchi (2017) stated very rightly that a woman's most obvious power to reproduce and nurture the species is then made into the most effective engine of her enslavement.

Socio-cultural norms and practices

India offers a rich variety of socio-cultural diversity in almost every aspect of life. This diversity in terms of various norms and practices is passed on from generation to generation within the families. The birth of a child is one of such occasions which is celebrated in different ways from culture to culture, region to region. But, one commonality amongst all is that the celebration for a boy is much more elaborate than that of a girl.

In Mewat also, things were not very different. During pregnancy, no such celebration but after the child's birth sweets are shared with loved ones and neighbours. They said that people celebrate as per their economic conditions but in case of girl, mostly there is no celebration, in-fact it is tried that neighbours should not know about it and the birth of a girl child actually turns into a mourning event for the family.

In Hindu families, the birth of a boy is celebrated by sharing sweets with near and dear ones, beating plates (*thali bajana*) and singing songs (*jachcha gaana*). There are two more events- first one is celebrated on the sixth day of child birth called "*chhati poojna*" and worshipping a pond (*kuan poojan*) after around one and a half month, these are performed only for a boy. In Muslim families, arrival of a baby boy is celebrated by sharing sweets and

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after 40 days of child's birth, they organise a gathering called '*Hakiko*' in which mother's natal family members bring gifts for the new born and other family members. They said that relatives and midwives also ask for money or expensive gifts (*neg*) or some gold or silver ornaments only on the birth of boy. Also, when a girl is born, mother doesn't get proper rest and is asked to get back to the normal routine work from 4th day onwards which is around 10-15 days after a boy's birth and is not given nutritious diet too.

All these differences in rituals and traditions and also in the behaviour of the family members on the birth of a boy and girl also reinforce the preference of a male child. Women find themselves in a better bargaining position if they give birth to a male child.

Dietary pattern during pregnancy

Ransom and Elder (2013) stated that adequate nutrition, a fundamental cornerstone of any individual's health, is especially critical for women because inadequate nutrition wreaks havoc not only on women's own health but also on the health of their children. Women are more likely to suffer from nutritional deficiencies than men are, for reasons including women's reproductive biology, low social status, poverty and lack of education etc. Socio-cultural traditions and disparities in household work patterns can also increase women's chances of being malnourished.

All the women respondents said that their diet during pregnancy depends on the financial condition of the family. If they can afford nutritious diet including fruits, milk and milk products etc. then only they get to eat all these things otherwise not. They also shared that their diet during pregnancy is generally not a matter of concern in their houses and they are asked to eat whatever is available at home and keep on working. Many a times they have to go to the forests for fodder or to fetch water in full time pregnancy and sometimes delivery happens in farms in very complicated and unhygienic conditions putting mother's and child's life on risk.

Registration of pregnancy and antenatal care

Mewat is one of those districts where around 48.5% (DLHS-4) of deliveries are still happening at home as compared to 84.5% recorded in DLHS-3. In these four villages, women said that in their communities most of the deliveries (approximately 90%) take place at home with the help of traditional birth attendant (*dai*) or other experienced and elderly women of the family or community. On asking about reasons for not going to the hospitals, some of them said that in their nearby hospital, proper facilities are not available and even the staff members are very rude. So, until there is some complication which a midwife can't handle, they don't prefer to go to hospital. One of the old lady said that this generation of pregnant women can't tolerate the pain and have to go to hospital unlike the earlier times when women used to bear pain but deliver at home only. Akshay, P. & Anand, S. (2010) found in their study that bearing pain and developing tolerance without complaining about it is also something that is taught to our girls from their childhood to make them learn to compromise and adjust in any situation in order to prepare them to live in their marital home. But depriving women from a safe motherhood to make them more resistant to pain is just not human.

Breastfeeding (early initiation and exclusive breastfeeding)

In all these four villages, giving honey *ghutti* immediately after birth of the child is a common practice. If honey is not available then sugar syrup and when that is also not available then a few drops of tea is given to the child as *ghutti* even in hospital without consulting nurse or doctor. According to them honey *ghutti* clears the throat of the child. Now, almost all the children are regularly given *Mughli ghutti* till the age of 5 yrs. They didn't know much about colostrum or its benefits except that it is good for their child's health. Most of them said that in their previous deliveries which were done at home, they were asked to squeeze out that yellow milk and throw it on ashes (*raakh*). They were allowed to breastfeed only after three days of child's birth after taking bath (*nahan*) and till then child is given tea with spoon. But now with time this practice is changing. They said that in hospital, nurses give child to mothers immediately after cleaning and ask them to feed. Majority of them said that now children who are born at home also are breastfed immediately after birth but they were of the view that breast-milk is not secreted until mother takes bath on 3rd day which is nothing but a misconception.

The age long practices of not breastfeeding the child immediately after birth, throwing breast milk for three days and giving pre-lacteal feeds like honey or tea weaken the sucking and rooting reflexes of the newborn and may not result in a successful start for breastfeeding. Even now many of them don't feed their child before third day's bath.

Except a few, women respondent didn't know about exclusive breastfeeding for first six months though it was observed and reported that they breastfeed their children up-till the age of 2 or 3 years. They give water to their children in the period of exclusive breastfeeding if weather is hot and also some handy food items like biscuits or chapati roll when they are of 3-4 months. This kind of unawareness on such important issues among the mothers is alarming and may be contributing to the high infant morbidity as well as mortality.

Immunization and health check-ups of the child (0-2 years)

Universal Immunization Programme which was started by Govt. of India in 1985 is one of the largest immunization programme in the world and a major public health intervention in the country. Under the Universal Immunization Programme, Government of India provides vaccination to prevent seven vaccine preventable diseases i.e. Diphtheria, Pertusis, Tetanus, Polio, Measles, severe form of Childhood Tuberculosis and Hepatitis B.

Awareness about the benefits of immunization was negligible in the community women. There were very few of them who had got their children fully immunized otherwise majority of them were of the view that their children are doing well even without immunization so there is no need for it. Normally they take their children to hospital only when they are not well. In Papra village, women said that health check-up of the children is done at aanganwadi. For immunization, ANM comes in the community and mothers are informed by ASHA worker to bring their children and immunization card. When one of the ASHA workers was asked about the attitude of community people towards immunization, she said that even after repeated reminders women don't bring their children and many of them say that they don't want their child to get hurt or bear pain of injection. Some of them didn't even have the immunization card of their child. All mothers should be made aware of the importance of immunization along with consequences their children might have to face without proper immunization.

CONCLUSION

The paper suggests that for positive behaviour change and to encourage health seeking behaviour amongst women, awareness about MCH issues is very important. The key messages and provisions of govt. health schemes should be repeatedly shared and discussed with community women through local media of communication (drama, folk songs, community radio etc.) and personal interactions. Men should also be informed and encouraged to participate and extend their support in ensuring a healthy life and positive environment to women so that motherhood can become a happy and blissful experience for them and a reason for a healthy and prosperous society.

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WOMEN FOOD VENDORS IN TRIBAL MANIPUR: AUGMENTING FAMILY INCOME AND FOOD AVAILABILITY

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ABSTRACT

A tribal inhabited district namely Ukhrul district located in Manipur state was selected for a study with the main objective of understanding the role of tribal women food vendors in supplementing to their family income and food availability of their family; and the challenges and tough experiences they face in their venture. The reasons that pushes a lot of these women to take up this occupation and the key reason that came up was for them to earn livelihood for their family was also highlighted. These women vendors make major contributions to their family income. Purposive sampling method was used for the study. The researcher used structured interview schedule and took in- depth interviews exclusively with tribal women vendors. The salient findings indicate that once a woman enters this venture, naturally the availability of various food items in the kitchen for her own family consumption improves. The pull factors for women to take up this occupation of vegetable vending among various other occupations, was that it does not require a huge amount of capital for start-up. These tribal women come from poor economic backgrounds and they have low educational qualification that hinders them to venture into other professions. The constraints experienced by them include competition from fellow vendors and permanent shop owners, complaints and harassments from permanent shop owners and police. Some of the other challenges faced by them are the high interest rate of loans or credits, unavailability of basic facilities like toilets or market sheds, etc., dealing with perishable food items, frequent bands and curfews in the region were some of the factors that were adversely affecting their daily means of earning livelihood through food vending. However, the enabling or facilitating factor was availability of “Marup” (Manipuri word meaning “Money Pools”), which was found to be one of the most common and important types of savings amongst women vegetable vendors in Manipur. Vegetables, fruits and other food items they sell are majorly collected from their own garden, farms and forest. Not only do they make the region specifically preferred fresh food items readily available in the regional market but they also make the dull street into a vibrant lively place by spreading out their vast variety of colorful food items. Their importance not only for their family’s livelihoods but also for the society needs to be realized. The concerned local administrations and authorities should work for these women’s welfare so that they are able to carry out their important livelihood activities in a better environment with less threat and with better facilities that meets their basic needs.

Key Words: Women vendors, tribal, food availability, augmenting income

INTRODUCTION

Street vendors are the most common service providers who bring variety of daily necessary items to our reach. We often overlook their importance and the role they play in our everyday lives, we realize it only when they are not there where we expect them to be, sitting under a temporary shed in the street or plying a particular pathway (Cohen, Bhatt & Horn, 2000). National Policy of Urban Street Vendors defines street vendors as, “A street vendor is a person who offers goods or services for sale to the public without having a permanently built structure but with a temporary static structure or mobile stall (or head-load). Street vendors could be stationary and occupy space on the pavements or other public/private areas, or

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could be mobile, and move from place to place carrying their wares on push carts or in cycles or baskets on their heads, or could sell their wares in moving buses." (National Policy on Urban Street Vendors, 2004, Department of Urban Employment & Poverty Alleviation, MUPA, GOI).

The exact count of street vendors around the world are incredibly hard to get as their numbers are highly under reported and some countries don't even keep tabs.

Global food insecurity and hunger has been the major problem since the beginning of time. UN Sustainable Development Goals 2016 has listed food security, alleviation of hunger, improved nutrition and promotion of sustainable agriculture as one of the major goal to be achieved till 2030. According to UN survey one in nine people in our world are malnourished (UN Sustainable Development Goals, 2014).

There has been major evidence that shows the vital roles our street vendors have to play in providing conveniently available low cost food gathering to all income group, consequently having a great scope in serving to achieve this developmental goal if they are uplifted and encouraged.

Tribal women food vendors

All over the world both in developed and under developed countries poverty takes the face of female, they many a times are the ones who suffers the most. Many a times the economic activities that women engage also are found to be too small to quantify for conventional lending programmes like loans from banks, financial institutions, government programmes, etc. (Rita Endeley and Thompson, 2005)

And as when it comes to comparing women in other regions with women in the tribal, tribal women suffer the most. Report on tribal women and employment National Commission for Women 1998 mentions that tribal women bear the major burnt as she is not absent from any economic and social activities, whether it is at home, farm, forest, or market.

Women food vendors play a key role in fulfilling the economic and food security of their family and society at large. The role of women, though not recognized and generally remain invisible in our society are yet very crucial. By and large when we look at women all over the world women have been mostly the invisible/unrecognized bread winners of their family. For women in developing countries one of the largest sources of earning their livelihood is through employment in the informal sector then it is for men. Other than in the North of Africa, where the employment of women in the informal sector is 43 per cent, 84% of non-agriculture workers in the sub-Saharan Africa and 85 in Latin America. When we look at the informal economy in India, it employs about 86% of the country's work force and 91 % of its workers are women. In the Indian economy the lower income group women workers working in the informal sector face a lot of challenges and they are a highly vulnerable group, the reasons are that their works are seasonal and irregular, they have little or no power to bargain, they belong to low economic status, less control over what they earn, generally balance their earning work with child and homecare, lack of ownership of any assets and they have very less access to any available institutional credits, training and knowledge/information (Kamala Kanta Mohapatra, 2012, 197).

Around the world many of the women are generally engage in vending goods in the street, majority of them involve in selling variety of food on the street as it is one of the easy earning professions with no high investment and with little or no educational qualification required. Women food vendors are identified as self-employed workers. Sally Rover states that, "Official statistics shows that street vendors make up between 2 and 24 per cent of total informal employment in African, Asian and Latin American cities. In many countries,

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especially in Africa, the majority of street vendors are women” (Sally Rover, 2014, 1). Like any street vendors that provide wide range of goods and services to the public, food vendors are scattered at all the corners of streets and they provide easy access to variety of fresh seasonal vegetables and fruits. They play an integral part in the economy.

Different Stakeholder Perspectives on food vending as an occupation

Municipal authorities:

Often authorities consider street vending as a menace or a nuisance. They are often accused of causing traffic jam, hindrance of the movement of public or involving in anti – social activities. They are often the target of the law enforcement, there has been time when they are harassed, fined or their goods gets confiscated. They often end up taking out a share from their hard earned money for paying bribes to the authorities to continue running their business. Most cities regard hawking/ street vending as illegal activity. Some of the municipal and police authorities impose restriction although not directly but for using urban space for street vending. According to the authorities and the police they are doing their duties, as the legislation of some of the major cities of India where the population of street vendors are vast like in Mumbai- The Bombay Provincial Municipal Corporation Act, 1949, Gujarat Town Planning and Urban Development Act, 1976 and Ahmedabad- Municipal corporation regulates trades in Ahmedabad under the provision of Bombay Provincial Municipal Corporation Act, 1949, briefly, all the acts prohibits the setting up of stalls or structures on the streets which destruct the public area, traffic or are hindering the proper flow of drain or open channel. Police officers in such cases are allowed to evict the street vendors or arrest everyone about to commit this offence without orders from the magistrate and without warrant. (Darshini Mahadeva, Suchita Vyas, 2012)

Permanent Shop Owners:

Permanent shop owners are often one of the major section opposing the existence of street vendors. People vending goods around their shops are seen as a menace that obstruct the proper running of their business and a competition. A news article covered a particular case in Indore where street vendors were removed by the Indore Municipal Corporation (IMC) with the help of police for reducing the competition for the permanent shop owners (Daily Bhasker.com, 02.08.13). There are many such cases because their existence are denied saying that they are transient workers and have no rights to be occupying the space as they will soon disappear.

Concerned civil society organizations and their role:

SEWA (Self Employed Women's Association) is one of the leading central trade union organizing women workers of the informal sector since 1972 with a goal of full employment and self-reliance in the country. They have major concerns for street vendors taking up many initiatives initially starting from demand for “Do Tokri Ki Jagaah” (place to keep two baskets) which went to the extent of International arena after not being considered properly in the national level. The organization worked and campaign on legal rights of street vendors. It passed a declaration demanding policies and space for vendors that urge upon the government to set up appropriate, participative, non-formal mechanism with representation by the street vendors, voluntary associations, local authorities, the police and others. They also emphasis on providing them with meaningful access to credit and financial services. SEWA initiated and set up the major coalition for the welfare of street vendors known as National Alliance of Street Vendors with representatives from unions and NGOs for pressuring the government to announce a “National policy for street vendors”.

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The National Association of Street Vendors of India (NASVI), registered in 2003, under the Societies registration Act of 1860 is an organization that brings together street vendor organizations under a single platform to collectively struggle for macro-level changes that are crucial for the livelihood of around 10 million vendors. According to the organization the outdated laws and changing policies, practices and the attitudes of those in power are threatening their livelihoods. They reached their major milestone after raging protest campaigns and mounting pressure on the political parties, on 19 February, 2014, the Rajya Sabha also passed the Street Vendors' Bill and thus Indian Parliament listened to the voices of street vendors of India. Though they have taken a huge leap from the time where there were no proper laws, they are still struggling for proper implementation of the central legislation (NASVI 2014).

Legal and regulatory environments governing street vending:

Street vendors Act of 2014 is the pioneer act for street vendor's livelihood and regulation protection. It allows all the street vendors with vending certificate to run their business according to the terms and conditions mentioned in the paper. The passage of the act is a major achievement which is the result of more than 30 years of activism and struggle of the National Association of Street Vendors and the Self Employed Women's Association. (Ministry of Law and Justice, 2014). The act is still new in the country so there is still a struggle for the proper implementation and enactment.

Research method:

Purposive sampling method was used for the study. The locale of the study was in a tribal inhabited town namely Ukhrul town situated at Ukhrul district, Manipur. The researcher used structured interview schedule and took in- depth interviews with 30 women vendors from a market in Ukhrul. Only tribal women were selected for the study.

The general objective of the study was to understand the role played by women food vendors in augmenting income and food availability of the family.

Tools for Data Collection

- Structured Interview schedule was used to collect the information pertaining to the objectives of the study.
- Observations and In-depth interview were taken with 30 selected women vendors on key aspects on their exceptional role and struggle of overcoming challenges in their daily livelihood struggle.

FINDINGS AND DISCUSSIONS

Socio- economic and demographic background

Table:1.1: Socio- economic and demographic background

Literacy rate		
	N=30	%
Illiterate	9	30
Up to primary	13	43.34
Up to secondary	8	26.67
Total	30	100.00
Marital Status		
Status	N=30	%
Married	23	76.67

Single	2	6.67
Widow	5	16.67
Separated	0	0
Total	30	100.00
Ownership of house		
Ownership	N=30	%
Rented	15	50
Own House	15	50
Total	30	100.00
Types of Family		
Type	N=30	%
Nuclear family	24	80
Joint family	6	20
Total	30	100.00
Source of start-up Capital		
Source	N=30	%
Own money	22	73.34
Borrowed from family or friends	12	40
Loans/Credit	17	56.67
Others	0	0
Total	30	100.00

Majority of the women who took up vending were between the age group of 36 to 45 years and who were married. These women generally venture into this business after they get married as they have to run a family with children and supplement or take charge of the expense and needs of the family. In most of the poor tribal regions it becomes a responsibility of women and not only of a man or husband to be the bread winner of the family. There are fair amount of women who still continue to be in the venture after the age of 46-55 or 56 and above, which show that the dependency of the family on their small income persist for a long period of time. It was also found that most women food vendors were found to have a low educational background. Food vending as a part of any other street vending is one such venture that do not require a women to be highly educated to run her business.

It was seen that out of the women interviewed half of them lived in a rented house. Owning a house within the town whether it be big or small were seen to be a very important factor that contributes to how much they can divert their income in other necessary expenditure rather than paying their hard earned money on rent.

During the last few decades the nature of family trend has shifted from living in a joint family to a nuclear family, people come from their villages to temporarily or permanently settle in towns or more urban places that provides them with better living prospects which is why young families usually leave behind their parental homes and start living in nuclear family settings which are considered to be more convenient trend of living. 80% of the women were found to be living in a nuclear family and only 20% in joint family.

46% of the women had been in the business for a long period of 5 years and more, 26% are there for 2-5 years and another 26% for less than 2 years. The longer period of being in the

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venture is a kind of assurance of their stability in the business. They tend to occupy a more permanent spot in the market itself despite the fact that those spots or stalls are more or less temporary.

Source of goods for selling:

Majority of the women i.e. 27 out of the 30 women respondents opted for supply of goods from small scale whole sellers. A good number of them also sell vegetable and fruits grown in their own gardens or farms.

This small scale food supplies are mostly organic and thus they are free from chemicals and good for health. They meet the unique preference of food of people in region, and thus the consumers have the option to opt for either the healthy organic food items or the ones available in large scale brought in from other parts of the country which are in-organic. One of the perk of vending food is that the food and nutritional security of the family are also fulfilled, all of the women respondents said that they were able to take out some amount of food items for the consumption of their own family, at times when they are not able to sell all of their produce in the market they bring it home for their own consumption. This adds to the variety of food that adds to the nutritional value of the food that they consume. This type of vending despite the fact that it is carried out in small scale plays a very important role in meeting the food demands of the region and thus fulfilling the important healthy and nutritious food security of their family and society at large.

Financial profile:

Table:1.2: Source of start up capital

Source	N=30	%
Own money	22	73.34
Borrowed from family or friends	12	40
Loans/Credit	17	56.67
Others	0	0
Total	30	100.00

73% of the women were found to have started their business with their own money. Some borrowed it from friends or family or taken credits or loans from money lenders. This shows that the women themselves choose to be in this business on their own will, which can be in certain way seen as a kind of empowerment, even if it is their financial challenges that might have compelled them to take up this business, they are taking charge of their own means to earn their livelihood.

It was evident that a large number of women i.e. 21 out of the 30 selected respondents, had taken some kinds of loans or credit in the years of running their business. Taking money from money lenders were the most relied upon source of credit or loans, despite the fact that the interest rate of such kinds of loans were as high as 10% or more. Only two of the women took loans/credits from marup or other cooperatives. None of them had ever taken any loans from banks. The most common reasons they gave for not taking such loans from banks were lack of information and also their perceived notions of having to go through long process of paper work.

Table 1.3: Number of women taking part in Marup and the purposes for which they use the money

No. of women who are a part of Marup	N=30	%
Yes	25	84
No	5	16.67
Purpose of using the money from marup		
Purpose	N=30	%
Buying necessary household items and other household expense	25	83.34
Children's education	20	66.67
Buying jewelry	4	13.34
Expanding business	3	10
Others	0	0

Marup is a local Manipuri word meaning money pools. These were found to be the most common system of savings among the women vendors. 25 out of the 30 participants were a part of marup with their fellow vendors, in which they collect some amount of money daily, weekly, monthly or yearly and at the end of a decided tenure each one of them take turns to gets the total amount of collected money.

Majority of the women made use of the money from the marup for buying household items and other necessary household expenses, and also largely on their children's education. A few of them were also using the money for buying jewelry and expanding their business.

These kinds of marup system are very important in aiding their financial needs. It also acts as a type of small short term savings for women vendors who do not have other savings accounts in other place such as banks or post office. These women vendors should be encouraged in inculcating the habits of small savings to help them have at least a small financial security. These financial securities in the long run would mean their growth and success of their venture.

Reasons that motivated them to start vending

Table:1.4. Reasons that motivated them to start vending

Reasons	N=30	%
To earn livelihood	28	93.34
To be independent	9	30
Both to earn livelihood and to be independent	7	23.34

Majority of the women enter into this business of vending to earn their livelihood, to provide for their family. Most of them though they might not be the sole income earners of the family are major contributors to the income of the family. Some few also take up this business to be more independent financially and emotionally as when they start earning income of their own

they feel more empowered and satisfied as they are able to provide for the needs of their children and family.

None of the women vendors said that they were not satisfied with their work. 63% said that they are satisfied as they are able to earn a living and supplement the income of the family, but they also said that had there been any other better opportunity of earning they would opted for that. Most of the women who enter this venture are either illiterate or have a less education, which is why their chances of having other better jobs are very low so many women choose to be in these venture where there are little to no educational qualification is needed. Some who enter this venture to be independent along with earning income to take care of their family said that they are satisfied with what they are doing. These women vendors seem to be getting a positive response and encouragement from their family members. They are helped out in their household chores when they are at work; they also get financial help and did not complain about their work timings. Lily from Lungshang village said, *“My children use to tell me how thankful they are to me for managing the household needs and supporting their education with my little income. They said that I inspire them to work hard. They help me with my household chores when I come home tired from work”*. Shanti from Longpi village said, *“My husband was the one who borrowed money from one of his friends for my start up when I told him that I wanted to start this venture”*. These are the kind of encouragement that fuels their zeal to do something in their capacity to help out their family to have a better life.

Challenges

Challenges women vendors face

Table: 1.5: Challenges faced by women vendors

Challenges	N=30	%
Competition from fellow vendors	28	93.34
Competition from permanent shop owners	24	80
Complaints and harassments from permanent shop owners	6	20
High interest rate of loans and credits	17	56.67
Others	6	20

Despite the important service they provide their activities and motivations have continued to remain poorly understood. Most of them do not have a fix avenue such as small shops or stalls to sell their goods. They sit in pavements or road sites where police usually harass them verbally or they are fined or their goods are confiscated.

They are not covered under any legal provision, the nature of their work condition make them fall in the category of unorganized/informal work sector. They are highly vulnerable and subjugated to harassment.

Their work environments are filled with many shortage and insufficiencies in facilities but most of them are so used to this kind of working environment that they do not realize their rights and basic needs are not being fulfilled.

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The study revealed that women vendors face a lot of challenges in their business.

- a) Competition- They have to always keep their business alluring so as to keep up with their business competitors, these competitors according to them are their fellow vendors and permanent shop owners.
- b) Harassments- They also sometimes faced complaints and harassments from permanent shop owners.
- c) High interest rate- Women who were running their business with loans, mentioned that the high interest rate of the loans is a major challenge they face, as there is not much left for them to take home after they pay the interest.
- d) Unavailability of Basic facilities- Most of the women use public toilets for their needs. Only few of them go to their relative's houses near the market as there are at least some basic facilities of water soap etc. available, which the public toilets near their vicinity do not have.
- e) Dealing with perishable food items- All of the women food vendors sell perishable food items. Some also sell non-perishable items along with perishable items like fruits, vegetable and other foods items with shorter shelf life. It is constantly a daily challenge for the women to try to finish selling their food items on time before it gets rotten or spoiled.
- f) Bands and curfews in the region affects their business- Due to the continuous political unrest in the region there are constant band and curfews, and 100% of the women said that their daily business is affected by this. The effects of this bands and curfews on their business are spoilage of perishable food items as they are unable to sell it when they are fresh. Secondly many women invest in daily marup, when the market close down for a day or two the women vendors have to find a way to pay their marup which they otherwise pay it out of their daily income. Some suffer loses when they have to cancel any vehicle they hire to bring their stuff to the market. Friends family and fellow vendors are the most relied upon source of information or news on any upcoming bands and curfews that close down the market. Some few gets the information from local authorities and local newspapers.

Methods adopted for reducing the threat of losses:

Table:1.6: Methods adopted for reducing the threat of losses

Methods	N=30	%
Selling from home to home or at home	18	60
Distributing it to their neighbors	22	73.33
Adopting and learning methods to preserve food or keep the food items fresh for longer period of time	27	90
Selling it at a cheaper rate	14	46.67
Others	1	3.33

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Women vendors have adopted various measures to prevent or cope with any losses when they are not able to finish selling their products in the market on time. 60% of the women try to sell their goods from home to home and they even sell it from their own house to their regular customers. Sharing and distributing their food items to their neighbors is also a common way adopted by women, this way instead of letting their food items get spoiled and wasted they give them away which help in their social bonding. When these vendors started their business, the variety of food in their own kitchen also increased, so when we look at it in one perspective they are helping in meeting the nutritional requirements of the people around them along with dealing with the food that would have otherwise been wasted. Some sell it at a cheaper rate at the end of the day so that they can finish it off and go home. They also lean to adopt various methods of keeping their perishable food items such as fruits and vegetables fresh for a longer period of time, the ones which they are not able to keep it fresh for long they make them into pickles, jams, juice, etc. so that they could preserve it and might also resell them in the market.

Usually when women vendors are not able to sell off their stuffs in the main market or when there are bands and curfews due to which they need to finish selling of their goods as early as possible they choose to sell it from home to home. Most of the women vendors visit at least 30 to 45 houses per day. Some women also choose to sell off their stuffs at their own home because it is more convenient, and they can cut off the expenses on transporting their goods to the market or on expenses like buying their refreshments when they sit's at their stall in the market and other such expenses.

Intervention from police and local administration:

Table:1.7: Intervention from police and local administration

Interventions	N=30	%
Enforcements of strict rules and regulations	4	13.33
Looking into the welfare of the vendors	22	73.33
Prevention of violence and harassments	23	76.67
Providing space for vending	18	60
Others	4	13.33

No strict rules and regulation are enforced by the police or the local administration on the women vendors. 73% said that the local administration has helped them and looked into their welfare such as giving them space to sell their goods and building semi-permanent shed for them. They also have prevented violence and harassment in the streets, making it a safe place for women vendors to carry out their business.

The only proper rules or norms set for the vendors were the days and time for opening and closing of shops. Other than that there are only few who mentioned payment of tax and duties, specification of space for vending and specification of selling items as set rules and norms. Women who were not only selling their foods in the market but also transporting it

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down to bigger market in the valley are the ones who experience imposition of tax and specification of selling items from the local administration.

Work place social environment and their effects on their daily business

All of the women said that their relationships with their fellow vendors are either good or very good. For these women their fellow vendors are like any co-workers in other field of work, good relationships with fellow vendors play as an important factor that drives and fuel these women to continue with their work despite the various challenges in their venture. Luingamla from Longpi village said, *“I have become very close to some of my fellow vendors, they are the one I spend most of my time with. We share our family problems or other problems with each other. We support one other emotionally, sometimes financially or in any other ways that we can.”*

90% of the respondents are a part of their trade union; some few who were not registered in this union were the ones who came to the market for selling their goods occasionally. Being part of the collective union gives them a sense of belongingness; they get social and emotional support, and thus decades back when there were no fix place for them to carry out their business they were able to fight for their rights and claim their space for vending. They organize gatherings, or during weddings or funerals of any fellow vendors or their family members they show their love and support as a group. Silla.S. from Poi village said *“All of us fellow vendors are like family now, we are there for each other in every major events of our lives; may it be at the time of grieve or celebration. We try to help each other in ways we can.”*

CONCLUSION

Women food vendors take an equivalent role as their male counterparts in providing for their family in tribal regions. These women vendors are the major income generators and providing better nutritious food not only to their customers but their own family food availability also increase and often gets extended to their neighbors or relatives. Many of them opted for this business because of lack of other better opportunities. They have to go through several challenges every day in struggling to run and to keep their business functioning. Better laws and orders to safeguard their rights and provision of better welfare means is desired. The concerned local administrations and authorities need to take cognizance of this important economic activity of the local tribal women and provide for basic facilities and health and insurance of these women so that they are able to carry out their important livelihood activities.

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SCHOOL ENVIRONMENT AND INCENTIVES SHAPE THE ASPIRATIONS OF YOUNG GIRLS: CASE OF GOVERNMENT SCHOOLS OF DELHI

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ABSTRACT

The government of NCT of Delhi launched Ladli Scheme in January 2008. A study was carried out to determine the perceptions of young girls enrolled in the scheme about its usefulness and their future aspirations. The study also attempted to secure evidence on the use of maturity claim money by the beneficiary girl children. The study also took into account the influence of the school environment, in shaping the aspirations of the girls. The study used mix methods design to elicit information about the aspirations of ninety girls studying in class XII in three types of Government schools namely Rashtriya Pratibha Vikas Vidyalayas, Sarvodya Kanya Vidyalayas and the Government Girls Senior Secondary schools of Delhi. North West district of Delhi with the highest enrolments under the Ladli scheme was selected as the locale of the study. The aspirations of the girls seemed to be shaped more by the type of school they studied in and the promised incentive money under the Ladli scheme gave them confidence of being able to pursue education.

Keywords: Girl Child, Sex selective abortions, Girls' education, Ladli scheme, Career aspirations

INTRODUCTION

The gender imbalance caused by a skewed sex ratio against girl children is a result of excess female infant mortality due to malnutrition and neglect, and sex-selective abortions, the roots for these practices lie in strong cultural preference for sons (Asadullah & Chaudhury, 2009). Another endemic pattern against girls is the high opportunity cost of educating them against their contribution to the family for household chores and care of the younger siblings. The schemes for protecting the girl children have been conceived to help reverse these trends and motivate and enable parents to send their daughters to school. This is steeped in the decades of empirical evidence and practical experience of linear relationship between women's educational attainment and development outcomes. It is now conventional wisdom in development discourse that where education levels are high among women, fertility rates are lower, family size is smaller, and women's health and economic status are better. So, there is no denying that education is essential to prepare girls for healthy, safe and productive transition into adulthood (Klasen, 1999). Girls' education has also proven to be a remarkably effective catalyst for social development and economic growth. So it is in some

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sense not only the individual girl who is empowered – it is the broader society (UNICEF, 2007).

The government of NCT of Delhi launched Ladli Scheme in January 2008 with the aim of ending discrimination against girls and promoting their education. The scheme aims at ensuring proper education to make the girl self-reliant. It attempts to provide economic security by providing financial assistance to school going girls. Thus, it attempts to mould the traditional mind-set of the people towards the birth of a girl child and to impart education to their daughters. It would also increase girls' presence in schools and reduce their dropout rates.

A study was planned to understand the future aspirations of young girls studying in class XII and to examine the influence of Ladli scheme (if any) in shaping the future aspirations of beneficiary girls. The study also attempted to assess the influence of school environment (if any) in shaping the career aspirations of the girl students. Evidence was also secured to analyse the influence of Ladli scheme in helping young girls realise their aspirations with the help of maturity claim amount received by them. According to the data procured from Ministry of Women and Child Development, Government of NCT of Delhi, the ministry responsible for this initiative, the North West district had the highest rate of enrolments under the Ladli scheme in the year 2014-2015 and hence it was chosen as the locale of the study.

Ladli Scheme of Delhi

Under the Ladli scheme the government sanctions financial assistance to school going girls. The financial partners of the Delhi government for implementing the scheme are SBI Life Insurance Company Limited (SBIL) and the State Bank of India. The financial assistance sanctioned by the government in favour of girls is deposited with SBIL till the girl becomes eligible for claiming the maturity value at 18 years. The financial assistance under this scheme is restricted up to two girl children in the family.

The Directorate of Education of the Delhi Government is responsible for implementing the scheme. It runs three kinds of schools for girls in higher secondary classes namely Rajkiya Pratibha Vikas Vidyalayas (RPVVs), Sarvodaya Kanya Vidyalayas (SKVs) and Government Girls Senior Secondary Schools (GSSS). Rajkiya Pratibha Vikas Vidyalayas (RPVVs) provide education from VI to XII standard. In these schools meritorious students from all government schools are admitted through a planned achievement-cum-aptitude test. These schools are prestigious institutions that have facilities and teaching faculty as per the established standards. The second type of schools are Sarvodaya Kanya Vidyalayas (SKVs), these are also called composite schools and run classes from I-XII. Government Girls Senior Secondary Schools (GSSS) are the third type of schools which include middle, secondary, senior secondary classes (Mahajan and Goyal, 2005).

For the study, in all 90 girls were selected from one school each of the above mentioned three types of schools to ascertain the influence of Ladli scheme and also the school environment in shaping their future aspirations. In addition to these, ten girls who had passed out from these schools were also interviewed to document evidence about the usage pattern of the maturity claim amount of the scheme.

Only girls studying in class XII were selected for the study as it is the last lock-in period for the scheme therefore these girls could provide better insights into the functioning of scheme and also would be more have relatively better sure of what they wish to do after completing their school education.

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The study revealed that 62% of the beneficiary girls under study had enrolled in the 3rd lock-in-period i.e. in 6th class, 36% in 9th class due to issues with procuring the required certificates and only 2% of the girls in 10th class as they had migrated from other schools and were helped in getting registered under the scheme by their teachers. This shows that efforts need to be made to create awareness among the stakeholders especially the teachers of MCD schools in Delhi as the students can avail the maximum benefit of the scheme if they get enrolled at the early stages.

The socio economic profile of the respondents reflected that most of these girls came from resource poor backgrounds with minimal economic resources and majority of them were living in joint families. Their parents were involved in menial jobs with minimal wages. Cash incentives being provided under the scheme were an attraction for these girls to continue their schooling.

Future Aspirations of Young Girls studying in Class XII

Almost all the girls wanted to continue their education to be successful and to secure their future. The girls in all the three types of school had some idea about what would they like to pursue after their schooling, 70% of the girls wanted to get enrolled in a regular college and the courses of their choice. RPVV girls were more explicit in their choices as compared to GGSS and SKV girls. It was heartening to know that the awareness level of the students of RPVV schools about the future career options available was quite high and they were conscious about the choices they made. RPVVs offer all the three streams i.e. Science, Commerce, Humanities, which made it possible for them to know about the avenues available in diverse fields unlike girls from SKV and GGSS who had limited choice of subjects for class XI and XII and could pursue only humanities or commerce. Even the commerce stream was available in a few SKVs and GGSS.

On being probed about their motivation to study, the girls expressed their desire to create an identity for themselves. They wished to meet their family's needs. 66% of the girls wanted to be economically independent. It was also observed that these girls were sure of their parents support for pursuing further education.

Influence of School Environment in shaping the Career Aspirations of the Students

It was observed that the girls from RPVV were more motivated and determined towards their future as they were all meritorious (admitted in school through a competitive exam) and their school had good facilities and competent teaching faculty.

For the purpose of study the facilities in the three types of schools were also examined and on the basis of observation and focus group discussions carried out with the girls, these facilities were classified into three categories: Basic, Desirable and ICT enabled facilities. Basic facilities for the purpose of this study included drinking water, toilets, and cleanliness in the school and furniture in their classrooms. Desirable facilities included laboratories and playground and ICT Support facilities included computers and smart class rooms in the school.

The data depicted that the facilities of RPVV schools are good and offer opportunities to the students to realise their potential whereas on the contrary SKV and GGSS schools need to be supported to enhance their infrastructure and improve facilities.

After examining the quality of infrastructure and its possible influence on students' achievement potential and exposure, the study examined the influence of Ladli scheme in shaping the future aspirations due to the available cash incentive. 55% of the girls believed that Ladli scheme can help in improving the status of the girls as the parents who cannot

afford to spend money on their daughter's education, have now started sending their daughters to school and let them complete education up to 12th standard. Therefore the length of the schooling period for girls gets extended and it helps them in getting a better understanding of the future options available for pursuing studies and career options available after school like vocational education opportunities or job opportunities to become self-sufficient. The students expressed that in the last few years in school, while in classes X to XII they became aware of many options which they were ignorant about earlier like vocational courses, distance education facilities, jobs in call centres and beauty and fitness industry and felt competent to work in future. They felt they could fight for their rights. Some of them for whom pursuing education could be difficult felt assured of continuing their education with the help of maturity claim amount. On the contrary, 45% of the girls believed that Ladli scheme may not be of great help as per their seniors' experiences. They felt that most of case beneficiary girls do not get money in time and generally for most of them, it is a meagre amount, owing to their enrolment in the scheme at a delayed milestone level, reducing the maturity claim they were entitled to and hence it may not be enough to meet their future educational needs. At the same time, 91% of the girls believed that they will try to pursue their education or get into vocational training even if they do not get the maturity claim. This was heartening that the girls across the schools were motivated to continue their education irrespective of receiving Ladli scheme benefits or not.

While examining the influence of Ladli scheme in realising the aspirations of the beneficiary girls, who have passed out from the schools, it was found that most of the girls had to face problems while claiming the maturity amount. They had to follow a cumbersome procedure of getting their documents verified, which took very long resulting in delay in claiming the money. Also there were delays in renewal of the forms and in most cases they had not received the renewal receipts from the department, hence they did not have any proof of registration. It was also observed that the girls who had passed out after 2014 were able to receive the money, but still there were many girls who had passed out from school earlier and their maturity claims got delayed due to the reasons discussed above.

Based on findings of this research, a few suggestions could be considered to implement the scheme better. These can be -

- 1. Generating awareness about the relation between Lock-in period and Maturity claim amount:** Awareness should be created that the parents who register their daughters at birth in the scheme would only get one lakh rupees at the time of claim. Most of the girls and their parents did not know this and had very high expectations of receiving the advertised claim amount of Rs. One lakh even they get their daughters registered at later stages of the scheme. Also this would motivate people and create awareness about earliest registrations at birth and enrolling eligible girls under the scheme.
- 2. Issue Identity cards to all registered girls and reduce paper work:** The Implementing authority should make an endeavour to reduce paper work involved in registering under the scheme and a better method needs to be devised for easy renewal. For every applicant, reapplication in the next successive stage is mandatory. Besides this, parents are also required to attach a number of other documents along like voter ID card and ration card, due to this, some applicants are unable to receive

the benefits of the scheme as they are unable to produce all such documents. Instead every beneficiary girl child may be issued an identity card at the time of registration and subsequent renewals can be made on presenting this card at every stage. The card can have all the details about the applicant and also a table depicting the six different stages of this scheme. When the applicant applies for the scheme, the parent, the implementing authority like school principal and district officer should acknowledge by signing in the respective cell.

- 3. Offer financial assistance within two weeks after declaration of senior secondary examination result:** The maturity claim amount can be transferred to the bank account of girls within two weeks of announcement of result of class 12th, and not until after one year as then the beneficiary girls would be able to utilise the maturity claim to pay fee for their admission to the desired courses in time without any delays. This will enable young girls to pursue studies despite economic constraints and the benefits will be able to give economic and emotional satisfaction.
- 4. Employ more staff:** The department must employ more workers at the district office to enhance its service provision so that the maturity claim procedure and the verification procedure can be done smoothly without any backlog.
- 5. Training of public information officers and staff in government offices:** The people appointed to provide information about the Ladli Scheme at the time of birth and in schools must be well-trained and well-informed about its procedure and other details. They should be genuinely willing to explain this to the parents, considering not many parents may be fully aware of all the requirements and eligibility criteria due to their low educational levels and poor access to information about the scheme beyond the school system.

CONCLUSION

The idea and design of the Ladli scheme of Delhi is commendable. Making educational milestones as the conditions to avail the benefits at 18 years of age by the beneficiary girls is a very appropriate structure to promote education among girls and to extend years of schooling for girl children and also delaying the age at marriage for young girls. The increase in the number of girls getting registered under the scheme gradually over the years is a testimony of the good response from parents of girl children from economically deprived sections. However there is a lot of scope for improvement in implementing the scheme. There is a need for greater synergy between the Department of Women and Child Development of NCT of Delhi and Department of Education and the Banking system to plug the gaps in the process of registration, renewals and disbursement of maturity claim. Similarly, it must enhance its service by employing more staff and training all the implementing stakeholders regularly to reduce the delays and avoid inconsistencies in the data for renewals and maturity claims.

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AWARD PAPERS

BANANA FIBER TO FABRIC: PROCESS OPTIMIZATION FOR IMPROVING ITS SPINNIBILITY AND HAND

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ABSTRACT

Banana fibers are obtained from the banana pseudostem which is discarded after the harvest of banana fruit. These lignocellulosic fibers are lustrous and stronger than cotton. The inherent drawback of banana fibers is the stiffness due to high lignin content. Hence there is need to soften banana fibers to be used in textiles. The present study aims to soften banana fibers and spin yarns from it. The spun yarns were used to construct banana blends.

Two softening treatment were standardised using enzymes and chemicals. The chemical treatment has been applied for patent. Both the treatments were applied on banana fibers and their effect was studied with the help of material characterization and physical properties. The untreated and treated yarns were used to spin two varieties of yarn: hand spun and ring spun. Another set of yarn was procured from Navsari Agricultural University, and cotton banana fabrics were woven. The fabric was divided into three parts, one was kept as untreated and the other two were treated with enzyme and chemical treatment.

It was observed that chemical treatment was more effective than enzyme treatment. Enzyme treated fibers had a soft hand but lacked spinnability. Treating at fiber stage gave better results than treatment at fabric stage. Fabrics made by using yarns from Navsari resulted in thick fabrics, which after treatment can be used for home furnishings.

Key words: banana fibers, banana yarn, banana fabric, spinnability, softening

INTRODUCTION

Banana is the second most important food crop grown in India. Major producing states are Tamil Nadu, Maharashtra, Karnataka, Gujarat, Andhra Pradesh, Assam and Madhya Pradesh. Gujarat ranks sixth in the area cultivation of banana in the country with the average cultivation area of around 46,500 hectares with a production of 1.9 million tonnes. Every year around a billion tonnes of banana plant stems are thrown on roadside after harvesting of the fruit. The biomass is either dumped on the roadside or burnt or left in suit causing detrimental impact on environment. Presently, waste banana stems pose problem of disposal and are available almost free of cost in Central and South Gujarat. Banana fibers can be extracted from these pseudostem (banana biomass) using Raspador machine which has been developed in recent past. Banana fibers hold more significance because they are extracted from disposed biomass of a food crop. Application of banana fiber for manufacturing textiles is a new concept in India. In India, only 10% of the banana waste (Pseudo stems) is used for extracting the fiber, rest is wasted. Banana fibers have excellent strength and luster. It is extremely important to realize the potential of these fibers and put them into textile application.

The potential banana fiber that can provide farm and off-farm based employment to large section of the population, utilization of the so called waste to generate wealth thus providing additional avenue for livelihood generation, allows for green economy. However, the inherent drawback of banana fiber is its poor quality and higher irregularity, owing to the multi-

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cellular nature of the fibers. Therefore, optimization of softening process for banana fiber is required, that could improve its spinnability. Hence, the present study was carried out with the following objectives:

Objectives of the study

1. To study the fine structure and physical properties of procured banana fiber.
2. To optimize chemical and enzyme treatment conditions for softening of banana fiber.
3. To test the physical properties and chemical composition of untreated and treated banana fibers.
4. To prepare hand spun yarn using untreated, enzyme treated, and chemically treated banana fibers and test their physical properties.
5. To develop hand woven fabrics using 100% untreated and treated banana yarns.
6. To apply optimized softening treatments on cotton banana fabrics developed from procured banana yarns.
7. To test and compare the properties of the fabrics prepared and suggest their end use.

METHODOLOGY

The study undertaken was an experimental and exploratory in nature. The study was divided into three phases: Fiber, Yarn and Fabric stage.

Phase I: Fiber stage

The study started with selection of raw material. Banana fibers were procured from three different sources, and on the basis of their strength and availability fibers were selected. The raw fibers were studied for its physical properties, microscopic properties and material characterization. Banana fibers are lustrous and possess excellent tensile strength. However, they need to be softened to improve its hand and spinnability. Hence based on the objective of the study two softening methods were standardised i.e. chemical treatment and enzyme treatment. After the chemical treatment, the effluent was also analysed. The untreated and treated banana fibers were tested using relevant testing standards.

Phase II: Yarn stage

Two sets of yarns were prepared using the untreated and treated fibers. Handspun variety of yarns were spun using the untreated and treated yarns on phoenix charkha. Another set of blended yarns was taken up as a project with TRADC Kosamba. The chemical treated fibers were blended with viscose, modal and excel. The enzyme treated staples were blended with only viscose. The methodology and results of this part of the research has not been included in present paper

Another set of yarn was procured from Navsari Agricultural University. The yarn was the resultant of the project undertaken. All banana yarns were used as weft for constructing banana union fabric. The constructed fabric was divided into three. One was kept as untreated and the other two were given enzyme and chemical treatment.

All the yarns were studied for their fineness, evenness, and strength and twist characteristics.

Phase III: Fabric stage

All spun banana yarns were used as weft for fabric construction. Handspun yarns were used to construct handloom fabric. Untreated and treated yarns spun on phoenix charkha and the procured yarns from Navsari were used as weft for weaving cotton banana union fabric. All

the fabrics were given silicon finish for improved hand. The fabrics were tested for their wear properties and KAWABATA test.

Results and discussion

PHASE I: FIBER STAGE

Primary properties of raw banana fiber

According to the test results, raw banana fibers length ranges from 90 to 110 cm. They were creamy to light brown in colour with bundle strength of 42 gms/tex, and moisture regain of 10.63. The filament fiber was not too fine, the fineness was 157.59 denier. When observed under the microscope (Fig1 and 2) it appeared as uneven bundle fiber with cross marking and striation surrounded with pithy material. The cross section showed serrated edges with lumen in the centre.

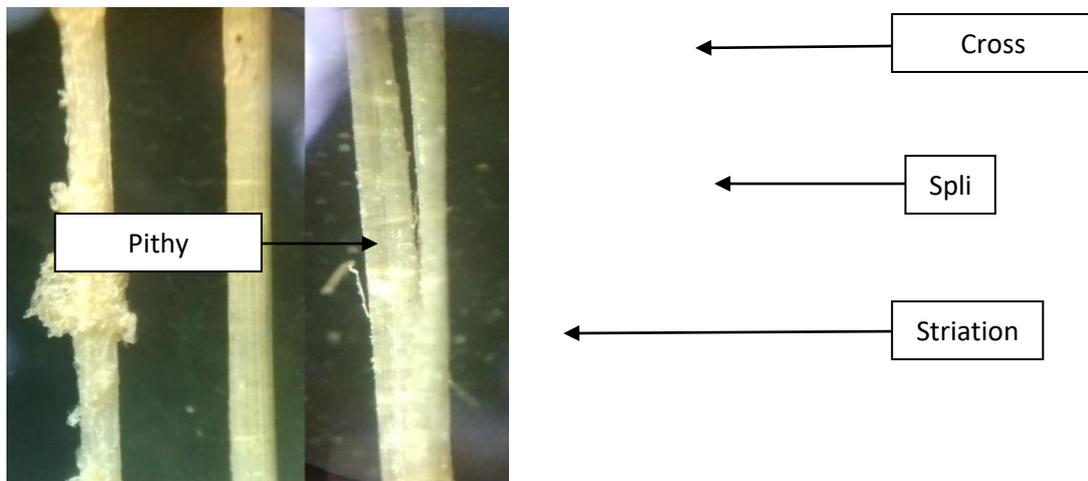


Fig1 : Longitudinal section of raw banana fiber

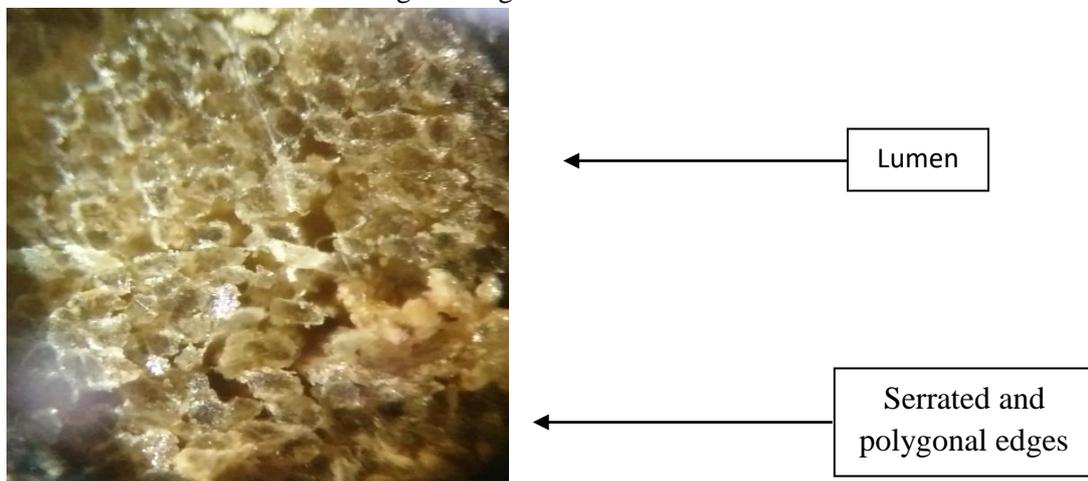


Fig 2: Cross section of raw banana fiber

A design of experiments was made for softening treatment of the fibers, taking into account the composition and characteristics of banana fibers. Two softening treatments were standardised: enzyme treatment and chemical treatment, their recipe has been given in Table 1 and Table 2.

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Table 1: Optimized chemical treatment recipe

Series of treatment	Parameters
Alkalization	4% NaOH for 90 min at 80 °C to 90 °C
Bleaching	Bleach concentration: 0.75% Bleach: H ₂ O ₂ : NaOCl: 2:1 pH: 9-10 Alkali: NaOH Alkali concentration: 4% Time: 30 min Temperature: 80 °C to 90 °C
Re-alkalization	4% NaOH for 60 min at 80 °C to 90 °C
Treatment with oil emulsion	Rice bran oil: 5 % w/v Non-ionic emulsifier: 5ml/1000ml of water Water : M:L::1:20

Applied for patent

Table 2: Optimized enzyme treatment recipe

Enzyme	Concentration	Time	Temperature	pH
Lacase	3%owf	30 min	55°C	5-6
Hemicellulase	1%owf	60 min	40°C	5.5-6
Cellulase	0.3%owf	45 min	55°C	4.5-5
Pectinase	0.7%owf	15 min	55°C	5.5

From the results of the two treatment optimized it was concluded that in alignocellulosic structure, removal of unwanted material (lignin, hemicellulose, and pectins) is effective when the cementing material i.e. lignin complex is loosen first, followed by breakdown and removal of hemicellulose and other components. Breakdown of lignin releases the components of banana fiber, thus providing enough sites for acting of chemicals /enzymes on the components of a lignocellulosic fiber.

Physical properties of untreated and treated banana fibers

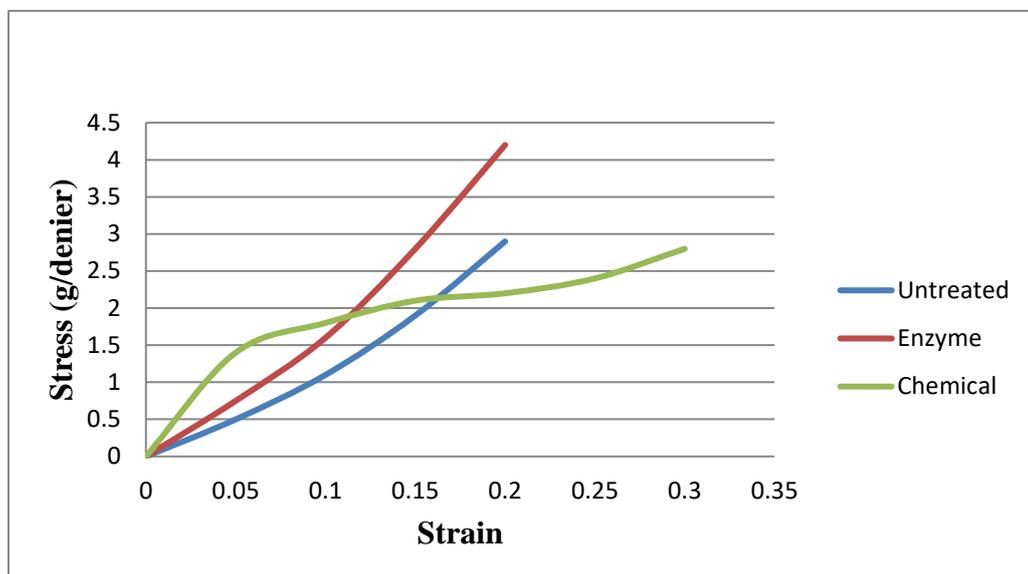
The test results showed that more weight loss was observed after chemical treatment than enzyme treatment; hence chemical treatment removed more impurities or pithy material making the fiber finer up to the count of 170 with only 5% strength loss as shown in Table 3. The removal of pithy material and improvement in the surface structure of the treated banana fibers was also observed in SEM results (Plate 1).

Table 3: Properties of untreated and treated banana fibers

Sr.No	Sample	%Weight loss	Bundle Strength (gm/tex)	%Strength loss	Denier	Cotton Count (‘s)
1	Raw		42		157.59	97
2	Enzyme Treated	14	37	12.5%	121.30	123
3	Chemical Treated	27	40	5%	87.27	170

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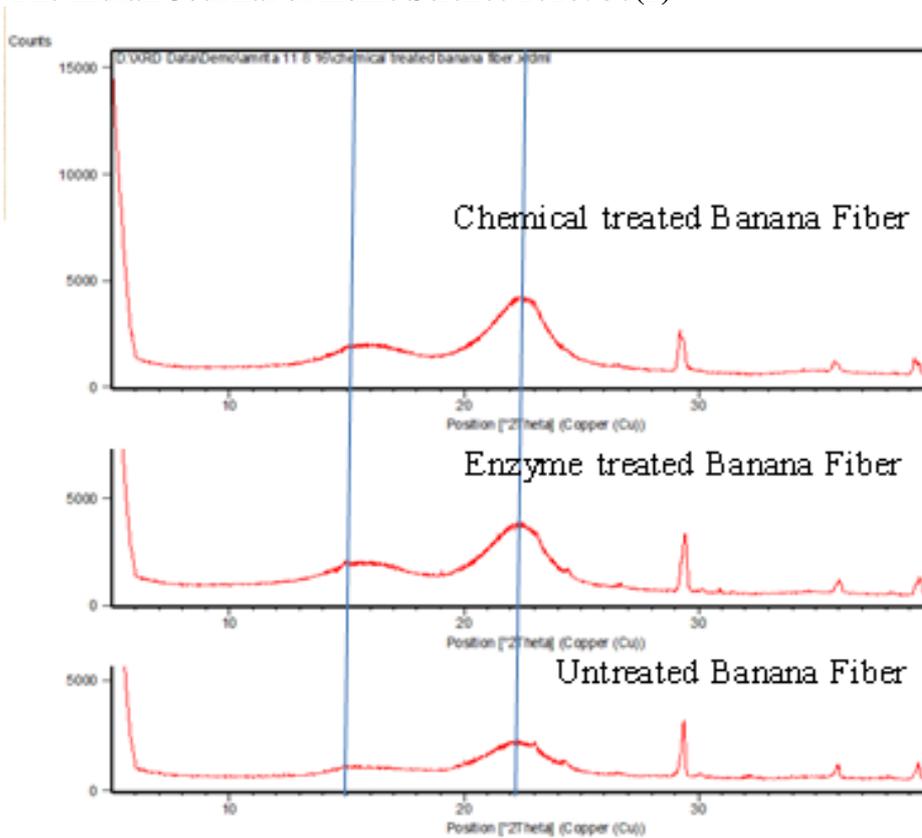
Tensile Strength of treated and untreated banana fibers: An interesting observation made in the stress strain curve, (Graph 1) was that even though the strength loss of chemical treated fibers was not high, but elongation was obtained after chemical treatment, which was an important property for spinning. The stress strain curve was obtained by load elongation test of individual filament fiber on Instron has been given in Graph 1.



Graph 1: Stress strain curves of untreated and treated banana fibers

XRD Analysis: Two main peaks at $2\theta = 14^\circ$ and 22° , assigned to amorphous and crystalline cellulose respectively. The CI (peak height method) for raw, enzyme treated and chemical treated was 35%, 62% and 46% respectively. Hence, enzyme treated fibers were more brittle than chemical treated fibers.

Peak Broadening and Sharpness : In the case of amorphous materials, when x-ray light incident on atoms in a plane then it scattered in random directions due to the random orientation of atoms and gives a broad peak or background hump. In crystalline materials atoms are periodically arranged, atoms then it scattered in a particular direction and gives a high intensity narrow peaks. The broadest peak was observed for the untreated banana fiber which symbolises that the raw fiber was more amorphous than the treated banana fibers.



Graph4 2: XRD analysis of untreated and treated banana fiber

Chemical composition of untreated and treated banana fibers: The lignin content of any lignocellulosic fiber is one of the most important reasons of its stiffness and lower pliability which was analysed by its chemical composition. The two treatments were effective in lignin and hemicellulose removal, which is depicted by the chemical constituents given in Table 4. The percent removal of hemicellulose was 60% in enzyme treatment and 68% in chemical treatment. 39% lignin was removed by enzyme treatment and 44% was removed by chemical treatment.

Table 4: Chemical composition of untreated and treated banana fibers

Constituents	Untreated banana fiber	Enzyme treated banana fiber	Chemical treated banana fiber
Water soluble	10	11.8	8
Fats and Waxes	1.95	2	2
Pectins	1.85	1.8	1.2
Hemicellulose	15	6	4.8
Lignin	9	5.5	5
Cellulose	62.2	73.47	77

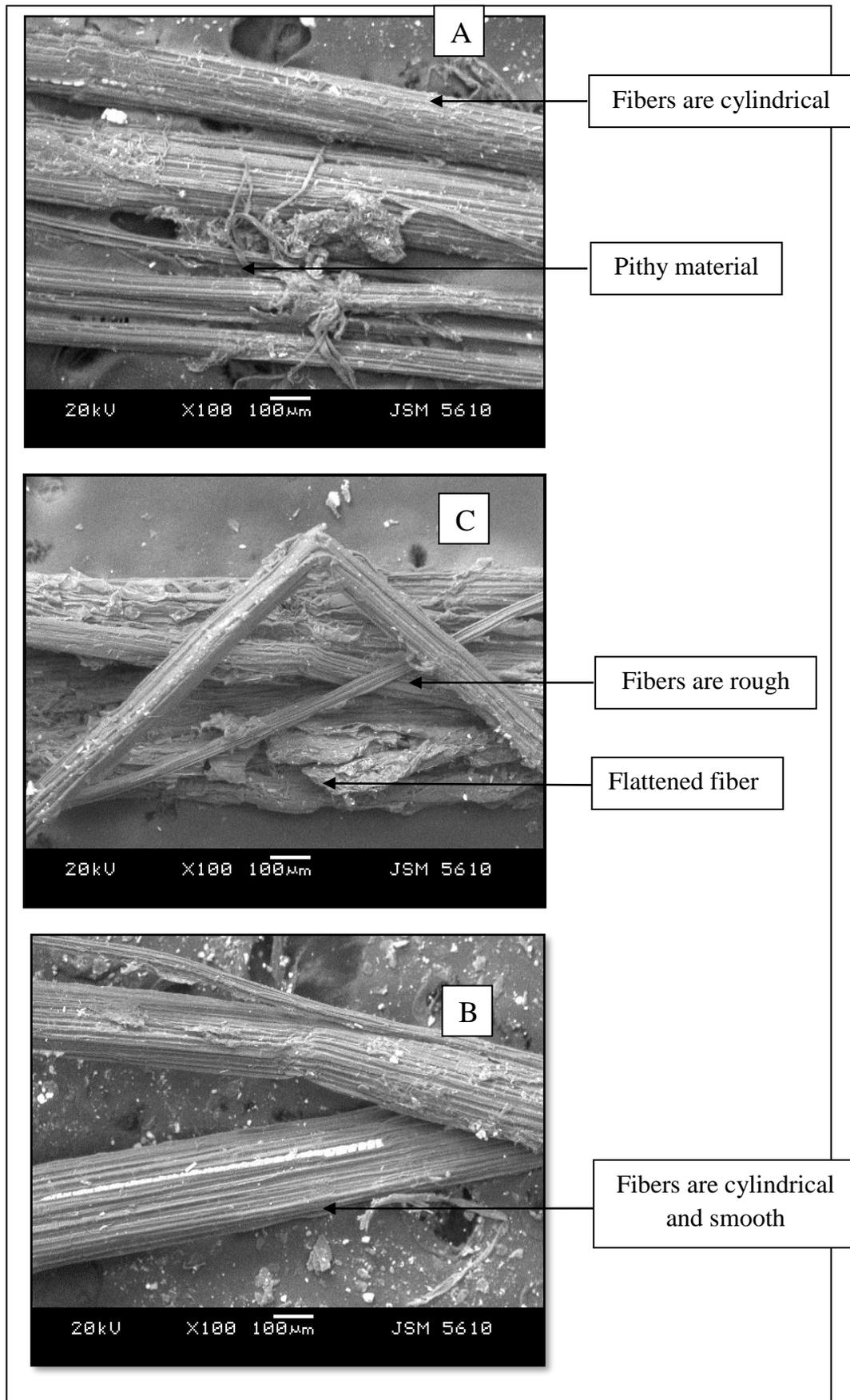
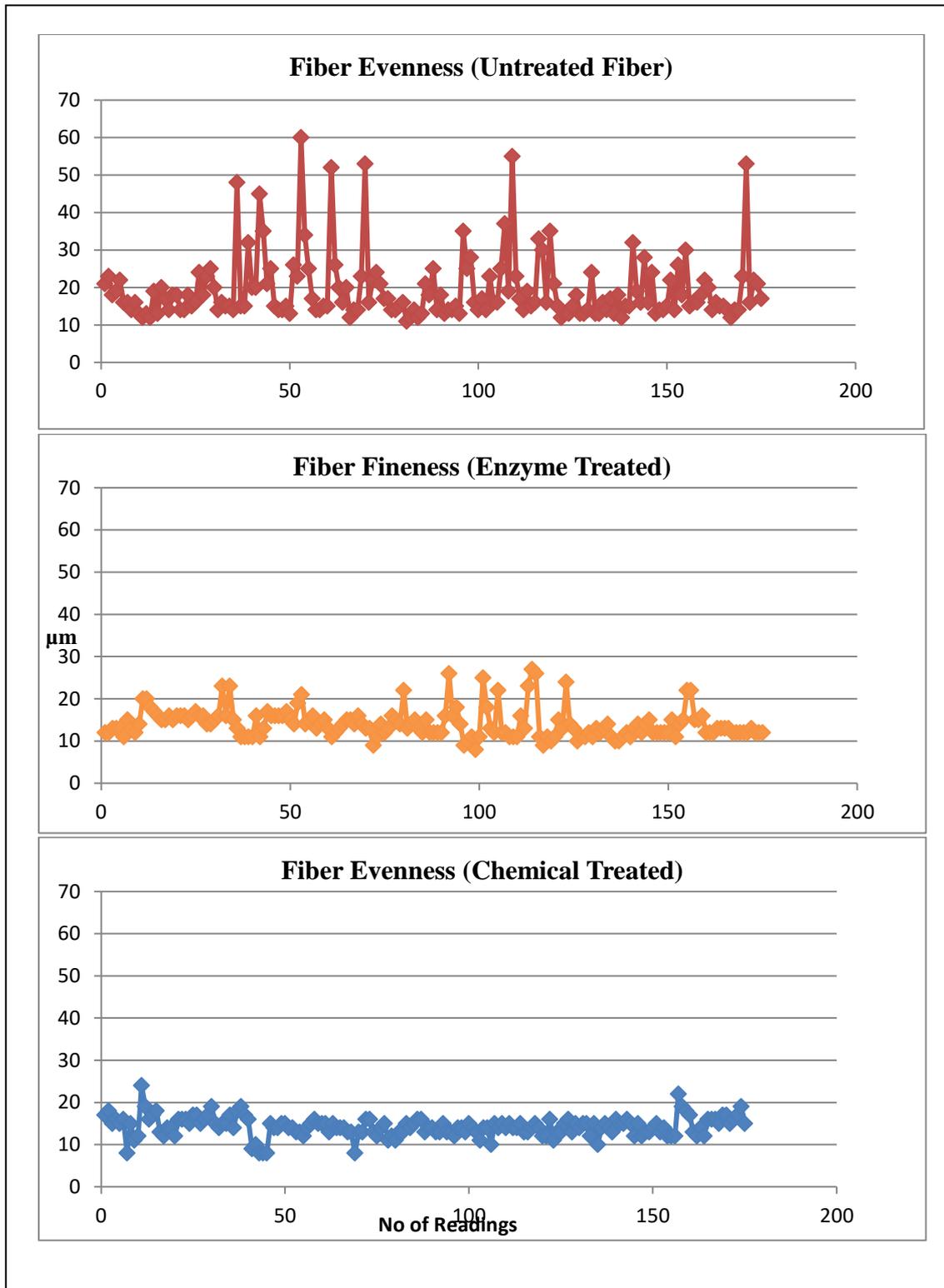


Plate 1: SEM image of A.) Untreated banana fiber B.) Enzyme treated banana fiber C.) Chemical treated banana fiber

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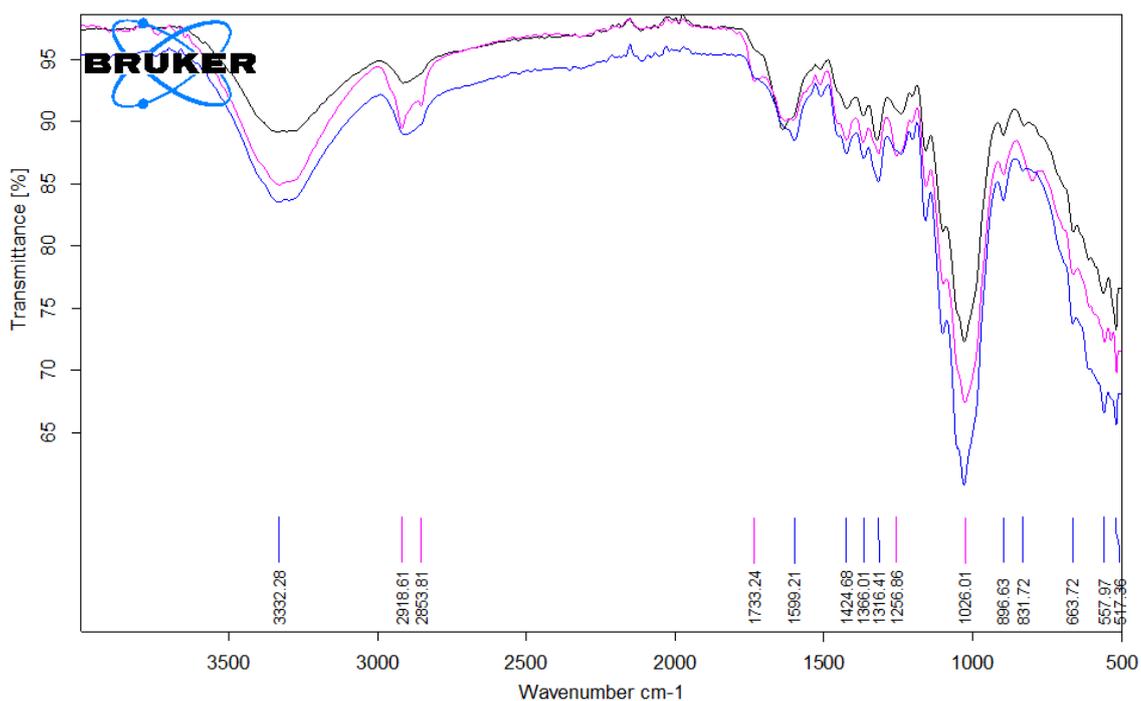
Fiber Evenness: Graph 2 shows the unevenness of untreated banana fiber with was improved by enzyme and chemical treatment. The standard deviation of UBF, EBF, CBF was 8.6, 3.4, 2.3 respectively. The reduction of SD explained the improvement in the evenness of treated fibers.



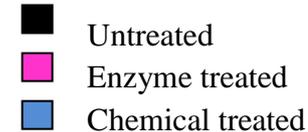
Graph 2: Fiber Evenness of untreated and treated banana fibers

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FTIR analysis: Vibrations in the region between 3332 cm⁻¹ associated with the C-H stretching of lignin, decrease in peak depth upon enzyme treatment and more after chemical treatment indicated breakdown of C-H bonds of lignin. (Temesgen 2014). Similar observations were made at IR spectra from 1360 cm⁻¹ for lignin, hemicellulose and cellulose. The peak band at 1424 cm⁻¹ was assigned to the crystalline structure. The peak was pointed for raw banana fiber which became broader for treated (enzyme and chemical) fibers. This could reflect more disordered structure of the treated fibers. Hence, the FTIR confirms that there were some structural changes in banana fiber after treatment.



Graph 3: FTIR of untreated and treated banana fibers



PHASE II: YARN STAGE

Hand spun yarns were spun on phoniex charkha (Plate 2). It is a double drive charkha. A motor was attached to the charkha to put the flywheel in rotation. Due to the motor attached the movement of the pedal and thus the charkha could be kept constant. The only uncontrolled factor during the spinning of banana yarns was the feeding of the filament fibers. The difference in diameter between pulleys created difference in RPM between rotation of the bobbin and rotation of the flyer. The differential in the RPM decides the twist per inch (TPI) imparted to the yarn. It is a simple instrument and can be easily used by farmers and their family members to generate additional income. Their preliminary properties have been given in Table 5:

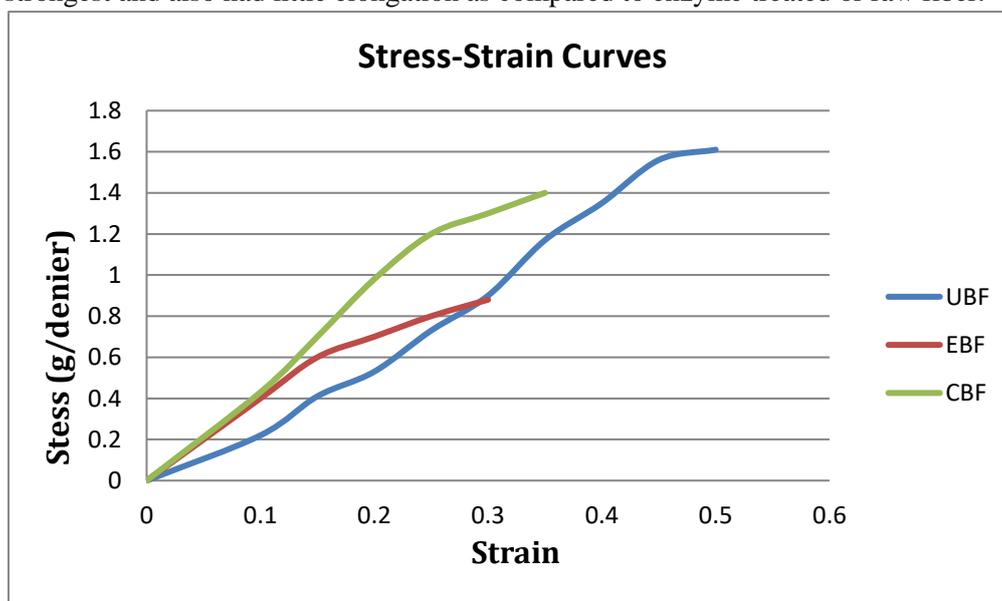
Table5: Preliminary properties of constructed banana yarns

S.No.	Type of Yarn	Count (Ne)	Twist per Inch
1	Untreated	3	86
2	Enzyme treated	3.4	91
3	Chemical Treated	11	194

Plate 2: Phoenix Charkha



The stress strain curve of hand spun banana yarn showed that chemical treated yarns were the strongest and also had little elongation as compared to enzyme treated or raw fiber.



Graph 4: Stress Strain curve for untreated and treated banana yarn

PHASE III – FABRIC STAGE

Details of constructed banana fabrics have been given in Table 6 and the test results of their primary properties have been given in Table 7.

Table 6: Warp and weft details for banana fabric constructed

S.No	Fabric Code	Warp Yarn		Weft Yarn	
		Fiber content	Yarn Count	Fiber content	Yarn Count
1	UCBF1	Cotton	12's	100% Banana	3's
2	ECBF1	Cotton	12's	100% Banana	3.4's
3	CCBF1	Cotton	2/60's	100% Banana	11's
4	UCBF2	Cotton	12's	100% Banana	1.3's
5	ECBF2	Cotton	12's	100% Banana	1.3's
6	CCBF2	Cotton	12's	100% Banana	1.3's

Table 7: Preliminary properties of treated and untreated banana fabrics

Chemical treated cotton banana fabric was the finest fabric in terms of thickness and feel. It was a balanced fabric with average weight, with maximum cover factor as shown in Table 7. From the Table 8, it can be concluded that the strength and elongation both improves after the treatment in weft direction and the chemical treatment is more effective to improve the load elongation values than the enzyme treatment. In the set I category where the fibers were treated first and then the yarns were spun and after that fabric construction took place: the

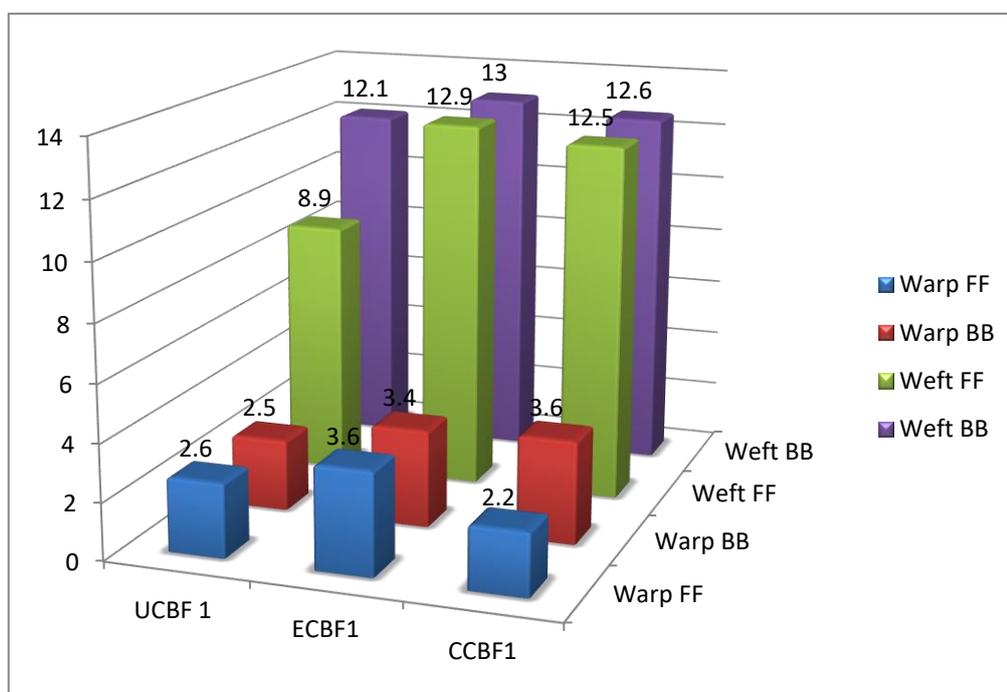
Sr. No.	Fabric code	Fabric thickness	Fabric count	GSM	% warp shrinkage	% weft shrinkage	Cover Factor	Drape Coefficient (%)
1	UCBF1	0.98	12 X16	253.2	3	1	20	58.17
2	ECBF1	0.84	24 X34	240.4	3	1	22	65.84
3	CCBF1	0.51	52X50	216	4	2	25	36.22
4	UCBF2	1.64	12 X16	498.8	1	0	15.67	65.76
5	ECBF2	1.50	12 X16	446.8	3	2	15.67	69.55
6	CCBF2	1.24	12 X16	443.2	1	1	15.67	58

load values increased from 13.83 to 15.46 and 20.85 for untreated banana fabric in weft direction followed enzyme and chemical treated fibers where as the increase in elongation was observed for chemical treatment from 61.78 to 46.82. In category II the load values decreased after treatment and elongation increased in weft direction.

Table 8: Load elongation values of untreated and treated banana fabrics

Fabric Code	Sample Reference	Gauge Length (mm)	Speed (mm/min)	Maximum Load (Kgf)	Percentage Strain at Maximum Load	Young's Modulus
UCBF I	Warp	100	100	9.13	22.55	45.25
UCBF I	Weft	100	100	13.83	6.14	294.6
ECBF I	Warp	100	100	11.91	27.16	56.16
ECBF I	Weft	100	100	15.46	3.99	360.1
CCBF I	Warp	100	100	10.67	23.02	69.33
CCBF I	Weft	100	100	20.85	9.08	466.7
UCBF II	Warp	100	100	10.34	20.25	30.23
UCBF II	Weft	100	100	61.78	3.53	609.1
ECBFII	Warp	100	100	10.02	21.57	27.79
ECBF II	Weft	100	100	45.23	5.01	437.8
CCBF II	Warp	100	100	9.80	17.37	55.66
CCBF II	Weft	100	100	46.82	7.58	449.2

One of the major drawbacks of banana fibers and fabrics was the stiffness. The stiffness of the constructed banana fabrics was measured by their bending length.. Bending length of BNAU fabrics was more than standard fabric length (15cms). Hence the test was not applicable for this category. The bending length of the other category of cotton banana fabrics has been given in Graph 5. The stiffness was more in the weft direction than the warp direction in all the fabrics.



Graph 5: Bending length of untreated and treated banana fabrics

KAWABATA analysis

Handle properties of the fabrics were evaluated by measuring the fabric low-stress mechanical properties on KAWABATA Evaluation System for fabrics (KES FB). The tensile properties and shear properties were studied on KES-FB1 (tensile and shear tester). Bending properties were measured on KES-FB2 (Pure bending tester). Compression properties were studied on KES-FB3 (Compression tester). The surface roughness and surface friction were measured on KES-FB4 (Surface tester). The primary & total hand values were calculated from sixteen mechanical properties.

Primary and total hand values of banana fabrics have been given in Table 4.34. Primary hand values are graded by using a scale of 1 - 10 where 1 indicates the weakest feeling and value 10 indicates the strongest with regards to the particular descriptor.

THV gives a consolidated index reflecting the suitability of the fabric for predetermined applications in a scale of 0 – 5, which was men’s suiting for the present study. A THV of 5 indicates that the fabric is ideal for the intended use while a THV of 0 suggests its unsuitability. A value of THV between 0-5 would indicate varying levels of suitability of the fabric for the proposed application.

Table 9: Primary and total hand values (Men’s Suiting)

Sr. No.	Fabric Code	Koshi (Stiffness)	Numeri (Smoothness)	Fukurami (Fullness & Softness)	THV KN-101
1	ECBF1	4.26	4.30	5.14	2.83
2	CCBF1	8.85	2.23	6.87	2.48
3	MBCT3	4.71	4.19	5.03	2.87
4	VBET3	6.43	1.30	3.98	2.39

THV values of all the four fabrics were almost similar, however Fukurami values of CCBF1 was the highest. Hence, the treatment improves the hand of banana fibers and thus the fabric.

Table 10: Compression properties using compression tester (KES-FB3A)

Sr. No.	Fabric Code	LC	WC (g.cm/cm ²)	RC (%)
1	ECBF1	0.287	0.304	41.69
2	CCBF1	0.212	0.585	50.67
3	MBCT3	0.300	0.290	43.02
4	VBET3	0.238	0.246	47.20

LC: Linearity of compression-thickness curve

WC: Compressional energy

RC: Compressional resilience

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The linearity of compression (LC) mainly depends on the fabric thickness and compressional characteristics of the yarn. It has been observed from Table 4.35 that LC is higher for MBCT3 and lower for CCBF1

Table 11: Fabric weight and thickness

Sr. No.	Fabric Code	Fabric thickness (To mm)	Fabric thickness at max. pressure (Tm mm)	Fabric wt. (mg/cm ²)
1	ECBF1	0.972	0.538	26.13
2	CCBF1	1.788	0.571	22.73
3	MBCT3	0.917	0.521	26.07
4	VBET3	0.932	0.508	28.04

To: Thickness at 0.5gf/cm²

Tm: Thickness at 5gf/cm²

Table 12: Tensile properties using tensile tester (KES-FB1A)

Sr. No.	Fabric Code		LT	WT (gf.cm/cm ²)	RT (%)	EMT (%)
1	ECBF1	Warp	0.486	23.90	42.20	19.65
		Weft	0.732	7.47	57.85	4.09
		Avg	0.609	15.69	50.02	11.87
2	CCBF1	Warp	0.520	24.25	42.75	18.65
		Weft	0.724	4.18	70.50	2.30
		Avg	0.622	14.21	56.62	10.48
3	MBCT3	Warp	0.496	25.15	44.51	20.25
		Weft	0.702	6.65	69.21	3.78
		Avg	0.599	15.90	56.86	12.02
4	VBET3	Warp	0.608	31.90	36.44	21.00
		Weft	0.760	7.63	70.20	4.02
		Avg	0.684	19.76	53.32	12.51

LT: Linearity of load - extension curve

WT: Tensile energy

RT: Tensile resilience

EMT: Tensile Strain

Tensile properties of the fabrics are shown in Table 4.36. The EMT (Tensile strain) factor affects tailorability and seam slippage. A high value of EMT provides wear comfort but creates problems during stitching and seam pressing. It was observed that EMT for warp was higher for all fabric samples than for weft.

Table 13: Shear properties using shear tester (KES-FB1)

Sr. No.	Fabric Code		G (gf/cm.deg)	2HG (gf/cm)	2HG5 (gf/cm)
1	ECBF1	Warp	0.32	0.39	0.60
		Weft	0.29	0.25	0.44
		Avg	0.30	0.32	0.52
2	CCBF1	Warp	0.52	1.30	1.69
		Weft	0.54	0.96	1.39
		Avg	0.53	1.13	1.54
3	MBCT3	Warp	0.31	0.38	0.55
		Weft	0.28	0.24	0.51
		Avg	0.29	0.31	0.53
4	VBET3	Warp	0.54	0.25	2.39
		Weft	0.72	0.28	2.75
		Avg	0.63	0.26	2.57

G: Shear Rigidity;

2HG: Hysteresis of shear force at 0.5o shear angle

2HG5: Hysteresis of shear force at 5o shear angle

The high value of shear rigidity causes difficulty in tailoring and discomfort during wearing. Shear rigidity of the fabric mainly depends upon the mobility of the warp and weft threads within the fabric. The compact structure of fabric having higher pick density gives higher shear rigidity values and hysteresis of shear.

Table 14: Bending properties using pure bending tester (KES-FB2)

Sr. No.	Fabric Code		B (gf.cm ² /cm)	2HB (gf.cm/cm)
1	ECBF1	Warp	0.0309	0.0188
		Weft	0.4145	0.3147
		Avg	0.2227	0.1667
2	CCBF1	Warp	0.0731	0.0605
		Weft	3.3538	4.2188
		Avg	1.7134	2.1396
3	MBCT3	Warp	0.0372	0.0187
		Weft	0.4737	0.3685
		Avg	0.2554	0.1936
4	VBET3	Warp	0.1767	0.1105
		Weft	0.3831	0.2837
		Avg	0.2799	0.1971

B: Bending Rigidity;

2HB: Bending Hysteresis

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Bending rigidity (B) of a fabric depends upon the bending rigidity of the threads and the mobility of warp and weft threads within the fabric. Bending rigidity (B) is high for CCBF1 & low for ECBF1. Bending rigidity and hysteresis of bending values are higher for the fabrics with more pick density.

Table 15: Surface properties using surface tester (KES-FB4)

Sr. No.	Fabric Code		MIU	MMD	SMD (μm)
1	ECBF1	Warp	0.188	0.0363	15.68
		Weft	0.229	0.0295	9.78
		Avg	0.209	0.0329	12.73
2	CCBF1	Warp	0.209	0.0545	11.45
		Weft	0.220	0.0415	9.01
		Avg	0.215	0.0480	10.23
3	MBCT3	Warp	0.186	0.0329	14.27
		Weft	0.228	0.0299	8.36
		Avg	0.207	0.0314	11.32
4	VBET3	Warp	0.173	0.0752	11.46
		Weft	0.138	0.0247	6.02
		Avg	0.156	0.0500	8.74

MIU: Coefficient of friction

MMD: Deviation in the coefficient of friction

SMD: Geometrical Roughness

The fabric surface properties are shown in Table 15. It is observed that the coefficient of friction (MIU) is higher for sample CCBF1 and lower for VBET3. The mean deviation of coefficient of friction (MMD) notes the surface smoothness as perceived while moving the fingers on the fabric surface.

CONCLUSION

- There is marked difference and improvement in the physical properties and structure of banana fiber after enzyme treatment and chemical treatment.
- Chemical treatment softens banana fibers, and also improves its spinnability.
- Chemical treatment is more effective for banana fiber than enzyme treatment
- Chemical treated fibers can be used to spin 100 % fine variety of banana yarn.
- Treating the fibers before spinning and weaving, had better results than application of softening treatment after fabric construction, as treatment at fiber stage improves the spinnability of the fibers.
- Handloom fabrics made from treated banana fibers can be used for home furnishings and also in certain apparels like men's suiting or as second layer on the skin.
- "Banana Khadi" – handloom fabric constructed by hadspun cotton yarn as warp and handspun banana yarn as weft can be made. This would give a new dimension to khadi and village industry.
- Banana Khadi and constructed banana fabrics could be a substantial product for niche market.

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EFFECT OF ECOFRIENDLY BIOPOLYMER FOR ENHANCING FUNCTIONAL PROPERTIES OF COTTON FABRIC THROUGH DYEING

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Paper Presented for the Young Scientist Category

INTRODUCTION

The textile dyeing industry growth is accelerating rapidly to fulfill the consumer's demands and colouration technology has dominated this industry. Colour of textile material play an important role in marketability of fabrics due to its psychological effect and catches the attention of the consumers. The global consumption of textiles is estimated to grow at the rate of 3 percent per annum. The colouration of this huge quantity of textiles need about 7,00,000 tonnes of dyes and such a huge amount of required textiles substrate cannot be dyed and printed with natural dyes only. Reactive dyes are most common classes which are used for colouration of cotton textiles but these are most unfavorable class of dye from the ecological point of view because effluent produced gives very high values of biological oxygen demand (BOD), chemical oxygen demand (COD) and increases salinity of river water which affect the delicate biochemistry of aquatic life. The best approach would obviously be to modify the textile processing technologies and chemistry to reduce the environmental discharge occurring during dyeing. So, most researchers focus on introducing salt-free/low-salt dyeing technology for reactive dyes.

When the cotton fabric is immersed in water, it carries the anionic charge on its surface. Reactive dyes are also anionic in nature. Thus the anionic surface of cotton fibre repels the anionic dye molecules. To overcome this problem huge amount of synthetic mordants to create forces of attraction between dye molecules and cotton fibre by developing cationic charge on cotton surface. At the same time these synthetic mordants are harmful and carcinogenic in nature. Cationic modification agents consist of two functional characteristics such as multiple functional groups that could react with cotton under alkaline conditions and cationic amino groups that could reduce the negatively charged barrier between fiber and dye. Modification is possible with the help of biopolymers, an environmentally benign route. It is well-known that biopolymers are capable of forming ionic interactions with cotton cellulose by rendering positive charge and provide other functional properties to fibre. In the present study the different biopolymers were tried to enhancing the dyeability of cotton fabric with anionic dyes. Among different biopolymer chitosan showed higher dyeing efficiency and very good wash fastness of synthetic dyed cotton fabric without using any synthetic mordant and electrolytes (salts) and also improved the other properties such as crease resistance and antibacterial property.

1. Objectives:

- i.** Selection of biopolymer and synthetic dye on the basis of dye absorption, colour strength and wash fastness

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- ii. Application of synthetic dye on biopolymer treated fabric and its effect on functional properties on cotton fabric.

2. Material and Methods:

Materials: Pure cotton fabric, biopolymers i.e. Chitosan, beta-cyclodextrin, Sericin, direct dyes, reactive dyes and acid dyes. Percent dye absorption, colour strength (k/s) value and wash fastness rating were used for selection of one synthetic dye and biopolymer.

Methods:

- i. **Colour measurement:** The colours of dyed samples were measured numerically through computerized colour matching machine. The reference spectra of dyed samples were observed by using spectrophotometer SS5100A, K/S value and CIE LAB co-ordinates L*, a* and b* were noted down directly from the computer screen. This spectrophotometer uses CIE LAB (1976) colour space, D65 illuminate matching and appraisal and 420 nm wavelength to measure the actual colour and change in colour. The CIE LAB colour space uses L*, a* and b* scales to describe colour. L* is a measure of darkness/lightness of colour of an object and range from 0 (black) to 100 (white), a* of redness (+ve a*) or greenness (- ve a*), b* of yellowness (+ve b*) or blueness (-ve b*), C* of dullness/brightness and H* is a measure of hue.
- ii. **Fastness to washing:** Wash fastness test was carried out as per recommendation of IS: 3361-1979 method (BIS, 1979). The change in colour of dyed samples was assessed with grey scale no.1 as per the recommendation of the ISO 105 method. The visual differences were compared between the original and tested material with the difference represented by the Grey Scale.
- iii. **Crease recovery angle:** Wrinkle recovery is the resistance to and recovery from creasing. Resistance to creasing depends on the rigidity while recovery depends on the elasticity. The measure of crease recovery is the angle at which the sample recovers from creasing. The wrinkle recovery was determined on the Shirley crease recovery tester using BS 3086:1972 test method.
- iv. **Antibacterial property:** Colony forming unit (CFU) were determined to know the microbial load on controlled, treated and dyed fabric. The bacterial resistance of the control and treated samples against Gram-positive bacteria (*Staphylococcus aureus*) and Gram-negative bacteria (*Escherichia coli*) was quantitatively tested by AATCC Test Method 100.

3. Results and Discussion:

- i. **Selection of biopolymer and synthetic dye:** The controlled samples were pretreated with sodium sulphate, sodium carbonate and sodium chloride according to the requirement of alkali for particular dye and dyed with fourteen dyes from three different classes of synthetic dyes. It is clear from Table 1 that amongst all three biopolymer treated fabric samples, dyed with synthetic dyes, the chitosan treated dyed fabrics showed highest percent dye absorption, colour strength and wash fastness rating as compared to the alkali treated dyed fabrics for all the synthetic dyes. The chitosan treated fabric showed the highest percent dye absorption (83.84), colour strength (14.56) and very good (4/5) wash fastness rating with hot reactive red dye followed by alkali treated reactive red dyed fabric (71.61 %, 10.92 k/s value, 4), beta-cyclodextrin treated reactive red dyed fabric (63.75%, 8.71 k/s value, 4) and sericin treated reactive red dyed fabric (61.13%, 8.38 k/s value, 3/4) respectively.

Table 1: Selection of biopolymer and synthetic dye on the basis of colour properties

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S. No	Synthetic dyes		Alkali treated fabrics (Control)			Biopolymer treated fabrics								
						Beta- Cyclodextrin			Chitosan			Sericin		
			% Dye absorption	Colour strength (k/s)	Wash fastness grades	% Dye absorption	Colour strength (k/s)	Wash fastness grades	% Dye absorption	Colour strength (k/s)	Wash fastness grades	% Dye absorption	Colour strength (k/s)	Wash fastness grades
1.	Direct	Red	70.31	9.90	4	68.75	9.19	4	74.21	11.62	4	64.84	8.79	4
		Brown	72.07	11.13	4	76.62	11.73	4	79.22	12.13	4	68.18	8.94	4
		Chlorantine Fast Yellow 5GLL	79.04	12.04	4	79.64	12.67	4	82.63	12.92	4	68.26	9.06	3/4
		Chloragol Orange RS	71.58	10.50	4	72.13	11.05	4	77.04	11.86	4	67.75	8.82	4
		Shakuntala Green BD	63.45	8.52	3/4	63.95	8.75	4	77.66	11.92	4	62.43	8.42	4
2.	Reactive (hot)	Red	71.61	10.92	4	63.75	8.71	4	83.84	14.56	4/5	61.13	8.38	3/4
		Brown H4R	70.25	10.02	4	68.53	9.10	4	82.32	12.84	4/5	60.34	8.00	3/4
		Turquoise HTG	63.90	8.64	4	64.39	8.89	3/4	83.44	14.23	4/5	63.41	8.79	3/4
3.	Reactive (cold)	Red M8B	47.52	3.98	3	48.01	5.07	3	58.41	5.14	3/4	24.75	1.00	2/3
		Blue MR	42.51	3.01	3	43.71	4.13	3	56.28	5.35	3/4	50.89	4.00	3
		Orange M2R	43.41	3.12	3	45.73	5.17	3	55.03	5.23	3/4	40.31	2.93	3
4.	Acid	Red	39.47	2.49	2/3	38.59	2.40	2/3	54.38	5.13	3/4	30.70	1.02	2/3
		Yellow	32.57	1.06	2/3	24.24	0.98	2/3	57.57	5.46	3/4	37.87	2.60	2/3
		Black	44.29	3.56	2/3	42.95	3.51	2/3	58.38	5.74	3/4	51.67	4.08	2/3

Amongst all the synthetic dyes, hot reactive red dyed fabric showed the highest dye absorption (83.84 %), colour strength (14.56) and very good (4/5) wash fastness grade with chitosan treatment followed by reactive Turquoise HTG (83.44%, 14.23 k/s value and 4/5), direct Chlorantine Fast Yellow 5GLL (82.63 %, 12.92 k/s value and 4), reactive Brown H4R (82.32 %, 12.84 k/s value and 4/5), direct Brown dye (79.22 %, 12.13 k/s value and 4), direct Shakuntala Green BD (77.66 %, 11.92 k/s value and 4), direct Chloragol Orange RS (77.04 %, 11.86 k/s value and 4), direct Red dye (74.21 %, 11.62 k/s value and 4) respectively.

Amongst different classes of synthetic dye, the hot reactive dye showed highest dye absorption, colour strength value and wash fastness rating followed by direct dyes, acid dyes and cold reactive dyes with chitosan treatment. Thus the chitosan was selected as biopolymer and reactive red dye (hot brand) as synthetic dye for further work.

Reactive dyes are anionic in nature and water soluble because of the presence of sulphonic (SO₃⁻) groups in the chemical structure and cotton also carry the anionic character in water, these dyes have low intrinsic affinity towards the cotton fibre due to the repulsive charges between the dye and cotton. It can be overcome by treating the cotton fabric with cationic

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agents i.e. chitosan. When the chitosan treatment was given to the cotton it imparted its cationic character to cotton and enhanced the attachments of dye anions on cotton fabric through ionic attraction. Thus the colour strength value found to be increased in the chitosan treated sample dyed with reactive dye. The findings of the study are found in line with **Bashar and Khan (2013)** findings revealed that the chitosan can easily adsorb anionic dyes such as direct, acid and reactive dyes by electrostatic attraction due to its cationic nature.

ii. Effect of chitosan treatment on crease recovery angle of cotton fabric:

The table exemplifies that the crease recovery angle of scoured fabric increased from 84.00 to 86.30 degree after alkali treatment with increase of 2.67 percent and further increased from 86.30 to 87.90 degree i.e. 4.44 percent increase when dyed with reactive red dye. The same pattern was also observed for chitosan treated cotton fabric which showed increase in crease recovery angle from 84.00 to 91.60 degree and on dyeing further increased from 91.60 to 100.0 degree. The percent increase was found 8.29 percent for chitosan treated fabric and 16.00 percent for chitosan treated dyed fabric. It is obvious from the table that chitosan treated reactive red dyed cotton fabric showed higher crease recovery angle than alkali treated dyed cotton fabric. Statistically the significant difference was noticed amongst the means of treated and dyed cotton samples for crease recovery angle at 5% level of significance.

Table 2: Effect of chitosan treatment and reactive red dye on crease recovery angle of V fabric

S. No.	Treated samples	Properties			
		Crease recovery angle (degree)			
		Warp Mean ± S.E.(m)	Weft Mean ± S.E.(m)	Mean (warp +weft)	Percent change
1.	Scoured fabric (control)	85.4 ± 0.24	82.6 ± 0.67	84.00	-
2.	Alkali treated	88.4 ± 0.68	84.2 ± 0.66	86.30	+2.67
3.	Alkali treated dyed fabric	89.4 ± 0.51	86.4 ± 0.51	87.90	+4.44
4.	Chitosan treated	92.4 ± 0.58	90.8 ± 0.81	91.60	+8.29
5.	Chitosan treated dyed fabric	100.6 ± 0.92	99.4 ± 0.74	100.0	+16.0
	C.D	1.86	2.05		
	C.V.	1.54	1.73	-	-
	F cal	83.86*	100.04*		

+ = Increase, - = Decrease, S.E. (m) = Standard Error of Mean, C.V. = Coefficient of Variance, F value = Fisher Ratio

*Significant at 5% level of significance, NS= Non- Significant

The chitosan treated and the chitosan treated dyed fabrics showed higher crease recovery angle than the alkali treated and alkali treated dyed fabric. **Yang et al. (1997)** reported that cross-linking with polycarboxylic acids (PCAs) also caused significant improvement in crease recovery behaviour of treated cotton fabrics. Crosslinked cotton fabric resisted deformation.

iii. Effect of chitosan treatment and reactive red dye on antibacterial property of cotton fabric:

From the table it can be noted that when the chitosan treatment was applied to the scoured cotton fabric, it provided 84.14 and 84.16 percent reduction in the growth of *E.coli* and *S. aureus* bacteria respectively. Further chitosan treated dyed cotton fabric exhibited 85.50 percent reduction in the growth of *E.coli* bacteria and 84.28 percent in the growth of *S.aureus* bacteria. Thus it is envisaged that chitosan treated reactive red dyed fabric displayed the higher percent reduction in growth of *E.coli* and *S. aureus* bacteria in comparison to alkali

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treated dyed fabric. The results of the study supported by **Malik and Kumar (2005)** developed antibacterial cotton textile by coating it with chitosan 3-amino-1,2,4-triazolehybrid at different concentrations. The antibacterial activities of the treated cotton materials displayed excellent antibacterial effects against gram-positive bacteria, *S. aureus* and gram-negative *E. coli*.

Table 3: Effect of chitosan treatment and reactive red dye antibacterial property of fabric

S. No.	Treated samples	Properties					
		Bacterial count mean(10^6)	CFU/ml For <i>E. coli</i>	% reduction in <i>E. coli</i> bacterial growth	Bacterial count mean(10^6)	CFU/ml <i>S. aureus</i>	% reduction in <i>S. aureus</i> bacterial growth
1.	Scoured Fabric (Control)	176.66	8.83×10^9	-	169.93	8.46×10^9	-
2.	Alkali treated	166.0	8.30×10^9	6.00	160.33	8.01×10^9	5.64
3.	Alkali treated dyed	129.30	6.47×10^9	26.80	126.00	6.30×10^9	25.58
4.	Chitosan treated	28.00	1.40×10^9	84.14	33.66	16.9×10^8	84.16
5.	Chitosan treated dyed	25.67	1.28×10^9	85.50	26.66	13.3×10^8	84.28

iv. FTIR analysis of chitosan treated cotton fabric: FTIR analysis of chitosan treated fabric was done and data related to presence of functional groups are presented in figure 1.

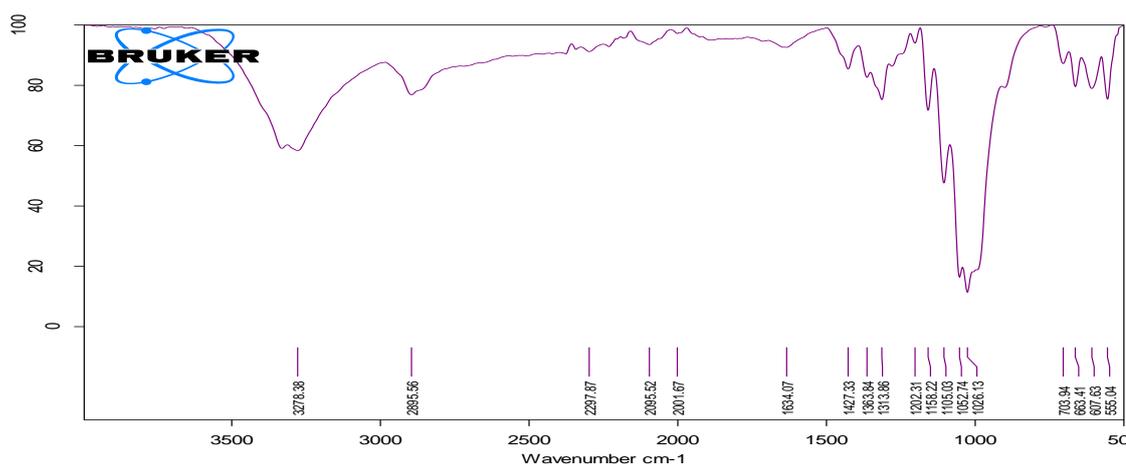


Figure 1: FTIR analysis of chitosan treated cotton fabric

FTIR analysis of chitosan treated fabric demonstrated the presence of functional groups i.e. hydroxyl group (H-bonded–OH- stretch) alcohol, C-H stretching, O-H stretching, alkanes, carboxylic acids, cyano compounds, disubstituted alkynes, -OH bend , tertiary amine –CN- stretch, secondary amine –CN- stretch, C-O stretching - alcohol, carboxylic acids, esters,

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ethers. According to **Hollen and Saddler (1979)** chemical reactivity of cellulose is related to three hydroxyl groups (OH groups) of the glucose unit. These groups readily react with moisture, dyes, and many finishes. FTIR analysis of chitosan treated cotton fabric indicated the presence of amine groups (NH₂) which are the active sites for many chemical reactions. It revealed that the chitosan imparted its cationic character to the cotton fabric and provided more cationic sites for the attachment of anionic dye. Due to the presence of amino groups the chitosan treated cotton fabric showed bacterial resistance against *E.coli* and *S. aureus* bacteria.

v. **FTIR analysis of chitosan treated reactive dyed cotton fabric:** The figure 2 consists of the FTIR spectrum of chitosan treated cotton fabric dyed with reactive red dye.

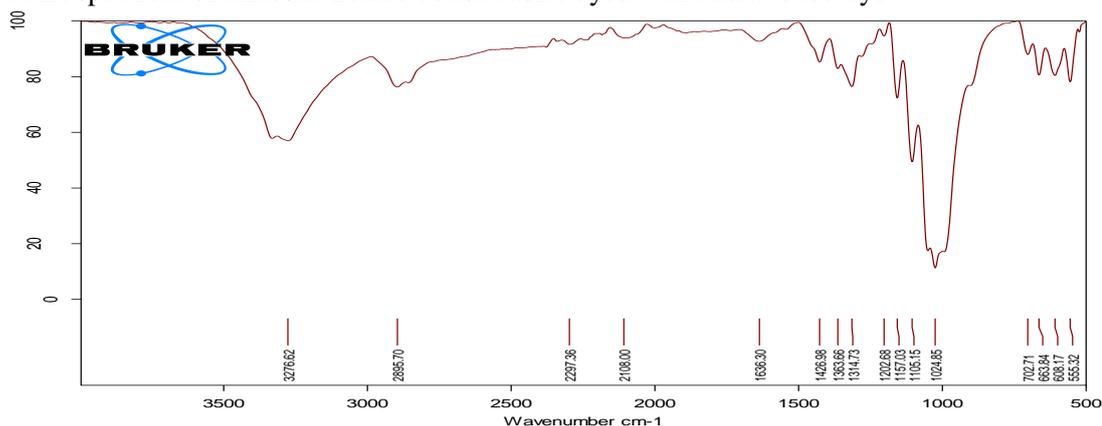


Figure 2: FTIR analysis of chitosan treated reactive red dyed cotton fabric

FTIR spectrum of chitosan treated cotton fabric dyed with reactive red dye depicted different functional groups namely hydroxyl group (H-bonded-OH-stretch), alkanes and cyano compounds, distributed alkynes, C-triple bond-C-stretch, -C-double bond-C stretch, primary amine and N-H bend, -OH bend (aromatic primary amine stretch), The tertiary amine, -CN-stretch and secondary amine, -CN-stretch. The result of the study supported by **Chattopadhyay (2001)** revealed that pretreatment of cotton with polyamide epichlorohydrin (PAE) polymer resulted excellent exhaustion of reactive dye from dye bath in absence of salts but the exhaustion and fixation reached the maximum at 2.0 % (owf). The dye exhaustion found more in acidic condition. The improvement in dye might be attributed to the presence of secondary and tertiary amino groups of polyamide epichlorohydrin (PAE) polymer.

CONCLUSION

Thus it was concluded that the combination of dyes with biopolymer is the promising approach to fulfill the requirement of the consumers for safe and eco-friendly products. This approach enhanced dyeing efficiency of cotton fabric without using salts and alkalis and also improved other properties such antibacterial and crease recovery ever demanded by consumers.

IMPLICATIONS:

- The study will increase income of the farmers who are engaged in production of cotton, dyers and manufacturers occupied in business and trade of natural dyes in small scale industry and will also generate employment.
- Chitosan treatment makes the dyeing process more eco-friendly, safe and it will also reduce the cost of production and waste generation.

4. Recommendation:

- Chitosan treatment and dyeing process of natural and synthetic dye enhanced the dyeing efficiency and provided very good wash fastness to cotton fabric without any salts or

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electrolyte. Thus it makes the dyeing process more eco-friendly, safe and it will also reduce the cost of production and waste generation.

- Chitosan treatment can also be used for enhancing the dye efficiency of other cellulosic fabric. It may also be used for imparting the crease resistant and antibacterial property to the cotton fabric.

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NATURAL DYES: ESTABLISHING A VALUE CHAIN FOR
SUSTAINABILITY OF MINOR FIBRES AND TRADITIONAL
CRAFTS

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ABSTRACT

The present paper explores the prospect of establishing a sustainable value chain for minor fibres through the use of natural dyes in congruence with the well researched age old traditional textile practices existing in India. A lot has been said and researched about the traditional textile practices existing in India and there has been a surge of documentation and exploratory studies in the said field over the past two decades. The present paper reports a segment of the longitudinal research in the field of natural dyes and minor fibres along with documentation of traditional practices in the field of natural dyes, with their scientific standardization of procedures, and their application in newer product repertoires and also sharing the knowledge with the artisan as well as moulding young minds and inspiring craft enthusiasts towards the traditional natural dyeing processes.

INTRODUCTION

India is a country of living traditions. India has a rich tradition of painting, textile arts, fibre and fabric crafts. Painters of almost all styles of painting in India have used natural dyes or colors to decorate their paintings. Whether it be the folk paintings of India, such as Warli, Madhubani, Patachitra, Pithora, Phad, or those that enjoyed royal patronage such as the Ragamala miniatures, Tanjore, Pahari, or indigenous art forms like Batik, Tie-dye, Block Printing, Kalamkari, Pichwai, the use of natural dyes is ubiquitous. Surviving traditions of arts and crafts and the most relevant and practical works of art according to the regional availability of material; are still seen today.

An eminent researcher puts it thus, “It has been our good fortune that we are people steeped in tradition and in some remote areas of our country; natural dyeing of fabric is still a way of life, else, survival of these ancient arts would have been a near impossibility. Thanks to some visionaries, who realized the need to keep natural dyeing alive - it is still flourishing.”^{Himani kapila}

Revival of this ancient art has to be contemporary in its outlook. It has to make the modern generation aware of our ‘scientific and eco-friendly’ heritage to be of relevance in today’s world. Today, for Natural Dyeing to survive, it has to be contemporary and relevant to present day needs. Traditional methods have to be given an exposure and their scientific nature should be highlighted. It has to adopt techniques for production, without sacrificing quality. It has to step out of its image of a 'Cottage Industry' to appropriate 'Rural Technology' without making the mistake of becoming an 'Urban Industry'. That is very important because we have seen that urban industrialization has been the root cause of pollution to the magnitude that is unimaginable and – Today it is suffocating and threatening our very health and existence.

Himani Kapila

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With the world becoming more conscious towards ecology and environment, there is greater need today to revive our heritage and tradition of Natural dyeing. The synthetic dyes and chemicals used in dyeing process created problems both in polluting the surrounding as well as having adverse effects to human health. In recent years interest has been manifested towards natural dyes. The reasons are manifold including such as those of ecological movement, biodegradability and higher compatibility of natural dyes with environment. Other advantages associated with natural dyes include lower toxicity and allergic reactions in relation to synthetic dyes. This wave of global revival of natural dyeing has not come a moment too soon for India. There are still a few scattered areas left today, where some skilled dyers are practicing this art. They have had actual experience in the use of Natural dyes. They are old now and it is imperative to support these sources of knowledge, on a priority basis, or this knowledge too, which was at best, an oral tradition will be lost forever. ^{N.Sekar}

PURPOSE OF THE STUDY

The market for natural dyed textile products is huge and has not been fully tapped. The Indian textile exports can greatly benefit from developing a niche market for natural dyed/printed products. High value addition is possible through the use of these dyes. Employment generation and protection of the environment are some of the additional benefits accruing of their use. Today, use of natural dyes is restricted to certain pockets like, in art forms of kalamkari and commercial practices like Ikat weaving, block printing, boutique work, etc.

In WTO era a demand for 'new' and 'exclusive' products may create an additional demand for 'naturally dyed' fabrics. It is also noticed that the application of natural dyes is mainly done on fabrics of commercial use and new fibre categories are not explored.

There are various minor fibres available throughout the length and breadth of India, which find application into indigenous craft forms of the region. Some like jute, cane and bamboo have created a niche for themselves and are used to make very useful utility products. Some of the plants whose leaf, fibre or stem are used are palm, banana, pineapple, screw pine, cane, betel nut/areca, sisal, bamboo, hemp, *munj* (grass craft of Bihar), *korai* grass/sedge (grass craft of Kerala), coir, water hyacinth, etc. Parts of these plants are woven, knitted or handcrafted to manufacture products like baskets, trays, mats, mattress, rope, carpets and floorings, sack, seat base, rugs, doormats, hats, furniture, rope, fishing rods, walking sticks, handmade paper, table mats, gift boxes, lamp shades, composite ply boards, pack saddle for horses, mules and donkeys and for tying garlands. www.craftandartisans.com

Assessment of the prospects of the then textile and clothing sector points to the fact that the Textile and clothing sector accounts for 16.98 million employment generation (principal and subsidiary) in the country as per the data available from NSSO(National Sample Survey Organization) employment by industry of work, 61st round data (2004-05) as compared to employment generation of 459 million in the entire economy. Thus share of employment generated in textile and clothing sector accounts for 3.7 per cent of the total number of employees in the economy. <http://www.mospi.gov.in>

Analysis of the trends in consumption of various textile items for house hold and Non-household consumption /Made –ups also indicate that there is a huge untapped potential for the application of the Minor Fibres in the Indian Home Décor industry.

This research aimed to utilize the exclusivity factor of minor fibres and also diversify the form of their usage in order to add value and make them applicable for niche market consumption. The décor in the high end Indian homes across metros, especially in the capital, is going back to traditional after years of dabbling in the utility and Spartan chic of

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contemporary west. This means, tradition is making a comeback in Indian home décor.^{March 1st 2009, 2:12p.m. ICT by IANS}

Hence, the investigator proposed “A Study on dyeing of Minor Fibres with Natural Dyes”. In an environment conscious world today Natural fibers hold an important place and to fulfill the demand of newer varieties of fibers, various Natural sources have been explored to obtain them. Various types of fibers like banana, jute, sisal, flax, coir, coarse wool, wild silks, etc are amongst the few varieties of fibers used for apparel purpose and for other textile made-ups.

SCOPE OF THE STUDY:

The study was aimed to develop products using indigenous dyes and fibres and non-machine intensive techniques in order to create value added products that would fetch a high price in the market. It would be of immense importance to the small scale industry segment and to agencies working at the grass root level for training of rural artisans in the art of natural dyeing and product making.

The study will help to realize higher value for indigenous fibres available all across the country as a value added end product could be made by imparting dyeing and product designing skill to the traditional weaving and printing clusters of India.

METHODOLOGY

The study had an experimental and exploratory format on dyeing of minor protein and cellulosic fibres with natural dyes. (Refer Illustration 1: Research Design)The main aim of the study was to develop a colour palette by varying pH, mordants and composite dyeing. 6 natural dyes and three composite combinations were used and 10 mordanting variations were worked out through literature reviews. Dyeing recipes were standardized based on the traditional dyeing practices. A total of 90 shades (Refer Plates 1-9) per substrate were developed and its colour strength assessment was done through the K/S studies, the samples were tested for their fastness properties to agencies of wear like wash, rub and light, through standard testing procedures. A study of the eco parameters for dyeing was also done as the natural dyeing process entails the use of metal mordants. Atomic absorption spectra (Refer Table 2)of the dyed samples was done in order to assess the residual metal mordants on the fabric.

The next stage consisted of applying the total range of shades obtained through experimentation and standardization (Refer Table:1), onto products made out of minor fibres for use in home décor. Cellulose and protein minor fibres were selected. Each category had two fibres; they were: Jute fabric and sisal fibre in the cellulose minor fibre category and Eri silk and Kutch goat hair in the protein fibre category.

The study was also planned to analyze the acceptance of the natural dyed value added products by means of consumer responses. A preliminary exhibition was held in the early part of the study with natural dye application on fabrics like cotton and silk to assess awareness and acceptance of Natural Dyes. Two exhibitions were held in the cities of Baroda and Ahmedabad respectively, where natural dyed minor fibre products were exhibited, in order to assess the market acceptability of the new products. A need-gap analysis for the natural dyed minor fibre products was done through administering a structured questionnaire to the visitors of the exhibition. Data was coded and statistically analysed to understand the findings reported.

A strategic plan was also developed to establish awareness and acceptance of natural dyes and minor fibre products. Natural dye workshops were planned with school children. During the course of the work, three exhibitions were held. The work was published and presented at various forum, during and after the completion of study. It was also shared with practicing

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craftsmen through training workshops and art enthusiasts and townfolk. Subsequent to the completion of the doctoral research the author has shared her knowledge through training artisans from the field of Ikat Crafts, Bandhani and Bhuj shawl weaving artisans in the art of Natural dyes. The author has continued the scientific and documentary quest of Natural dyes through documentation and standardization of Ajrakh dyeing process. Coordinated workshops on Rogan and Balotra printing, and also documented and designed a ramp collection using Bagh prints. The author is also currently working on exploring the microbial world as potential source of natural dyes, through a sponsored Minor Research Project. The department was granted a UGC Major Research Project in 2012, on the research framework of the study.

RESULTS AND CONCLUSION

The research was aimed to explore the applicability of natural dyes on minor fibres. The present study was an attempt to investigate scientifically into the art of dyeing with natural dyes. At the same time the study catered to research questions like:

- Whether the natural dyes could be applied on select minor fibres?
- Could eco parameters of the dyes be stated along with the product?
- Would the natural dyed minor fibre products cater to a perceived value addition to the fibres?
- Would these products be accepted enthusiastically by the upper middle class consumers?

The following conclusions were derived from the study:

1. The study had overall 9 dyes (six single dyes and three mixtures done on the basis of combination of two colours that would yield a third colour). There were 10 mordant treatments which included plain sample dyeing, four metal mordants, two natural mordants and three variations in pH. A total of 180 shades were developed as an outcome of the dye, fibre, mordant and pH variation(Refer Plates 1-9).
2. The minor fibres Eri silk and Sisal had good dyeability as the k/s values of the dyed samples exhibited positive scores. It established that the shades had a good colour strength. This paper reports the k/s values and graphs of the composite colours (two natural dyes mixed) which was done in order to increase the colour palette of the dyes (Refer Graph 1-3). All dyes individually gave shades of good colour strength, however the colours tend to dominate each other when combinations are used while dyeing.
3. In case Madder and Ratanjot (Graph 1) dye mixture it was observed that all the shades fall under the red blue region; and they are lesser red and more concentrated towards the blue region. Hence, we may say that out of Madder and Ratanjot dye mixture; Ratanjot dye imparts more colours compared to Madder.
4. All the natural dyed products resulting as an outcome of this study confirmed the eco friendly parameter except for the fabrics mordanted with potassium dichromate, which was amended by working low concentrations of dichromate for the dyed products(Refer Table 2). It was observed through the AAS studies that copper was well within the limit of the permissible standards however potassium dichromate was very high, hence study was done to standardize lower concentration of the mordant for dyeing and it was found that potassium dichromate at 2.5% was an optimal concentration to use for mordanting and the same was used for the study.
5. The dye extracts had good optical density and it had a linear relationship with the k/s values obtained for the reflectance spectrophotometer analysis barring a few exceptions like Flame of Forest and Ratanjot when dyed at acidic and alkaline pH, the extract

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was light but the spent dye liquor had a higher optical density, indicating precipitation and thus having an invert relationship with k/s values. It was observed that the dye extraction was good when flame of forest was extracted in acidic medium; and gave good exhaustion good at 4pH; confirming that the dye obtained from flame of forest petals was of acidic type. It did not have natural affinity towards cellulosic fibre but it dyed proteins well. This was confirmed by the percent dye absorption readings in case of eri silk fabric and sisal fabric. The readings also showed that dyeing at alkaline pH had given very poor results and the exhaustion is only 7.69 percent and - 25.92 percent in case of eri silk fabric and sisal fibre; the reasons for such low readings could be the reaction of the dye molecules with sodium carbonate where the colour of the dye solution brightens up; this colour is only superficial in case of fabric dyeing as the bright yellow orange colour bled off during the soaping procedure after dyeing.

6. The dyes possessed average to good fastness to light, laundry and crocking except the Flame of Forest dye which had fair to poor fastness to light with an average rating of 2-3 for all mordant dye combinations. Marigold dye had poor rubfastness with an average rating of 2/1 for dry rub fastness, on Eri silk fabric and overall average fastness was also average.
7. A positive correlation was observed between need and gap in availability of the products and between need and perceived value of the products. It was also concluded from the analysis that there is dearth in variety of products offered in the category of home décor products fashioned out of minor fibres. (Refer Graphs 4-6)
8. It is observed from the graphs 4-6 that there most respondents felt that there was a vast gap between the type of products offered from the KVIC and Handloom and Handicrafts outlet, which led to the conclusion that there was a high perceived need / existing market opportunity waiting to be tapped in the area of natural dyed value added products.

Hence it was theorized that Minor fibres Eri silk, Sisal fibre, Jute and Goat hair were suitable to be dyed with natural dyes. Use of metal mordants in concentrations stated in the study help to confirm to the eco parameters laid by laws regulating permissible amounts of heavy metals on the substrate. The dye extracts had good optical density and they had a linear relationship with the k/s values obtained from spectrophotometric analysis and possessed average to good fastness to agencies of wear. Products for home décor designed out of minor fibres were well received at the two exhibitions held in Baroda and Ahmedabad. Hence, there is a huge latent potential for natural dyed value added home décor products fashioned out of minor fibres.

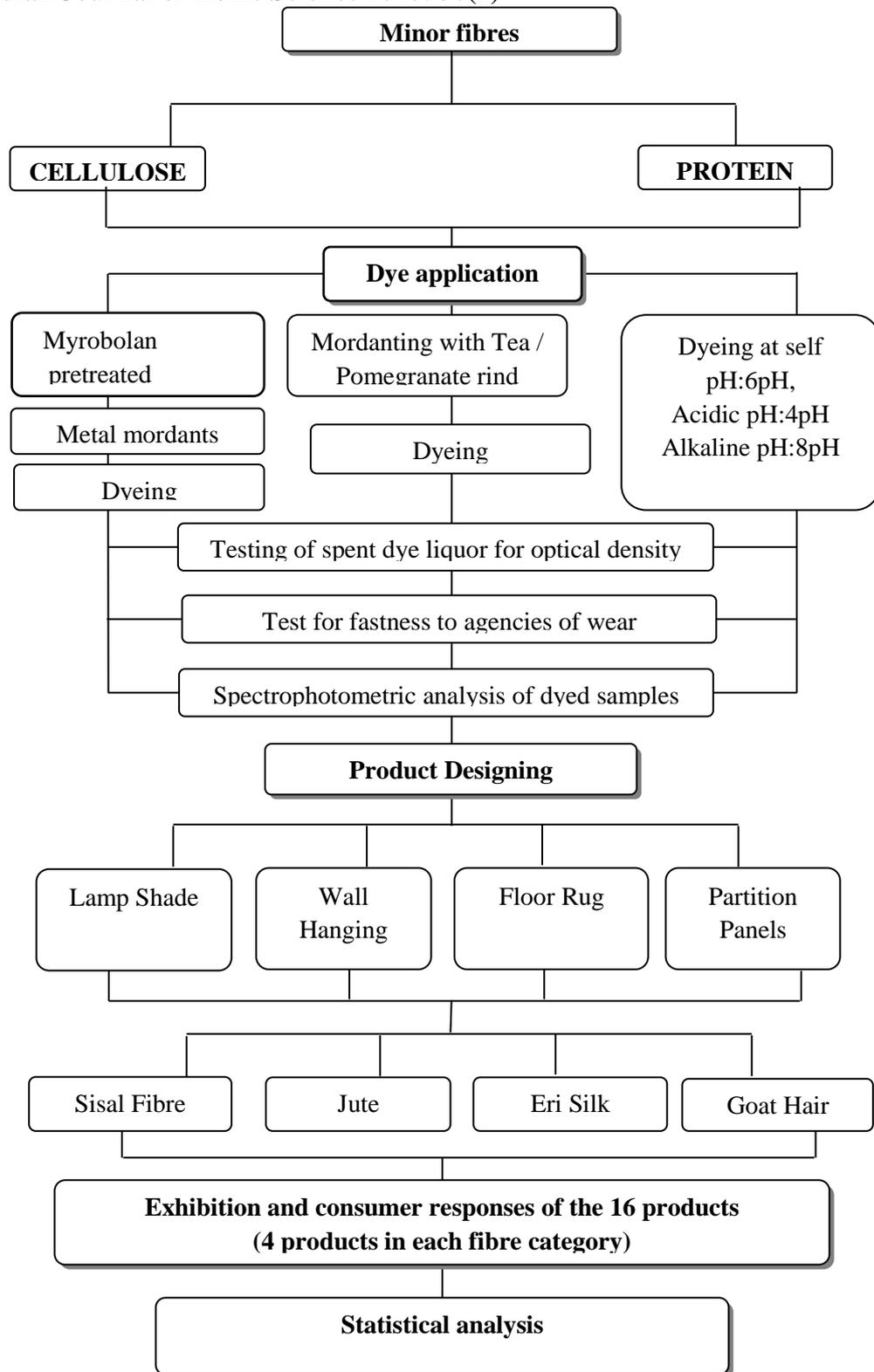


Illustration 1: Research Design

Table: 1 Standardized recipes for extraction of dyes

Sr. No.	Dye Source	Obtained as	Procedure of extract	Time and M:L ratio for extraction	Time and M:L ratio for premordanting	Time and M:L ratio at dyeing
1.	Indian Madder	Root	Powdered and soaked for 15 min.	30 min. At 1:40 M:L	30 min. at 1:30 M:L	45 min. at 1:40 M:L
2.	Marigold	Flower petals	soaked for 15 min.	30 min. At 1:40 M:L	30 min. at 1:30 M:L	45 min. at 1:40 M:L
3.	Henna	Leaves	soaked for 15 min.	30 min. At 1:40 M:L	30 min. at 1:30 M:L	45 min. at 1:40 M:L
4.	Flame of forest	Flowers	soaked for 15 min.	30 min. At 1:40 M:L	30 min. at 1:30 M:L	45 min. at 1:40 M:L
5.	Ratanjot	Wood	Powdered and soaked for 15 min.	30 min. At 1:40 M:L	30 min. at 1:30 M:L	45 min. at 1:40 M:L
6.	Acacia Catechu	Resin	Powdered and soaked for 15 min.	30 min. At 1:40 M:L	30 min. at 1:30 M:L	45 min. at 1:40 M:L
7.	Ravenchi wood	wood	Powdered and soaked for 15 min.	30 min. At 1:40 M:L	30 min. at 1:30 M:L	45 min. at 1:40 M:L
8.	Red Sandalwood	wood	Powdered and soaked for 15 min.	30 min. At 1:40 M:L	30 min. at 1:30 M:L	45 min. at 1:40 M:L
9.	Lac	Crystallized resin matter	Powdered and soaked for 15 min.	30 min. At 1:40 M:L	30 min. at 1:30 M:L	45 min. at 1:40 M:L
10.	Ferrous Acetate	liquid		30 min. At 1:40 M:L	30 min. at 1:30 M:L	45 min. at 1:40 M:L

Table 2: Results of the Atomic Absorption Spectra Analysis of Eri Silk and Sisal Fibre

AAS Analysis for Metal Mordants	Permissible limits for heavy metals	Residue on Eri Silk Fabric	Residue on Sisal Fibre
Residue on fabric at 5% Coppersulphate	< 50 ppm	39.71ppm	33.09 ppm
Residue on fabric at 5% potassium dichromate	< 2ppm	17.56ppm	13.49 ppm
Residue on fabric at 2.5% potassium dichromate	< 2ppm	2.9 ppm	2.1 ppm

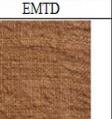
Eri Silk	Sisal Fibre	Eri Silk	Sisal Fibre	Eri Silk	Sisal Fibre	Eri Silk	Sisal Fibre
							
ED	SD	EMD _{4pH}	SMD _{4pH}	ED	SD	EMD _{4pH}	SMD _{4pH}
							
EMAD	SMAD	EMD _{6pH}	SMD _{6pH}	EMAD	SMAD	EMD _{6pH}	SMD _{6pH}
							
EMCuD	SMCuD	EMD _{8pH}	SMD _{8pH}	EMCuD	SMCuD	EMD _{8pH}	SMD _{8pH}
							
EMCrD	SMCrD	EMTD	SMTD	EMCrD	SMCrD	EMTD	SMTD
							
EMFeD	SMFeD	EMPRD	SMPRD	EMFeD	SMFeD	EMPRD	SMPRD

Plate 1: Shades of Madder

Plate 2: Shades of Henna

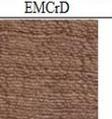
Eri Silk	Sisal Fibre	Eri Silk	Sisal Fibre	Eri Silk	Sisal Fibre	Eri Silk	Sisal Fibre
							
ED	SD	EMD _{4pH}	SMD _{4pH}	ED	SD	EMD _{4pH}	SMD _{4pH}
							
EMAD	SMAD	EMD _{6pH}	SMD _{6pH}	EMAD	SMAD	EMD _{6pH}	SMD _{6pH}
							
EMCuD	SMCuD	EMD _{8pH}	SMD _{8pH}	EMCuD	SMCuD	EMD _{8pH}	SMD _{8pH}
							
EMCrD	SMCrD	EMTD	SMTD	EMCrD	SMCrD	EMTD	SMTD
							
EMFeD	SMFeD	EMPRD	SMPRD	EMFeD	SMFeD	EMPRD	SMPRD

Plate 3: Shades of Marigold

Plate 4: Shades of Flame of Forest



Plate 5: Shades of Ratanjot

Plate 6: Shades of Acacia Catechu



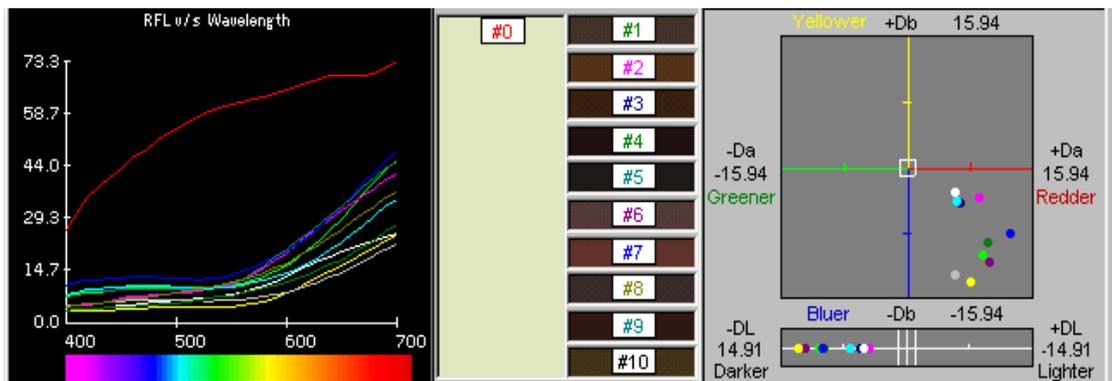
Plate 7: Shades of Madder and Ratanjot

Plate 8: Shades of Madder and Flame of Forest

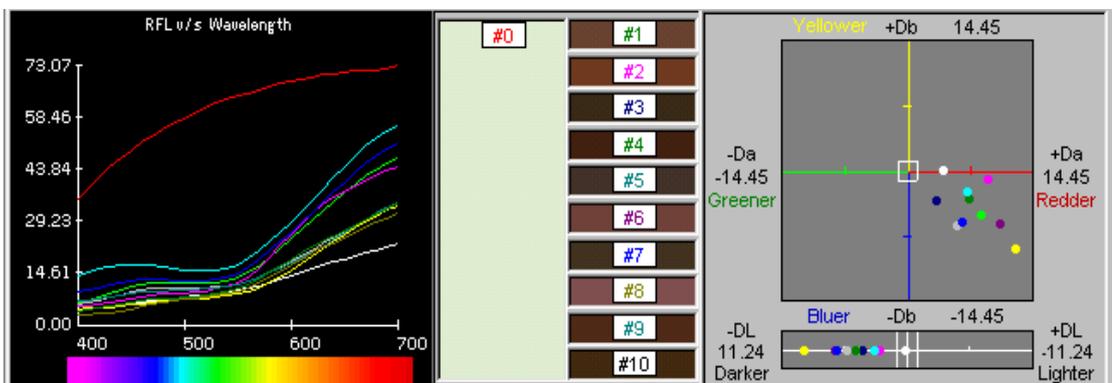
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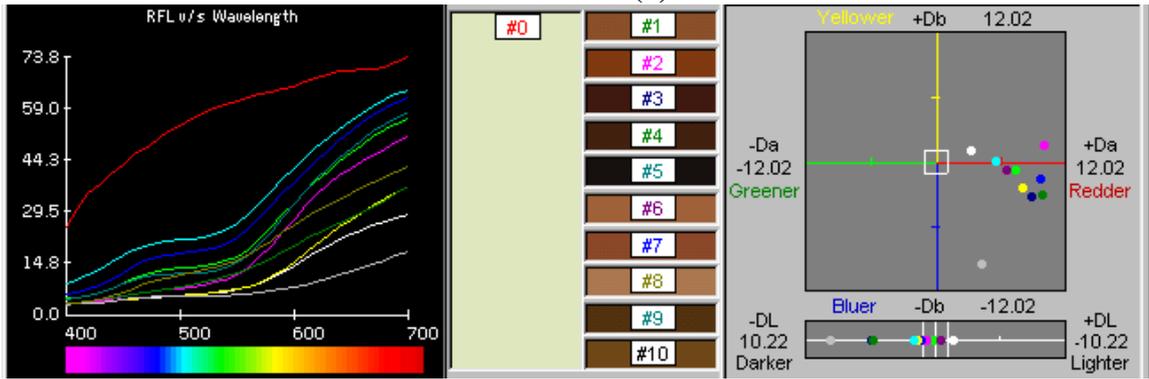
Plate 9: Shades of Madder and Marigold



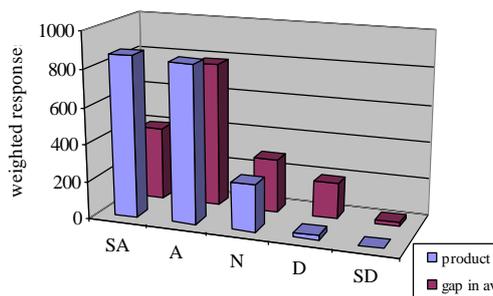
Graph 1: Reflectance values of Madder and Ratanjot composite dye on Sisal fibre.



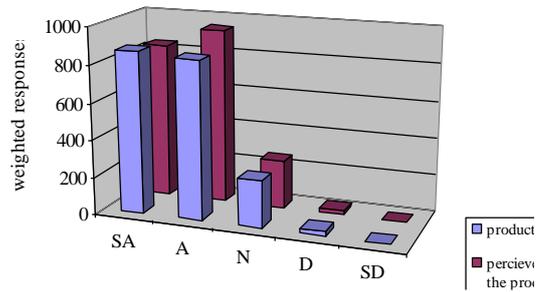
Graph 2: Reflectance values of Madder and Flame of Forest composite obtained on Eri Silk.



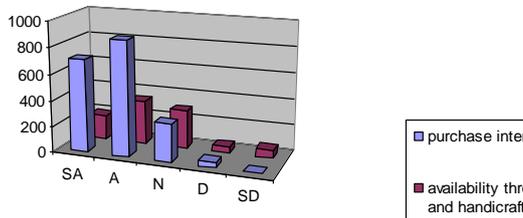
Graph 3: Reflectance values of Madder and Flame of forest composite dye on Sisal fibre.



Graph 4: Correlation between product need and gap in availability of the products made from minor fibres



Graph 5: Correlation between need for minor fibre products and perceived value of the exhibited minor fibre products



Graph 6: Correlation between purchase intention vis-à-vis availability of natural dyed minor fibre products for home décor through handloom and handicraft outlets

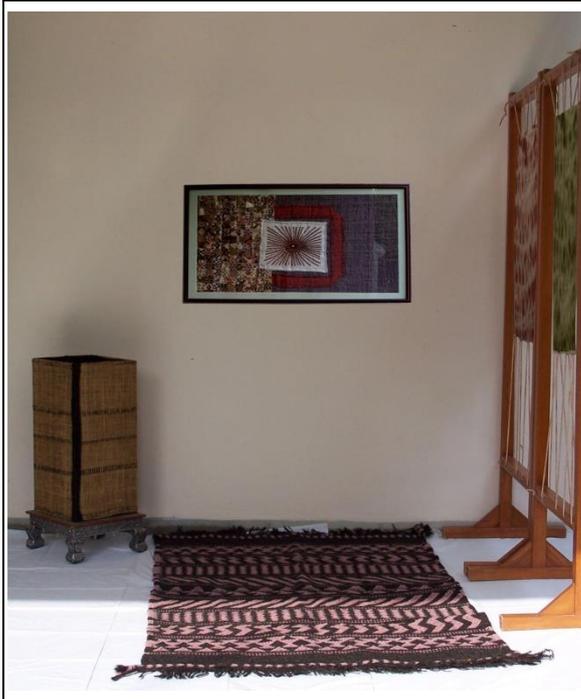


Plate 10: A range of home décor products designed out of Goat Hair



Plate 11: A range of home décor products designed out of Jute fabric



Plate 12: A range of home décor products designed out of Eri silk fabric



Plate 13: A range of home décor products designed out of Sisal fibre fabric

IMPLICATION AND RECOMMENDATION

The study was an attempt to address the contribution that natural dyes might make 'again' to cultures and economies in a 'global' world. A vision of the world of natural dyes renewed both by the awareness of the threats to natural environments and the advances in the field of research.

Continuity of natural dyeing depends largely on transfer of knowledge and appreciation to the younger generation, both in rural areas where the program needs to be 'rooted' and the urban areas which would sustain the program in terms of 'demand'. Dissemination of knowledge is vital in the form of workshops and training centres or action projects. Although the aspect of appreciation comes from use of products in terms of apparel worn or when utilized as a home décor item. Natural dyeing can grow from an academic subject to being utilized at handloom and handicraft training centres. There is a huge potential for the minor/unconventional/underutilized fibres to be utilized into household textiles.

- Other minor fibres could be utilized for value addition and product diversification through designing and application of natural dyes.
- Design sensitization and training workshops utilizing the knowledge of natural dyes and product designing techniques could be imparted to craft clusters through government and non-government organizations.

Studies on improvement in the tactile and drape qualities of the minor fibres could be undertaken by textile research institutes or as academic projects in order to increase the utility of the fibres.

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DEVELOPMENT OF PALMAROSA MICROENCAPSULATED ORGANIC COTTON KNITS: A SUSTAINABLE APPROACH FOR GREEN ENVIRONMENT

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Paper Presented for the Mid Career Award Category

ABSTRACT

Organic cotton *SAHANA* variety grown under organic production systems was processed and spun into 30s single yarn dyed with four natural colorants (Areca nut slurry, Eucalyptus leaves, Pomegranate rind and Indigo) and eco dyed yarn was further used for development of single jersey knitted fabric. Palmarosa oil was used for the preparation of microcapsules using organosilica as shell material through interfacial polymerization technique subjected to FTIR, TGA and SEM for characterization of microcapsules. The knitted fabric was finished with Palmarosa microcapsules by exhaust and pad dry cure methods. The finished organic knit was assessed for effect of laundering on antimicrobial efficiency and aroma intensity. The FTIR spectral results revealed that three major functional groups (O-H, C-H and C=O stretches) were found in pure oil and oil microcapsules with reduced intensity. The TGA of Palmarosa microcapsules were found to be better with minimum weight loss at higher temperature than the pure oil and the morphology of microcapsules was fairly irregular due to preparation conditions. Irrespective of methods of application, organic cotton knits finished with microcapsules by pad dry cure method showed maximum zone of inhibition compared to knits finished by exhaust method against *S.aureus* and *E.coli*. The antimicrobial activity of the finished samples was subjected to multiple washing which indicated that knits finished with pad dry cure method showed a zone of inhibition even after 20th wash and better aroma retention compared to knits finished with exhaust method of application. Further, the group of respondents rated that the 5th washed samples had greater aroma intensity in both the methods than the other samples. Thus the Palmarosa microencapsulated organic cotton knits are free from hazardous chemicals and have multi functional properties which can be suitable for medical and healthcare textiles.

Key words: Palmarosa essential oil, Palmarosa oil microcapsules, Organic cotton knits, Interfacial polymerization technique, FTIR, TGA, Bio-assay method, Parallel streak method, Exhaust and Pad dry cure method of finishing.

Note: The research results are a part of the Staff Research Project sanctioned by UAS, Dharwad .

INTRODUCTION

Recently, a demand for natural fiber-based textile coloured and finished with various bio-resources is gaining academic, research and industrial importance because of the increased global awareness of environmental pollution. Therefore, wet processing of textile carried out by using various plant extracts is gaining greater attention due to presence of the inherent colouring compound and functional properties. These textiles exhibited excellent UV protective, antimicrobial and aroma functions. However, organic cotton has been gradually gaining popularity in the modern times, since people all over the world are becoming more aware of global warming, health, pollution and environmental protection issues. Hence, more

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number of spinning mills are opting for organic cotton production which is being used in knitting and weaving mills. Thus, the demand for organic cotton is increasing day by day as the awareness among consumers is growing for the eco friendliness from the fibre stage itself.

Nature is providing all the resources to mankind for their sustenance. Natural dyes, pigments and aromatic sources and many more are the best examples which are being used in the textile wet processing since time immemorial. Essential oils are a rich source of biological active compounds possessing antibacterial, antifungal, aromatic, antiviral and insecticidal properties. But their application is limited because of volatile nature and chemically instable in the presence of oxygen, moisture, heat and repeated laundering. The stability of the essential oil can be enhanced by micro encapsulation by different techniques. Chemically microencapsulation methods are based on polymerisation or poly condensation mechanisms that may be carried out through different techniques. The cotton fabric was finished by neroline loaded polystyrene based microcapsules containing fragrance that were produced by in-situ polymerization techniques was found to be appropriate for textile application and proved that the loaded microcapsules retained their efficiency even after 35 wash cycles (Azizi *et al.*, 2014). A pure cotton fabric finished by rosemary essential oil with chitosan and tween 80 of various concentration showed greater zone of inhibition and strongly persisted aroma upto 15 days without wash and then begins to gradually decrease (Muresan *et al.*, 2009). Microcapsules prepared by interfacial polymerization has several advantages over other which include high yield encapsulation, inexpensive preparation cost and ease of regulation of the encapsulation process (Rodrigues *et al.*, 2008). The Palmarosa essential oil has been traditionally used in aroma therapy for relieving stress, anxiety, nervousness, tension and insomnia for a long time. It has multi functional value which can be used as eco-friendly finishing agent on textiles to impart better functional properties. Hence, the oil was purposively selected for preparation microcapsules using organosilica as shell material through interfacial polymerization technique with objectives; to develop organic cotton knits, characterization of Palmarosa oil microcapsules, finishing and wash durability of Palmarosa oil microencapsulated organic cotton knits.

METHODOLOGY

Development of organic cotton knits

Organic cotton *SAHANA* variety grown under organic production systems was procured from Organic Farming Institute, UAS, Dharwad. The seed cotton was processed and spun into 30s count single yarn (Table 1 , Plate 1).The spun yarn was subjected to natural dyeing with four natural colourants *viz*, Eucalyptus, Areca nut slurry, Pomegranate rind and Indigo. The eco dyed yarns were used for development of single jersey knitted fabric (24 stitch density, 0.58 mm thickness and busting strength of 45/p).

Preparation and characterization of Palmarosa essential oil microcapsules

Bio-assay test

Palmarosa essential oil (*Cymbopogon martinii*) was procured from Amrita Herbal Extracts and Research Center, Karwar, Karnataka . The oil was subjected bio assay test to determine the anti microbial efficiency of oil against the test organism *Staphylococcus aureus* and *Escherichia coli*. The paper disc method was adopted for diffusion of essential oil to determine the antimicrobial activity and it was found that maximum zone of inhibition was noticed in *S.aureus* than *E.coli* (Plate 3).

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Microencapsulation technique

Pure oil encapsulated with organosilica shell was prepared through interfacial co-hydrolysis and co-condensation of Tetraethylorthosilicate (TEOS), Methyltrimethoxy silane (MTMS) in mini emulsion with required amount of other auxiliaries as mentioned in Table 2.

Characterization of Palmarosa essential oil microcapsules

The microcapsules were characterized under Fourier Transform Infrared Spectroscopy (FTIR), Thermal Gravimetric Analyzer (TGA) and Scanning Electron Microscope (SEM) to know the functional groups, thermal property and size of the capsules. The above mentioned testes and trials were carried out at BTRA, Mumbai using standard instruments and test procedures (Plate 4 & 5).

Antimicrobial efficiency and wash durability of Palmarosa oil microencapsulated organic cotton knits

A specially designed multi striped organic cotton knitted fabric was finished by Palmarosa oil microcapsules through exhaust and pad dry cure method (Plate 6). Antimicrobial activity of the treated fabrics was assessed by AATCC 147 test method to determine the antimicrobial efficiency and to estimate the degree of antimicrobial efficiency after multiple washes.

Olfactory analysis

Treated organic cotton knits were subjected to olfactory analysis to rate the fragrance retention after washing cycles by the 30 panel members. Sensory evaluation was carried out by administering a self structured questionnaire to elicit the olfactory analysis for treated fabrics after every wash cycle (5-20th). The experimental data was analysed by using Weighted Mean Score (WMS), frequencies, percentage and standard deviation.

Results and discussion

Fourier Transform Infrared Spectroscopy of Palmarosa oil and microcapsules

The functional groups present in the essential oil were determined by comparing the vibration frequencies in wave numbers of the sample. Spectrograph obtained from an FTIR revealed that, the absorption band of 3333.22 cm^{-1} with transmittance percentage 92 per cent showed the presence of O-H stretch of strong broad intensity. The absorbance frequencies between 2967 cm^{-1} to 2857 cm^{-1} indicate C-H stretch for alkane and IR absorption frequency ranged from 1241 cm^{-1} to 1668.80 cm^{-1} revealing the presence of strong C=O band for carbonyl groups and a medium weak multiple bands between 1440 cm^{-1} to 1093.63 cm^{-1} indicating the presence of aromatic C=C stretch. A single strong peak at 996.93 cm^{-1} showed the presence of ester C-O stretch and a weak multiple bands ranged between 664.36 cm^{-1} to 831.55 cm^{-1} indicated the presence of alkyl Halide C-Cl stretch (Fig 1a).

Further, Fig 1b shows the functional groups present in the Palmarosa microcapsules and explained that a strong multiple bands between 2800 cm^{-1} to 2900 cm^{-1} indicates presence of alkane C-H stretch with slightly higher transmittance percentage than the pure oil. Similarly, carbon groups of C=O stretch and aromatic bands of C=C stretches were also present in microcapsules with reduced intensity. Further, a single peak at 1270 cm^{-1} is characteristic for Si-CH₃ groups. From the FTIR graph it can be concluded that the major functional groups present in the Palmarosa oil were also focused in microcapsules of Palmarosa oil encapsulated with organosilica shell material with reduced intensity.

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Thermo gravimetric analysis of Palmarosa oil and microcapsules

The weight loss of pure oil started from 38.19°C temperature with the weight of 99.37 percentage and maximum weight loss was obtained at 188°C with a weight of 0.868 percentage. Further, the complete loss of oil weight was observed at 604.69°C with residue weight of -0.852 per cent because of its volatile nature and chemically instable in the presence of oxygen, moisture and heat.

The TGA of oil microcapsules recorded that the weight loss of oil microcapsules initiated at 76.98°C with weight of 98.25 per cent and at the temperature of 264.50°C the oil microcapsules attained the weight of 56.48 per cent and complete discharge of weight 42.14 per cent was observed at 544.76°C (Fig 2a & 2b).

The TGA of microcapsules were found to be better with minimum weight loss at higher temperature than the pure oil. This may be due to combined effect of core material and wall material used during microencapsulation which helps to retain and improve the weight of core materials as compared to pure oil.

Size distribution of palmarose essential oil microcapsules

The size of the Palmarosa oil microcapsules ranged from 1.78 ± 0.192 to 64.31 ± 3.849 . Table 3 and Plate 7 indicated that the morphology of microcapsules are fairly irregular and the shape of the microcapsules are regular and round at some places, some are spherical in shape and few are rounded by small aggregates. This may be due to influence of preparation conditions, core and shell material concentration and liquor ratio. The results are on par with the study conducted by Marcela *et al.* (2015) stated that the microcapsules were formed at lower concentrations of polymers but there morphology was very irregular.

Antimicrobial efficiency and wash durability of Palmarosa oil microcapsules finished samples

In general, irrespective of method of application the microencapsulated fabric through pad dry cure method showed maximum zone of inhibition compared to the fabric treated through exhaust method against *S. aureus* and *E. coli*. This may be due to the deeply deposition of Palmarosa microcapsules in the fabric structure. However, in all the samples the zone of inhibition was found to be greater against *S. aureus* than *E. coli* organism. This may be due to the gram positive bacteria which are more susceptible to natural herbal plants extracts compared to gram negative bacteria (Mohanraj *et al.*, 2011).

Wash durability of pad dry cure microencapsulated knits exhibited a inhibition zone even after 20 washes compared to exhaust method samples, which showed negligible inhibition zone. This may be due to the deep deposition of microcapsules and slow release of active core compounds over the repeated laundering. But in case of exhaust method, the microcapsules are distributed on the surface without firm bonding resulting into fair antibacterial durability. These results are on par with the study conducted by Sathinarayanan (2010) and Ramya and Maheshwari (2015) who reported that microencapsulated fabric was not significantly affected due to repeated laundering compared with direct treated fabrics. Sumitra and Vasugi (2012) opined that the durability of herbal finishing was increased by microencapsulation and nanoencapsulation methods and opined that the antimicrobial effect persisted after few washes against the standard strains. Thilagavati and Kannaian (2010) revealed that the microencapsulation process of geranium extract lead to slow release of active core materials and preserved the durability upto 15 washes compared to direct geranium extract treatment (Table 4 and plat 8) .

Olfactory analysis of Palmarosa oil microcapsules finished organic cotton knits

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Based on the olfactory analyses majority of the respondents stated that 5th wash samples ranked first in both the methods of application *i.e.*, sample finished by pad dry cure (4.50/4.35) and exhaust method (4.36/4.20) which exhibited strong aroma intensity than the unwashed samples. However, aroma release was found to be greater in case of pad dry cure microencapsulated samples due to application of roller pressure that lead to slow release of fragrance. These results are on accordance with the results of Karolia and Mendapara (2007) who reported that the fabric finished with padding method showed maximum bacteria reduction and better aroma property than the fabric finished with exhaust method. Saranya *et al.* (2014) revealed that in padding method the fragrance retention was found to be greater than the exhaust method.

Wash durability among the treated samples explained that the microencapsulated knitted fabric by pad dry cure method retained its aroma up to 20th wash with moderate to mild aroma compared to knits finished by exhaust method. This can be attributed to the fact that wall of microcapsules provided covering to the oil thus protecting it from outside environment and providing with controlled release to give longer life. These results are in line with Bhat *et al.* (2015) who reported that the fabric treated through exhaust method retained fragrance till 10 washes, while the fabric treated through oil microcapsules retained fragrance up to 30 washes (Table 5 and Plate 9).

Table 1: Fibre and yarn physical properties of organic cotton grown under organic production system

SI No	Parameter	Unit
I	Fibre properties (SAHANA Variety cotton)	
1	2.5 % SL (mm)	26.52
2	U.R. (%)	47.42
3	Mic.(g/in)	3.40
4	Tenacity (g/tex)	20.18
5	Elongation (%)	5.70
II	Yarn evenness properties (1000mtrs)	
1	Thin Places (-50%)	1330
2	Thick Places (+50)	2056
3	Neps (+200)	2714
4	Total Imperfection	6100
5	Uniformity Ratio	19.93
6	CSP (Count strength Product)	1797.03
III.	Yarn physical properties	
1	Twist per inch (TPI)	24.30
2	Tenacity (g/tex)	10.90
3	Breaking elongation (%)	6.20

Table 2. Chemicals and auxiliaries used in preparation of Palmarosa oil microcapsules and finishing on organic cotton knits

Sl No.	Treatment	Chemicals used
01	Preparation of palamarosa essential oil encapsulated with organosilica shell material	<ul style="list-style-type: none"> • Pure oil (1.0 g) • MTMS (Methyltrimethoxy silane) (0.5 ml) • TEOS (Tetraethylorthosilicate) (1.0 ml) • CTAB(Cetyltrimethylammonium Bromide) (0.328 g) • Deionized H₂O (28.5 ml) • Anhydrous ethanol (14.2 ml) • Aqueous ammonia (25 wt%, 1.04 ml)
02	Finishing : Method of application`	
	Exhaust Method	<ul style="list-style-type: none"> • Citric acid (8% Owf) • Palmarosa oil microcapsules (8% Owf)
	Pad dry cure Method	<ul style="list-style-type: none"> • Acrylic binder (8% Owf) • Palmarosa oil microcapsules (8% Owf)

Table 3. Size distribution of Palmarosa oil microcapsule

Capsule size category	Size (Diameter μm)
Small size	22.28 \pm 2.01
Medium size	41.56 \pm 1.46
Big size	64.31 \pm 3.849
Aggregated form	1.78 \pm 0.192

Figures in parentheses indicate Mean \pm Standard deviation

Table 4. Antimicrobial efficiency of Palmarosa oil microencapsulated organic cotton knits and wash durability

Treated organic cotton knits	Wash cycle	Intensity of aroma (WMS)			
		Teachers	Rank	Students	Rank
PME	0 wash	3.60	IV	3.90	III
	5 wash	4.50	II	4.35	II
	10 wash	3.10	VI	3.60	VI
	15 wash	2.60	VIII	2.40	VIII
	20 wash	2.13	X	1.90	X
PMP	0 wash	3.75	III	3.80	IV
	5 wash	4.36	I	4.20	I
	10 wash	3.60	V	3.90	V
	15 wash	3.10	VII	3.20	VII
	20 wash	2.3	IX	2.00	IX

Note : No Inhibition (NI)

Figures in parentheses indicate Mean \pm Standard deviation

Table 5. Olfactory analysis of Palmarosa oil microcapsulated organic cotton knits

Note: **PME:** Palmarosa oil microencapsulated organic cotton knits finished by Exhaust method of finishing.

PMP: Palmarosa oil microencapsulated organic cotton knits finished by Pad dry cure

Zone of inhibition (mm)	Method of finishing	Organism	Wash cycle	Control	Palmarosa oil microcapsule (mm)
	Zone of inhibition (mm)	Exhaust method	<i>S.aureus</i>	0 wash	NI
5 wash				6.8 ± 0.18	
10 wash				4.5 ± 0.612	
15 wash				2.9 ± 0.651	
20 wash				19 ± 1.083	
<i>E.Coli</i>			0 wash	NI	7.5 ± 0.612
			5 wash		4.5 ± 0.61
			10 wash		2.3 ± 0.57
			15 wash		1.6 ± 0.41
			20 wash		1.0 ± 0.20
Pad dry cure method		<i>S.aureus</i>	0 wash	NI	10.5 ± 0.353
			5 wash		9.1 ± 0.741
			10 wash		7.9 ± 0.41
			15 wash		6.00 ± 0.790
			20 wash		2.7 ± 0.57
	<i>E.Coli</i>	0 wash	NI	9.8 ± 0.570	
		5 wash		7.5 ± 0.35	
		10 wash		6.0 ± 1.00	
		15 wash		2.6 ± 0.41	
		20 wash		1.4 ± 0.821	

method of finishing.

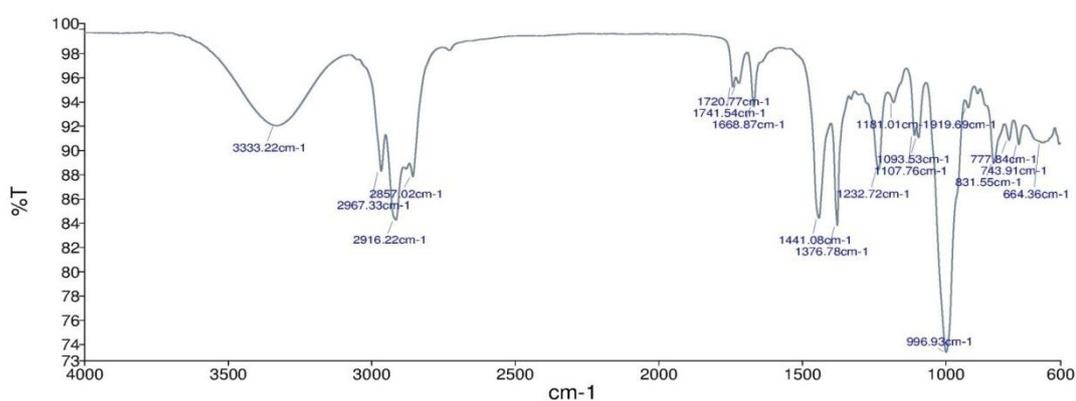


Fig. 1a: FT-IR spectra of Palmarosa oil

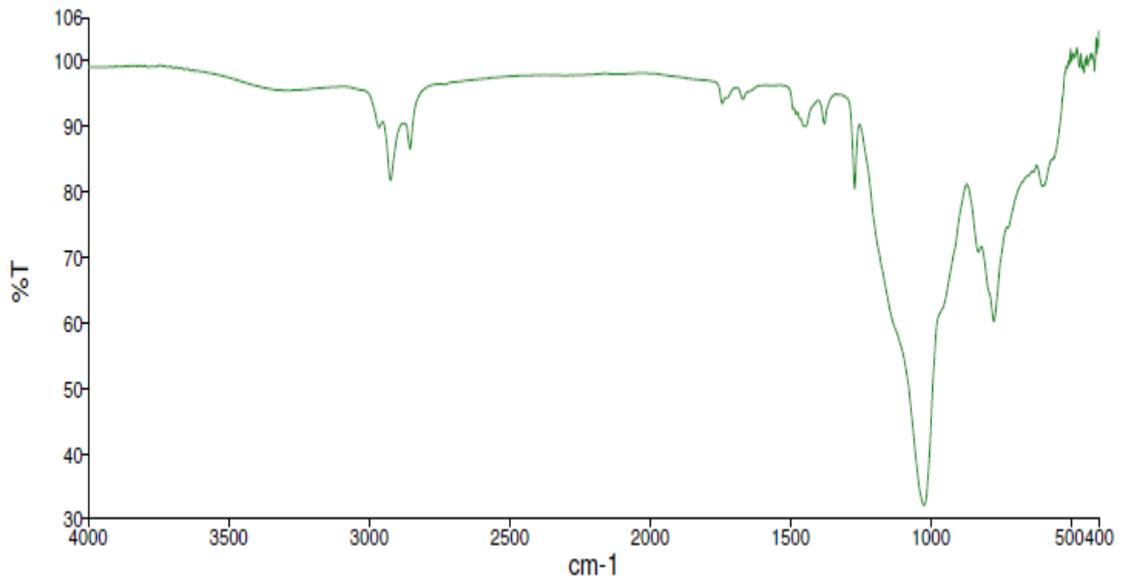


Fig. 1b: FT-IR spectra of Palmarosa oil microcapsules

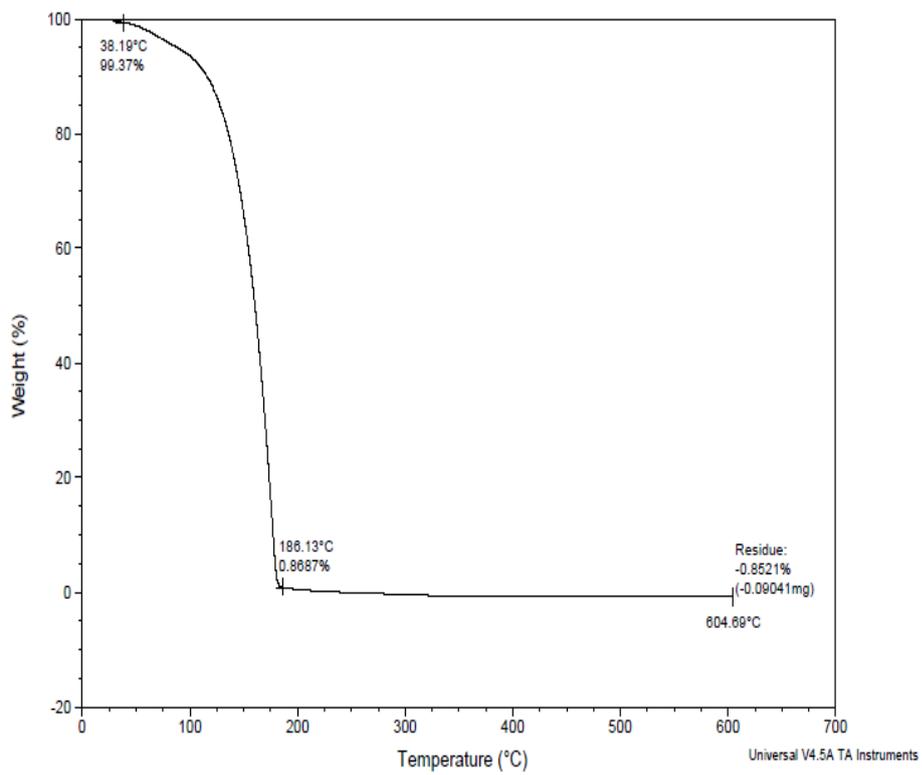


Fig. 2a: Thermo gravimetric analysis of Palmarosa oil

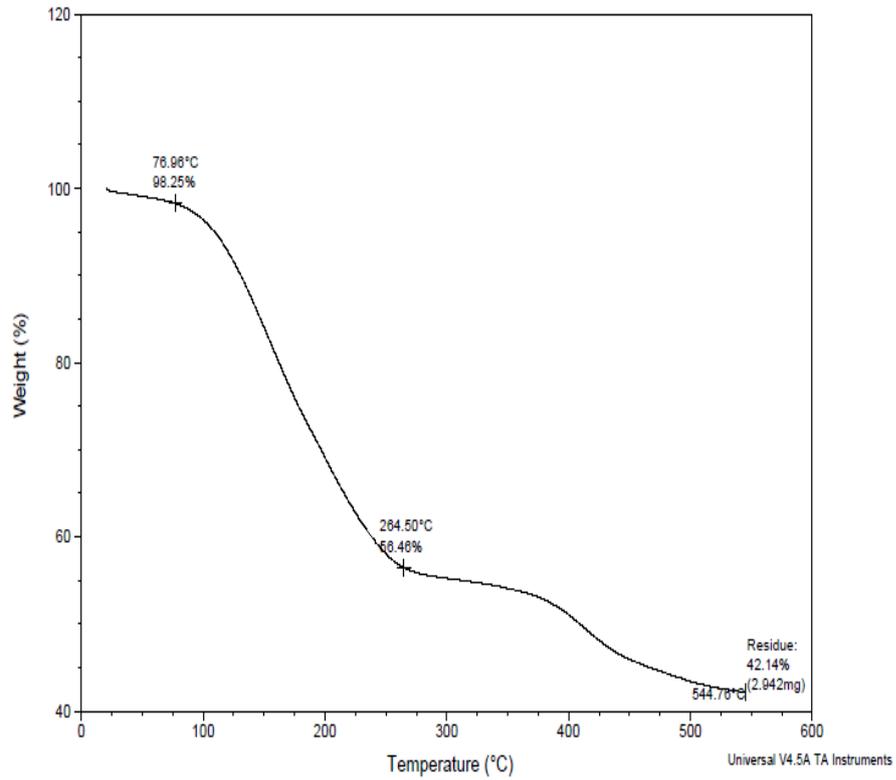
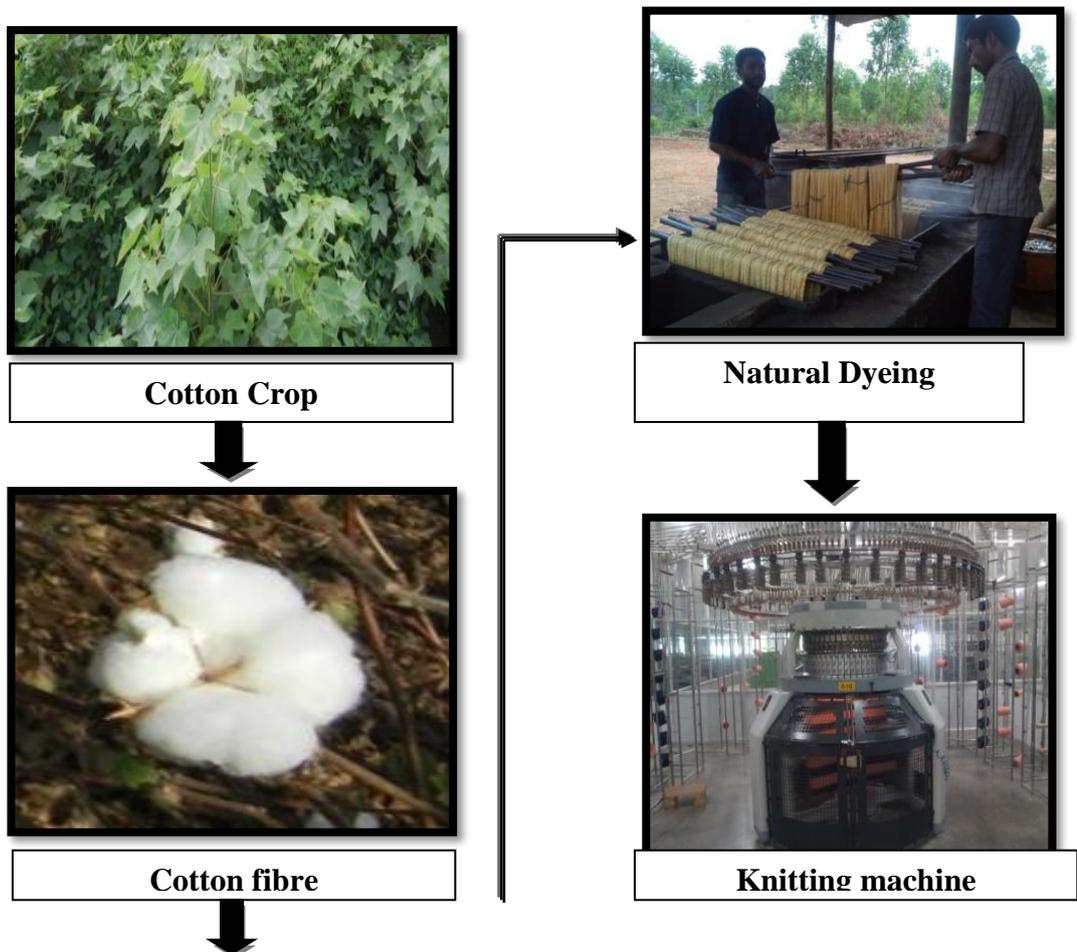


Fig. 2b: Thermo gravimetric analysis of Palmarosa oil microcapsules





Cotton Ginning



Cotton spinning



Organic cotton Knit fabric

Plate 1. Development of organic cotton knitted fabric



B

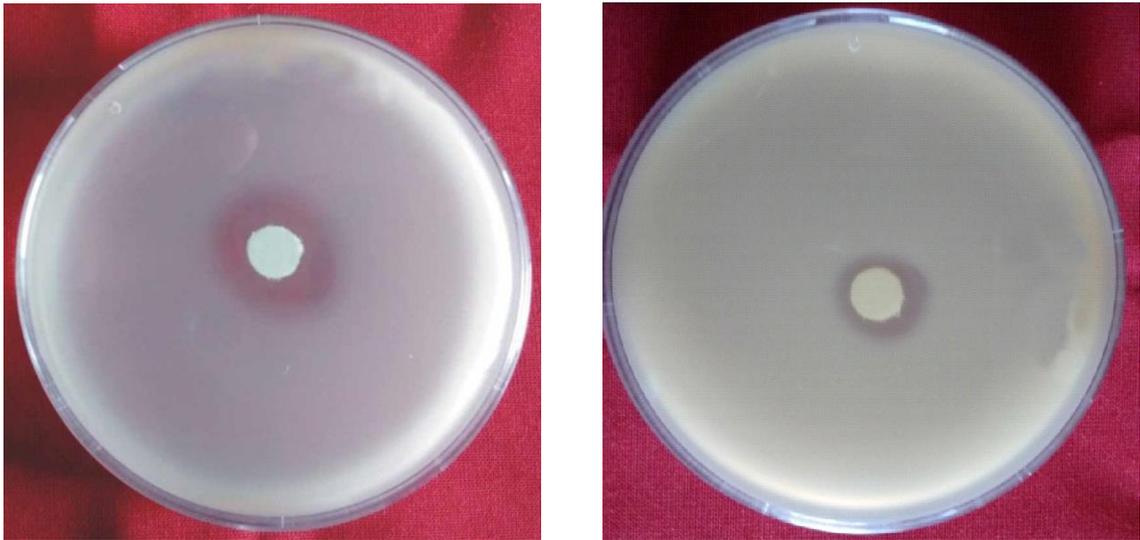


Plate 3. Antimicrobial efficiency of Palmarosa oil against *S. aureus* (A) and *E. coli* (B) through bioassay method (Paper disc method)



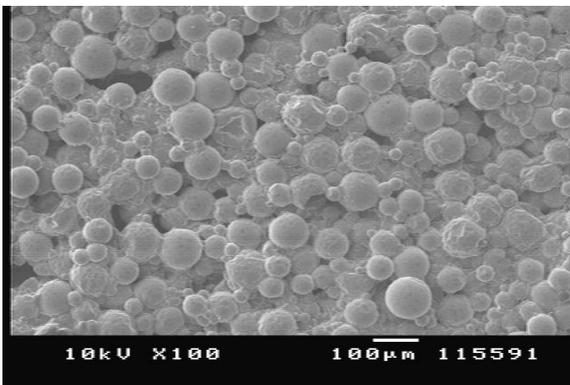
Plate 4. Preparation of Plamarosa oil microcapsules through Interfacial polymerization technique



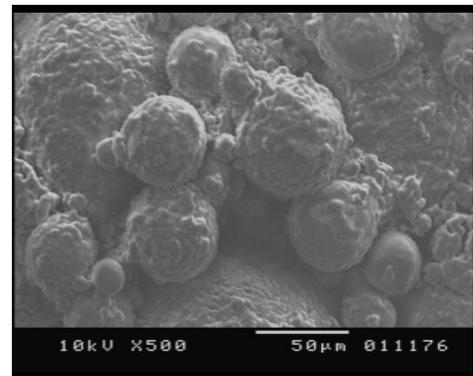
Plate 5. Characterization of Palmarosa microcapsules through Scanning Electron Microscope (SEM)



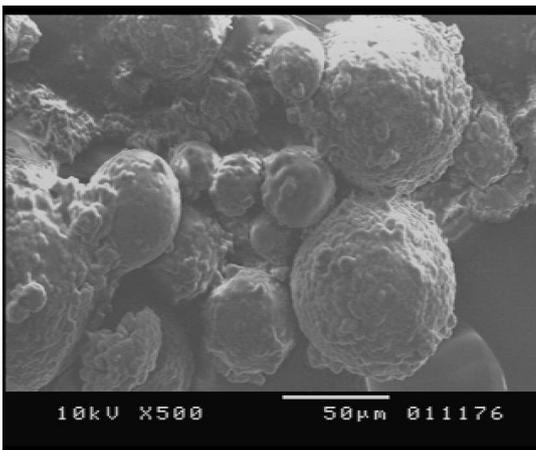
Plate 6. Application of Palmarosa oil microcapsules on organic cotton knit fabric through pad dry cure method



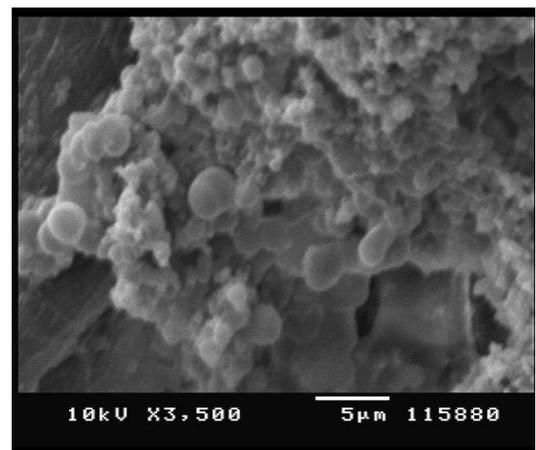
Small size microcapsules



Medium size microcapsules

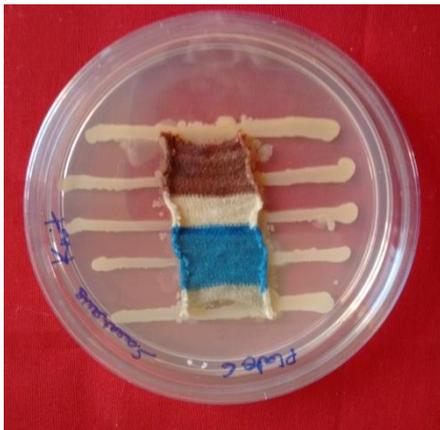


Big size microcapsules

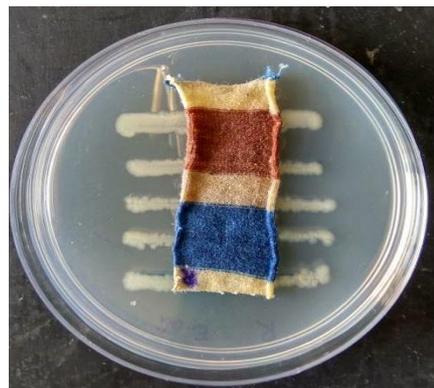


Aggregated form of microcapsules

Plate 7. Size distribution and surface morphology of Palmarosa oil microcapsules through SEM



Organic cotton knits against *S.aureus*
(Control)



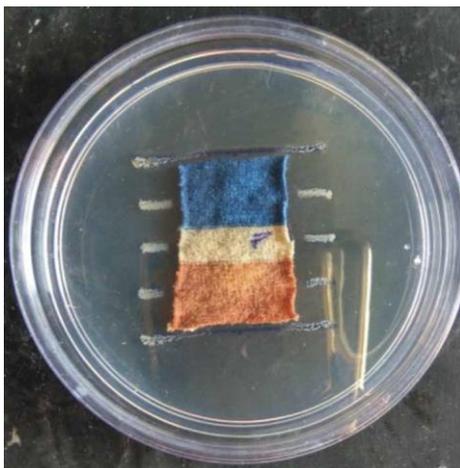
Organic cotton knits against *E.coli*
(Control)



Palmarosa oil finished samples
(Exhaust) against *S.aureus*



Palmarosa oil finished samples
(Exhaust) against *E.coli*

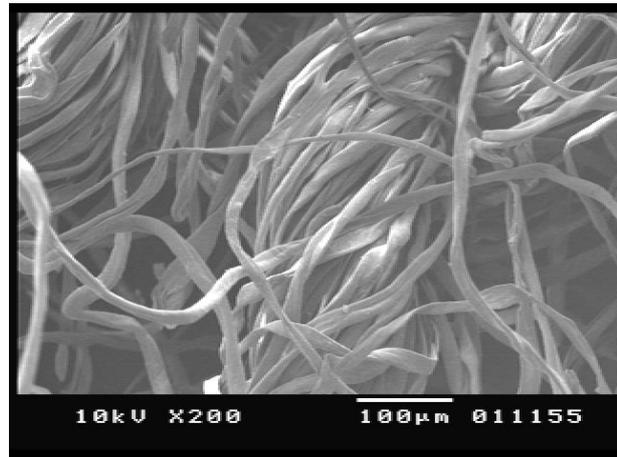


Palmarosa oil finished samples
(Pad dry cure) against *S.aureus*
E.coli



Palmarosa oil finished samples
(Pad dry cure) against

Plate 8. Antimicrobial efficiency of Palmarosa encapsulated organic cotton knits against microorganisms



Organic cotton knitted fabric (Control)

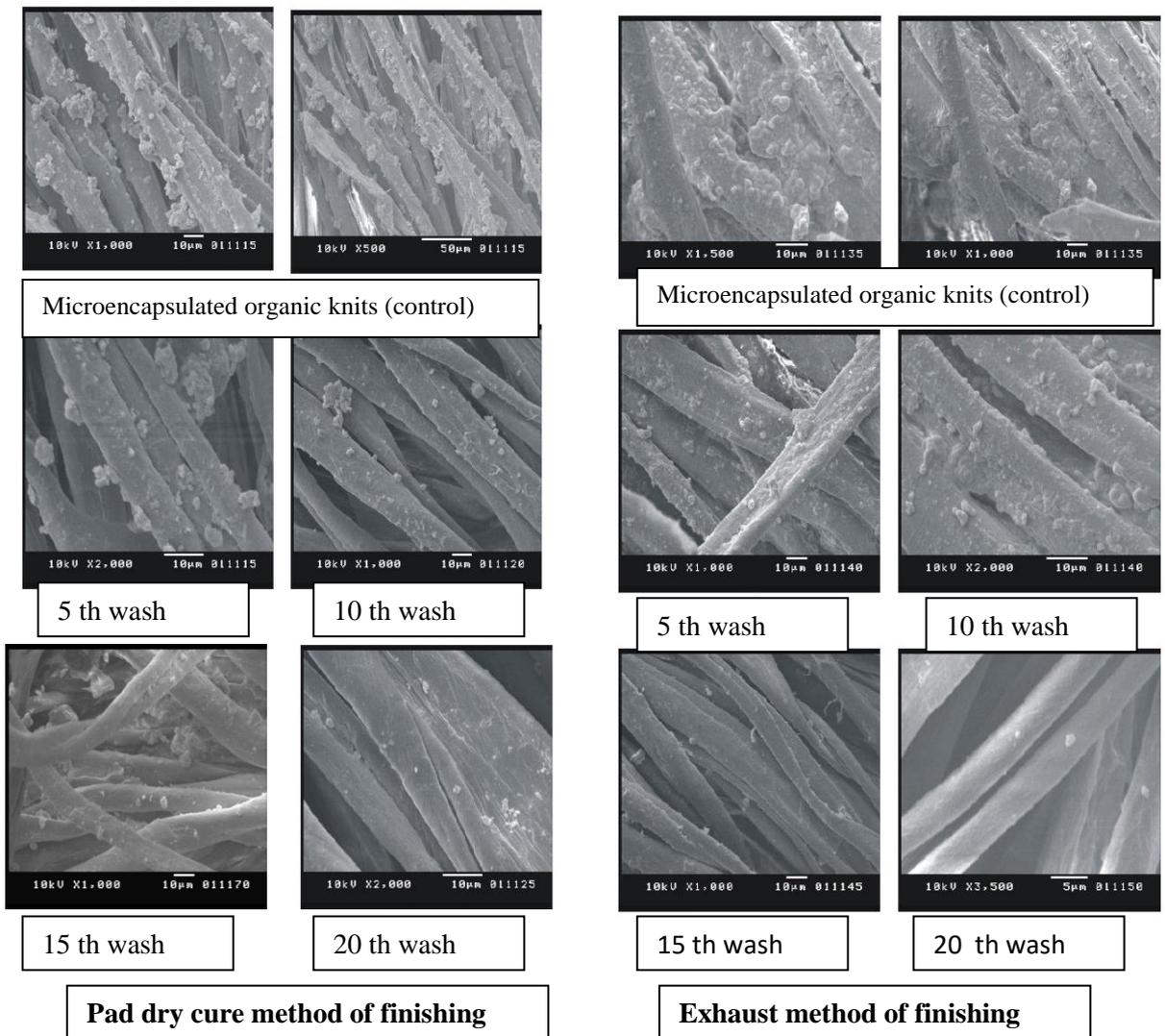


Plate 9. SEM images of Palmarosa oil micro capsulated organic cotton knits through exhaust and pad dry cure method

SUMMARY AND IMPLICATIONS

The FTIR spectra of pure oil assigned three major functional groups (O-H, C-H and C=O stretches) with varied frequency and transmittance percentage were also present in oil microcapsules with reduced intensity. The TGA of Palmarosa oil microcapsules were found to be better with minimum weight loss than the pure oil and the morphology of the microcapsules were fairly irregular. Irrespective of methods of application, organic cotton knitted fabric finished with microcapsules by pad dry cure method showed maximum zone of inhibition with better wash durability compared to knits finished by exhaust method against *S.aureus* and *E.coli*. The antimicrobial efficiency of the finished samples was subjected to multiple washings indicated that pad dry cure finished knits showed a zone of inhibition even after 20th wash compared to knits finished with exhaust method of application. Further, the group of respondents rated that the 5th washed samples had greater aroma intensity in both the methods than the other samples. Microencapsulated knits by pad dry cure method retained its aroma even after 20th wash with moderate to mild aroma compared to exhaust method of finishing. It can be concluded that the Palmarosa oil microencapsulated organic cotton knits are free from hazardous chemicals and has multi functional properties which can be suitable for medical and healthcare textiles. Organic farming system and eco friendly textile wet processing routes not only provide protection from environmental hazards but also safeguard the environment, prevent pollution, promote eco-friendly textiles and certainly this value chain is encouraging approach for green environment.

Acknowledgement

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IMPACT OF INTERVENTION ON MENTAL HEALTH, SELF ESTEEM AND LIFE SATISFACTION AMONG RURAL ELDERLY

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Paper Presented for the Senior Scientist Category

ABSTRACT

Mental Health , Self Esteem and Life Satisfaction of 177 rural men and women elderly from two villages of Dharwad Taluk of age 60 to 88 yrs and most of (79.1%) who were from lower middle SES was assessed using the standard measures. A sizable proportion of elderly were with poor mental health (36.2%), with moderate level of depression (35.0%), low self esteem (46.9%), low level of life satisfaction (47.5%). So an intervention programme consisting of 10 weekly sessions, with one session per week from 11.00 to 5.00 pm was developed and conducted on 177 elderly in two batches, village-wise. The intervention program focused on common physical and psychological problems during late adulthood and remedies, importance of diet and nutrition, healthy practices for healthy life and sound relationships with family members and friends. The program was conducted in the Day Care Centre established in the university campus in 2015-16. The content was delivered through power point presentations, discussions, video shows and sharing their meaningful life experiences. Therapies such as physiotherapy by physiotherapist, mud therapy by the interventionists and recreational activities /games /competitions were conducted.

A non- experimental research design with single group pre- test and post test design was employed. On post- testing through paired “t test” and Chi-square analysis, it was noticed that the groups were significantly better on the mental health status, self esteem and life satisfaction indicating that the intervention was effective.

Education intervention programmes would improve the mental health of the elderly and add life to their added years due to healthy aging.

Keywords:-Ageing, Elderly, mental health, life satisfaction, self esteem, depression, intervention.

INTRODUCTION

Ageing is a natural biological phenomenon, an universal process and an inevitable process of the life cycle that every being has to cross upon sooner or later. It is a multidimensional process of physical, psychological and social change.

Aging of population is one of the most significant characteristics of the 21st century. Globally, there is a demographic transition underway. People are living longer. Even though “old” is defined differently across the world, there will be more people over the age of 65 than children under five by 2015. By 2050, there will be an estimated 1.5 billion people aged 65 or older. India is the second populous country in the world, with 99.87 million persons above 60 years, constituting 8.3 percent of the total population (Census of India, 2011). Increased life expectancy of an average Indian has resulted in increasing numbers of elderly persons.

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Elderly contribute to society in many ways – be it within their family, their local community or society more broadly. However, the extent of these human and social resources and the opportunities available to each of them as they age, will be heavily dependent on one key characteristic: one's health. If people are experiencing these extra years in good health, their ability to do the things they value will have few limits. If these added years are dominated by declines in physical and mental capacities, the implications for older people and for society may be much more negative.

With emerging changes in the social and cultural values, the elderly who are normally economically unproductive are sadly neglected. It is recognized that the elderly are prone to psychological problems such as social isolation, malnutrition, economic and emotional depression and so on.

Healthy ageing is the process of optimizing opportunities for physical, social and mental health to enable older people to take an active part in society without discrimination and to enjoy an independent and good quality of life.

“Life satisfaction”, defined as a positive perspective on past and present life activities, is considered an indicator of subjective wellbeing and overall quality of life. (Choi, 1986; Liu & Guo, 2008). Successful aging is sustained in an adequate optimization of the three dimensions of life quality: psychological, social and physical functioning (Reig, 2003). Life satisfaction has been considered the subjective expression of quality of life (Fernandez- allesteros et al., 2001) and it is therefore an indicator of successful aging.

Limited knowledge on aging negatively contributes to quality of life, including psychological wellbeing (Jeon & Shin, 2009; Kim, 2003). Knowledge on aging, as defined by Palmore (1980), is factual information that covers the basic physical, mental, social facts, and also common misconceptions about aging. It is needed in order to understand the aging process correctly.

The National Policy on Older Persons has identified principal areas of intervention and one of them is development of trained manpower to meet the special health needs of the elderly (Dandekar, 1993). Intervention education programmes would not only improve the skills of the elderly in their daily functioning but also provide an avocation to them, helping with healthy aging (Rani, 2004). Early interventions to promote an active life can reduce the proportion of physical health and psychological health problems and induce life satisfaction.

Therefore it was imperative to know the mental health and life satisfaction among elderly and to design an intervention programme and test its efficacy in enhancing the mental health status, self esteem and life satisfaction of elderly.

METHODOLOGY

Research Design- A non- experimental design with single group pre-test and post-test was employed to know the impact of educational & nutritional intervention programme on mental health status, self esteem and life satisfaction of the rural elderly.

Population and Sample: A sample of 177 elderly with 107 men and 70 women of age 60 years and above from rural area were selected from two villages of Dharwad taluk , Karnataka. A total of 177 elderly participated. A sample of 117 elderly (77 men and 40 women) attended all the 10 sessions of the programme for a duration of two and half month while the rest attended 3-9 sessions.

Tools and Measures:

1. Socio Economic Status: Aggarwal *et al* (2005) scale which consists of 22 statements which includes parameters such as education, occupation, income from all sources, family

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possessions, number of children, number of earning members in family, education of children, domestic servants hired, possession of agricultural and non-agricultural land and animals and social participation of the family. The scores range from 0 to ≥ 76 and are categorized as Very poor (Below Poverty Line) with scores ≤ 15 , Poor (16-30), Lower middle (31-45), Upper middle (46-60), High (61-75) and Upper high (≥ 76).

2. Mental Health Inventory: Jagadish and Srivastava's mental health inventory (1983) was used. It is a self rating scale which consists of six dimensions (1) Positive self-evaluation, (2) perception of reality, (3) integration of personality, (4) autonomy, (5) group oriented attitudes, (6) environmental mastery. There are 54 statements with 4 alternative responses for each statement as 'always, most of times, sometimes and never' with scores anchored from 4 to 1 for positive statements and reverse scoring for negative statements. The scores range from 54 - 216 and categorized into very poor (54-86), poor (87-119), average (120-152), good (153-184) and very good (185-216). The Split-Half reliability coefficient was found to be 0.92 which was significant..

3. Depression Scale: Zung's Depression scale (1965) is a self rating consisting of 20 items with four common characteristics of depression: the pervasive effect, the physiological equivalents, other disturbances and psychomotor activities. There are ten each positive and negative statements. It is a four point Likert scale with score of 1-4 for a 'little', 'some', 'good part' and 'most of the time' respectively. The total score ranges from 20 to 80 and categorized into Normal (20-35), Mildly depressed (36-50), Moderately depressed (51-65) and Severely depressed (66-80). The Split-Half reliability coefficient was found to be 0.58 which was statistically significant

4. Self Esteem scale: Rosenberg's (1965) unidimensional scale is a 10-item scale that measures global self-worth by considering both positive and negative feelings about the self. The responses for all items are rated using a 4-point Likert scale ranging from 'strongly agree to strongly disagree'. The scores range from 10 to 40 and categorized as low (10-20), Moderate (21-30) and High (31- 40). The Split-Half reliability coefficient of the scale was found to be 0.92 which was statistically significant.

5. Life satisfaction Scale: Ramamurthi (1978) scale consists of 20 items both positive and negative with three alternate answers; agree, disagree and 'not sure' with score of 3, 2 and 1 respectively for positive statements and the reverse scoring for negative statements and categorized into less satisfied (20-33), moderately satisfied (34-46) and highly satisfied (47-60). The Split-Half reliability coefficient was found to be 0.52 which was statistically significant.

Development of intervention program: The educational intervention programme consisted of providing knowledge on positive attitude towards ageing, restoration of physical health through proper nutrition practices and physical exercises, social participation and recreational activities and mental health issues. There were health checkups by a physician and advice and prescription of medicines were provided for physical health ailment like common cold and cough, throat infection, skin & foot infections and body aches. Blood tests for diabetes and anemia and blood pressure was assessed by the University medical staff. Eye check- up and cataract operations were arranged. A total of 33 elderly got operated for cataract. The nutritional intervention included provision of ragi malt and nutritious salad. Therapies such as physio-therapy by a physio therapist, mud and water therapy were provided. Skills were developed for productive activities / income generating activities such as candle making, soap making, agarbatti making, paper bags. Arrangements for issue of the "identity cards" for elderly by the Department of Disabled and Senior Citizen, Government of Karnataka were also made.

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Procedures: The physical and mental health status was assessed using the tools/ scales that were translated into regional language. As the participants were illiterate, they were interviewed using the standard tools. The interviews were conducted for each of the participant individually in the Day Care Centre for elderly established in the department in 2015

The intervention program was provided at the day care centre in two batches of elderly village wise, once in a week for 6 hours/day from 11.00 am to 5.00 pm, a total of 10 sessions of 60 hours. The educational content was delivered through power point presentations, discussions, video shows and sharing their meaningful life experiences. Conveyance was arranged for the participants for pick up and drop to the village.

Statistical analysis: The differences in mean scores on mental health status, self esteem, life satisfaction between pre-test and post-test was tested through paired 't' test Chi-square analysis.

RESULTS AND DISCUSSION

Characteristics of the sample - The characteristics of the sample is presented in table 1a & 1b. There were 107 male and 70 female elderly. Among them 61.4 percent female and 56.1 percent male elderly were in young old category, 33.6 percent male and female elderly were in 'old old' category and 15.7 percent and 10.3 percent female and male elderly were in the 'oldest old' category. A large proportion belonged to (79 %) lower middle SES, 17 percent in 'poor' and only 4 percent were in the upper middle SES. At post test, there were only 117 samples who attended all the 10 sessions where in 77 were male and 40 were female with 75 per cent of female and 66.2 per cent of male who were young old, 27.3 per cent of male and 17.5 per cent of female were 'old- old' and 7.5 percent of female and 6.5 per cent of male were oldest old.

Mental health of elderly - At pre test, only 45 percent elderly and 19.2 percent had average/good mental health status, while 36 percent were in poor category (**Table 2**). But in post test, 62 and 19.7 percent were in good and average category and 17.9 percent showed very good mental health status. None were in poor category indicating that the intervention showed positive impact in enhancing the mental health status of rural elderly.

When the comparison of mean scores (Table 2a). between pre-test and post test were made gender wise the results revealed highly significant positive increase in mental health of male elderly at post test (169.4) from pre test (132.4). Brar et.al (2013) found that higher the mental health, more active and productive the elderly were in their later life. On comparison among female elderly (Table 2b) similar trend of highly significant positive increase in mental health status at post test (165.75) in comparison with pre test (134.1) was noticed. The result is in line with Khadi et.al (2016) who found significant difference in the mental health status among only female elderly at pre and post test indicating that the programme benefitted female elderly and not male elderly.

Depression depicts the mental health. In pre test, 44.6 were mildly and 35 percent were moderately depressed, while only 20.3 percent were in normal category (**Table 3**). None of elderly were found to be severely depressed. But in post test, 82.9 percent were normal and 17.1 percent were mildly depressed. None of the elderly were moderately or severely depressed indicating that the intervention showed positive impact in enhancing the mental health of rural elderly.

When the comparison of mean scores between pre-test and post test was made gender wise, the results revealed (Table 3a) that there was significant decrease in depression of male elderly at post test (32.29) from pre test (45.53). These results are supported by Yadav (2010), Mohan and Sajjan (2005), who indicated that mental depression was at a

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higher side among old age subjects due to declining health status. Similarly when comparison was made for female elderly, there was noticeable decrease in depression at post test (32.97) in comparison (Table 3b) with pre test (44.43). The results are in-line with Pracheth (2016) and Chalise (2014) who also revealed that the prevalence of depression was significantly higher among female subjects of urban and rural elderly population.

Life Satisfaction of elderly - In pre test 47.5 percent elderly were less satisfied, 45.8 percent were moderately satisfied and only 6.8 percent were highly satisfied with life (Table 4). In post test, there was an increase in the life satisfaction with 48.7 percent moderately satisfied, 44.4 percent highly satisfied and only 6.8 percent elderly were less satisfied. When the comparison of mean scores between pre-test and post test was made gender wise, it was noticed that there was a highly significant increase in the life satisfaction among rural male elderly at post test (45.40) from pre test (34.8). These results are supported by Khadi et.al (2016) who found that there was an increase in the life satisfaction among 186 men and women elderly (60-87yrs) from five villages who participated in 20 sessions programme from pre to post test.

Similarly when the comparison of mean scores between pre-test and post test (Table 4b) was made for female group, it was observed that there was increase in life satisfaction at post test (44.73) as compared to pre test (35.79). Results are in line with [Fatemeh K.](#) and [Anahita k. k.](#) (2015) who also reported significant difference between the pretest and post-test scores of meaning of life and life satisfaction in the experimental group.

Self esteem of elderly -Majority of the elderly had low self esteem (46.9 %), 34.5 percent with moderate and only 18.6 percent had high self esteem at pre test. But at post test 50.4 percent elderly had high self esteem and 49.6 percent had moderate and none had low self esteem. (Table 5).When the differences were studied, gender wise, among male elderly (table 5a), at post test (30.57) there was a noticeable increase from pre test (22.64). **Brar et.al (2013)**, observed a significant positive correlation between mental health i.e general positive affect with emotional ties, life satisfaction and self esteem indicating higher the general positive affect, emotional ties and life satisfaction, higher was the self esteem. Higher the mental health, more active and productive the elderly were in their later life. They stated that there would be sound and healthy social relation and more positive self concept and feeling of worthiness which would lead to high self esteem. **Alphilippe, (2008)** showed that self esteem was an important aspect of the adaptive processes at all stages of life especially in older adults. The quality of adaptation, well-being, life satisfaction and health and the individual's quality of social integration and adaptive capacities to cope with life events including physical and cognitive decline was better. Similarly there was significant increase in self esteem at post test (31.20) as compared to pre test (24.61) among female elderly. These results are supported by Khadi et.al (2016) who found that there was an increase in the self esteem of female elderly from pre to post test in an earlier study.

Conclusion: The intervention proved to be significantly effective in enhancing the mental health, self esteem and life satisfaction among the rural elderly. This may be due to regular participation in the programme which might have enhanced and translated the scientific knowledge into practice, there by bringing about a significant positive impact in enhancing their mental health status, self esteem as well as life satisfaction.

Recommendations- The intervention provided to the rural group was effective in improving their mental health status, self esteem and life satisfaction of both male and female elderly. This indicates that the female and male elderly need the knowledge pertaining to the positive mental health, self esteem and life satisfaction and in adopting

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good scientific practices for healthy aging. So such Day Care Centres could be established in every village for strengthening the families in the care of the elderly.

Table 1a: Percentage distribution of male and female elderly participants by age (N=177)

Age(yrs)	PRE TEST (N=177)			POST TEST (N=117)		
	Male	Female	Total	Male	Female	Total
Young Old (60-74)	60 (56.1)	43 (61.4)	103 (58.2)	51 (66.2)	30 (75.0)	81 (69.2)
Old Old (75-84)	36 (33.6)	36 (33.6)	16 (22.9)	21 (27.3)	7 (17.5)	28 (23.9)
Oldest Old (85 and above)	11 (10.3)	11 (15.7)	22 (12.4)	5 (6.5)	3 (7.5)	8 (6.8)
Total	107(100.0)	70(100.0)	177 (100.0)	77(100.0)	40 (100.0)	117 (100.0)

Figures in parenthesis indicate percentages

Table 1b: Percentage distribution of male and female elderly by SES

Socio economic status category	PRE TEST(N=177)			POST TEST(N=117)		
	Male	Female	Total	Male	Female	Total
Upper middle	7 (6.5)	-	7 (4.0)	6 (7.8)	-	6 (5.1)
Lower middle	84 (78.5)	56 (80.0)	140 (79.1)	60 (77.9)	31 (77.5)	91 (77.8)
Poor	16(15.0)	14 (20.0)	30 (16.9)	11 (14.3)	9 (22.5)	20 (17.1)
Total	107 (100.0)	70 (100.0)	177 (100.0)	77 (100.0)	40 (100.0)	117(100.0)

Figures in parenthesis indicate percentages

Table 2 - Percentage distribution of elderly by level of Mental health at Pre and Post test

Mental Health	Pre Test ((N=177))	Post Test (N=117)
	N	N
Poor	64 (36.2)	-
Average	79 (44.6)	23 (19.7)
Good	34 (19.2)	73 (62.4)
Very Good	-	21(17.9)
Total	177 (100.0)	117 (100.0)

Figures in parenthesis indicate percentages

Table 2a: Mean scores of mental health of male elderly at Pre and Post test

Mental Health	Male Pre Test (N=107)			Male Post Test (N=77)			Paired 't' value
	N	Mean	SD	N	Mean	SD	
Poor	40	107.0	11.6	-	-	-	11.48**
Average	43	136.6	11.1	14	142.2	7.69	
Good	24	165.8	10.9	48	169.4	8.50	
Very Good	-	-	-	15	194.8	8.15	
Total	107	132.4	24.8	77	169.4	18.18	

**Significant at 0.01 level

Table2b: Mean scores of mental health of female elderly at Pre and Post test

Mental Health	Female Pre Test (N=70)			Female Post Test (N=40)			Paired 't' value
	N	Mean	SD	N	Mean	SD	
Poor	24	110.79	9.46	-	-	-	7.46**
Average	36	141.97	9.30	9	141.89	8.75	
Good	10	161.60	11.17	25	168.20	8.74	
Very Good	-	-	-	6	191.33	7.14	
Total	70	134.09	20.51	40	165.75	17.47	

**Significant at 0.01 level

Table 3: Percentage distribution of elderly by level of Depression level at Pre and Post test

Category	Pre test (N=177)	Post test (N=117)
Normal (20-35)	36(20.3)	97(82.9)
Mildly Depressed (36-50)	79(44.6)	20(17.1)
Moderately Depressed(51-65)	62(35.0)	-
Severely Depressed (66-80)	-	-
Total	177(100.0)	117(100.0)

Figures in parenthesis indicate percentages

Table 3a: Mean scores of Depression of Male elderly at Pre and Post test

Depression level	Male Pre Test (N=107)			Male Post Test (N=77)			Paired t- value
	N	Mean	SD	N	Mean	SD	
Normal (20-35)	19	31.84	2.98	64	31.20	4.02	11.08**
Mildly Depressed (36-50)	51	44.16	4.70	13	37.62	3.07	
Moderately Depressed(51-65)	37	54.46	3.24	-	-	-	
Severely Depressed (66-80)	-	-	-	-	-	-	
Total	107	45.53	8.82	77	32.29	4.55	

**Significant at 0.01 level

Table 3b: Mean scores of Depression of female elderly at Pre and Post test

Depression level	Female Pre Test (N=70)			Female Post Test (N=40)			Paired t- value
	N	Mean	SD	N	Mean	SD	
Normal (20-35)	17	33.00	2.09	33	31.24	4.32	6.86**
Mildly Depressed (36-50)	28	43.61	5.10	7	41.14	2.67	
Moderately Depressed(51-65)	25	53.12	2.57	-	-	-	
Severely Depressed (66-80)	-	-	-	-	-	-	
Total	70	44.43	8.56	40	32.97	5.56	

**Significant at 0.01 level

Table 4: Percentage distribution of elderly by level of Life Satisfaction at Pre and Post test

Life Satisfaction	Pre Test (N=177)	Post Test (N=117)
	N	N
Less satisfied (20-33)	84 (47.5)	8 (6.8)
Moderately satisfied(34-46)	81 (45.8)	57 (48.7)
Highly satisfied (47-60)	12 (6.8)	52 (44.4)
Total	177 (100.0)	117 (100.0)

Figures in parenthesis indicate percentages

Table 4a: Mean scores of Life Satisfaction of male elderly at Pre and Post test

Life Satisfaction	Male Pre Test (N=107)			Male Post Test (N=77)			Paired t- value
	N	Mean	SD	N	Mean	SD	
Less satisfied (20-33)	54	28.7	3.24	4	29.25	2.87	10.49**
Moderately satisfied (34-46)	45	39.4	3.40	40	41.57	3.16	
Highly satisfied (47-60)	8	49.3	2.55	33	52.00	2.75	
Total	107	34.8	7.35	77	45.40	7.00	

**Significant at 0.01 level

Table 4b: Mean scores of Life Satisfaction of female elderly at Pre and Post test

Life Satisfaction	Female Pre Test (N=70)			Female Post Test (N=40)			Paired t- value
	N	Mean	SD	N	Mean	SD	
Less satisfied (20-33)	30	29.43	3.07	4	31.25	0.50	6.75**
Moderately satisfied (34-46)	36	39.69	3.44	17	40.17	2.36	
Highly satisfied (47-60)	4	48.25	0.95	19	51.16	3.27	
Total	70	35.79	6.67	40	44.73	7.28	

**Significant at 0.01 level

Table 5: Percentage distribution of elderly by level of Self esteem at Pre and Post test

Category	Pre test (N=177)	Post test (N=117)
Low (10-20)	83(46.9)	-
Moderate (21-30)	61(34.5)	58(49.6)
High (31- 40)	33(18.6)	59(50.4)
Total	177(100.0)	117(100.0)

Figures in parenthesis indicate percentages

Table 5a: Mean scores of self esteem of male elderly at Pre and Post test

Self esteem	Male Pre Test (N=107)			Male Post Test (N=77)			Paired t-value
	N	Mean	SD	N	Mean	SD	
Low (10-20)	56	17.43	2.04	-	-	-	9.93**
Moderate (21-30)	34	25.26	3.31	36	26.31	2.87	
High (31- 40)	17	34.59	2.59	41	34.32	2.89	
Total	107	22.64	6.78	77	30.57	4.94	

**Significant at 0.01 level

Table 5b: Mean scores of Self esteem of female elderly at Pre and Post test

Self esteem	Female Pre Test (N=70)			Female Post Test(N=40)			Paired t-value
	N	Mean	SD	N	Mean	SD	
Low (10-20)	27	17.41	2.32	-	-	-	6.07**
Moderate (21-30)	27	25.74	2.99	22	27.14	3.25	
High (31- 40)	16	34.88	2.44	18	36.17	2.25	
Total	70	24.61	7.20	40	31.20	5.35	

**Significant at 0.01 level

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‘GENDER SENSITISATION: A JOURNEY TOWARDS INCLUSION AND EQUALITY OF WOMEN’

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Paper Presented for the Senior Scientist Category

ABSTRACT

Even after 70 years of independence, women in India find it difficult to enjoy the basic human rights, equality of opportunities, legal equality, equal wages, property ownership, cultural equality and so on. In many ways the socio- economic systems continue to favour men over women. The investigator’s quest for creating a gender balanced community began way back in year 2004. The following table presents information about research work and findings in brief.

Brief Description	Findings
2004 -To bring about gender sensitivity in college going adolescent girls. - Sample- 100	- Specially designed ‘Gender Sensitisation Workshop’ was effective in reducing gender bias significantly. - Use of Known-to Unknown approach.
2009 - To estimate gender bias of educated adults in Nashik city and develop an ‘Interactive Computer Programme on Gender Education’. -Sample: 833 -Ph. D. Research	- The self-learning user-friendly interactive computer programme, ‘Building Bridges’ was found highly reliable on Likert scale (Cronbach's Alpha -P value = 0.962) - Interactive multimedia package reduced sample’s bias significantly.
2012 - To compare degree of ‘Gender Bias’ in 4 cities of Maharashtra State. - Sample: Over 1231 - MRP	- Created a 15 minutes ‘Documentary Film’ titled ‘Beyond Boundaries’ in two languages to give ‘Gender Education’. - Nashik emerged as most and Mumbai as least biased city. - All cities had comparable biases despite difference in size and culture.
2014 - To know distribution of everyday domestic responsibilities in houses of working women. - Sample: 153	- 21% women earned equal income for the family as their male counterparts. - Only four chores were considered as responsibility of both, out of 43. - Everyday domestic responsibilities not shared on fair basis.
2015 - To find out existing self-concept and stressors responsible for	- Use of stratified random sample technique. - ‘Self Concept Questionnaire’ of National Psychological Corporation developed by N.C.E.R.T.

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burnout of working and non-working women. - Sample: 400 - MRP	and 'Maslach Burnout Inventory (MBI)' would be used data collection.
2016 -To prepare and carry out 'Health and Well-being Survey' -Sample: 133	- 78.94% women had some or the other gynaecological problem but only 15.78% had visited a doctor. - 74.43% felt that only for incurable illnesses or pregnancy woman should go to doctor.

The above research findings were presented in national and International forums at Mumbai, Jamaica, London, Bali, Penang, and were published in reputed peer reviewed journals. The investigator has worked persistently on gender issues related to women, developed innovative material to give 'Gender Equality Education' and scientifically tested its effectiveness.

INTRODUCTION

'The layers of inequity woven into India's social fabric are well known. The teachers and students alike have inherited them from generation to generation together with their inherent biases.' (UNICEF, 2017) The status of women in any society is determined by the interplay of various socio-economic factors, some of which may be 'objective' in nature like education, employment, income, etc. and others are 'subjective', depending on the social values prevailing in the society. Realising that 'Gender Equality Education' could be the key driver for sustainable growth that would create equality of opportunities for women forming a healthy and inclusion society. With this the investigator's quest for gender equality and inclusion for women began.

Brief Descriptions of the Researches Undertaken:

➤ 2004:

In year 2004 the investigator carried out a systematic research for her second M.Sc. in 'Extension Communication'. The details are as under:

Objectives-

1. To estimate the Gender Sensitivity of college going adolescent girl students.
2. To develop a structured 'Gender Awareness Workshop' and a workshop manual.
3. To administer the specially designed workshop.
4. To test effectiveness of the 'Gender Awareness Workshop'.

Methodology-

Hundred girl students falling in the age group of 17-19 years pursuing degree course in Home-Science, Arts, Commerce and Fine arts were selected with random sampling lottery method. 'One Pre-Test and Two Post-Tests' pattern of research design was adopted to estimate gender sensitivity and also effectiveness of the workshop. Questionnaire of 15 questions was used as research tool. Comprehensive 3 hours 'workshop manual' was prepared giving minute details to facilitate execution of

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specially designed workshop. Two 'Gender Experts' actively working in field of 'Women empowerment' had done critical appraisal of 'workshop manual'. Workshop was executed with 30-35 students at a time to facilitate interaction. Second post-test was conducted after a gap of one month.

Important Findings-

1. In pre-test 48.8 % participants advocated gender-bias standpoint. However, in the post-test, only 14.7 % respondents held on to it.
2. Gender experts rated 'Workshop Manual' to be very effective.
3. A very negligible difference was seen in scores of both post-tests.
4. T-tests were performed to statistically validate the results.

➤ **2009:**

In year 2009, the investigator completed her doctorate on the topic 'Development of Interactive Multimedia Package on Gender Education for adult men and women and testing its effectiveness' with a sample of 833 adults with basic knowledge of computer usage falling in the age group of 18 to 52 years from city of Nashik constituted the sample.

Objectives-

1. To measure the existing level of awareness regarding gender and its implications among the target group.
2. To develop a self-learning interactive multimedia package to give gender education.
3. To assess the effectiveness of the multimedia package.
4. To estimate the correlation between various factors that influenced gender education.

Methodology-

A self-learning user-friendly interactive multimedia package having a self-learning computer programme was devised with a systematic process. Veteran experts working in the area of women's empowerment and gender equality, educational and developmental media, qualified professionals having computer expertise, authorities in e-convergence technology, did critical appraisal of the tool on a five-point Likert scale. A representative sample was selected with random sampling method. Exhaustive questionnaire of 85 items was administered before and after execution of the tool as pre-test and post-test.

Major Findings-

- Nearly three forth i.e. 74% of the experts rated the self learning C.D. to be highly reliable on the five point scale (Cronbach's Alpha test, the P value was 0.962), to disseminate the concepts of gender education.
- The average bias-score of the entire sample in the pre-test was 41 points. In post-test it measured to only 8 points. Found highly significant proving the multimedia package on very effective in driving the concepts across.
- Females were found more gender-prejudiced in the pre-test. Pearson Chi-Square test showed significant association between bias score and sex. Males were less biased as compared to females in pre-test. However, after the exposure to the interactive multimedia package women's bias had reduced significantly. Men

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were less gender biased initially but showed less willingness in accepting new ideas and concepts regarding gender equality.

- ANOVA ($P = .053$) and Paired t- Test ($P = 0.00$) were also performed. The study accepted all the three null hypotheses about no significant change in the level of knowledge and understanding of users of different sex, different educational backgrounds and different economic strata.

➤ **2012:**

In 2012, as a 'Principle Investigator' the investigator worked on a fully funded UGC Minor Research Project titled, 'Comparative study of gender bias and creation of audio-visual material to promote gender equality'.

Objectives-

1. To compare the existing level of gender bias among the target group from four different cities of Maharashtra State. (Mumbai, Pune, Nagpur and Nashik)
2. To estimate the statistical correlation between various factors those influence the gender bias.
3. To develop audio-visual material (Documentary Film) to give gender education.
4. To validate the learning material for its effectiveness.

Methodology-

An exhaustive questionnaire was designed to carry out a survey for data collection. A formal training was given to surveyors to sensitize them before they were sent to the field, in Nagpur and Mumbai. Pilot testing of questionnaire was done. The sample consisted of 1231 adult men and women from different walks of life of 21 years and above.

Major Findings-

- A city wise comparison of gender bias scores among different cities of Maharashtra was done by using one-way analysis of variance and 'Tukey post hoc pair wise comparison'. The city of Nashik had significantly higher Gender bias compared to other three cities of Maharashtra. No significant differences in scores were found in Mumbai, Pune and Nagpur.
- Gender biases were not limited to men; they were widespread in women too.
- All the cities under study showed comparable biases despite differences in dimension, life style and socio-cultural background of the city. Though equally educated, 'More females in housekeeping and more Males in Service' pattern still existed!
- A 15 minutes 'Documentary Film' titled 'Beyond Boundaries' was created in two languages (English and Marathi) to give 'Gender Education'.
- The data was treated using frequency statistics and tests like the Croanbach's Alfa, Pearson Chi-Square, T-tests, Kruskal-Wallis test, Dunn's multiple comparison tests and ANOVA.

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➤ **2014:**

In year 2014, the investigator interviewed more than 153 working and earning women from Nashik city, about their everyday domestic responsibilities and listed down 42 routine domestic chores.

Methodology-

Data was collected by employing 'Descriptive Survey Method' (Salaria, 2012). A questionnaire with basic demographic information and a checklist of forty-three family chores was administered. Sampling was done using stratified purposive sampling technique. (Cohen, 2006) Data was collected from 153 working women from Nashik city, aging from 23 to 56 years (64.05% were salaried, 25.49% were self-employed and 10.45% were professionals.) with a monthly family income ranging from Rs. 30, 000/- to Rs. 70,000/-. About 90% respondents (90.19%) were from nuclear families and in 93.46% cases both partners were gainfully employed. 83% women were at least graduate.

Major Findings-

- In spite of the working and earning status of women the everyday domestic responsibilities of family living were not shared on fair basis by men and women. Some low status or tedious and backbreaking domestic chores were done by negligent percentage of men.
- Only four chores were considered as responsibility of both men and women out of the 43 'everyday family chores' by nearly 50%.
- More than 21% women earned equal income for the family as their male counterparts.
- The statistical estimation showed a highly significant difference in the 'Everyday family chores' done and its responsibility assumed by women and men, even though the women are working outside home to earn a significant income for the family.

➤ **2015:**

In 2015, the investigator developed a MRP for UGC on the topic 'A Comparative Study of Self-Concept and Life Stressors Causing Burnout of Working and Non-Working Women' to study self-concept and stressors responsible for burnout of working and non-working women from various socio-economic backgrounds and professions.

Objectives:

1. To find out the existing self concept and the stressors responsible for burnout of working and non-working women using standardized tools.
2. To compare the self concept of women from various socio-economic backgrounds and professions.
3. To assess the stressors responsible for burnout of working and non-working women.
4. To estimate the statistical correlation between various aspects influencing the self concept and the stressors of working and non working women.

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5. To give recommendations to reduce the burn out possibilities and to improve the self concept of working non-working women.

Methodology-

Standardised questionnaires, the 'Self Concept Questionnaire' of National Psychological Corporation developed by N.C.E.R.T. and 'Maslach Burnout Inventory (MBI)' would be used to carry out a survey for data collection. 400 graduate women (200 gainfully employed in various fields and 150 non-working) of 25 to 45 years belonging to middle class households would constitute sample. Data would be collected from 15 different localities of Nashik city with stratified purposive sampling technique. Coding will be done using SPSS. Exploratory Data Analysis will be done using statistical tools such as non-parametric tests.

Project proposal is submitted to the UGC and approval is awaited.

➤ **2016- 17:**

In December 2016, an extensive survey revealed surprising results concerning the mindset of women about their general health, status of their gynaecological health, the medical treatment, health related practices and their thoughts about feminine gender.

Objectives:

1. To gather first hand information about women's health status.
2. To scrutinize the collected information using frequency statistics.
3. To identify problem areas concerning women's health in sample population.
4. To make suggestions and recommendations based on data analysis to intervention agencies for improving women's health status in sample under study.

Methodology:

The survey of 22 questions on 'Women's Health and Wellbeing' was conducted by the NSS volunteers during their 'Special Winter Camp' using purposive sample for 133 women falling in the age group of 25 to 55 years; residing in two villages situated in the suburbs of Tribakeshwar near Nashik city on an easily commutable distance from the city of Nashik. These were modern villages having socio-economically efficient living standards due to the positive interventions of NGO's like 'MICO Employee Forum' and 'Sarvahara Pariwartan Kendra' having successfully implemented many social, economical and educational welfare activities to create reforms and transformation.

Major Findings-

- 85.71% families in Chikhalwadi and Kacharuwadi under study had a family doctor.
- 78.94% women respondents were found suffering from some or the other gynecological problem, while only 15.78% had visited a doctor concerning the same.
- 83.45% women had not visited a physician for health problems like fever, pain in back, limbs or joints, stomach upset, migraine, gynecological problems, etc. and

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74.43% were of opinion that they should visit a doctor only if the illness is incurable or if the woman is pregnant.

- The 'health and wellbeing survey' brought out not only the health concerns of women but also their biased ideas which influenced their health related practices.
- Findings pronounced the need to mobilize the community for sustaining overall well-being of the community.

CONCLUSION

In this decade-long quest many different experiments were carried out to gauge people's gender bias thinking. They revealed the prejudices of mindsets regarding gender. Based on the need pronounced by the data, many innovative teaching-learning materials like structured workshop, interactive computer programme and documentary film were developed with a systematic process to give gender education. These devised tools were tested scientifically and were found very effective in moulding mindsets. They would be useful in sensitising Home Science students about gender realities. This knowledge will help to improve students self esteem, make them more confident and able to protect themselves as also to become better professionals with balanced attitudes to make their communities more inclusive.

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Section –II

**A Brief Report on
Biennial Conference of
Home Science Association of India
on
“Family and Community Science: A Catalyst for
Sustainable Development Goals”
February 1-3, 2018**

Organized by

**COLLEGE OF HOME SCIENCE,
(UDAIPUR CHAPTER, HSAI)
Maharana Pratap University of Agriculture &
Technology, Udaipur(Raj.)**

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Conference Brief

The College of Home-Science , Maharana Pratap University of Agriculture and Technology Udaipur, under the auspices of Home Science Association of India (HSAI) successfully organized XXXII Biennial conference of Home Science Association of India on “**Family and Community Science: A Catalyst for Sustainable Development Goals**” from February 1-3, 2018, an event of great magnitude. The conference witnessed overwhelming presence and participation of more than 450 delegates including scientists and students from far and wide places all over the nation, eminent speakers, dignitaries and guests and reflected the true color of what Home Science as a discipline is. The Conference has given recommendations about its bright and promising future.

The Sustainable Development Goals (SDGs) set by the United Nations were developed to replace the Millennium Development Goals in 2015. Seventeen broad goals were outlined which are interrelated and cover a range of environmental, social and economic development issues. Out of the 17 SDG's laid out, discipline of Home Science with its five specializations can play a major role in at least ten of the set goal as aptly highlighted by President HSAI Prof Anjali Karolia.

This XXXII Biennial conference of HSAI focused on sharing strategies and practices that demonstrates how higher education institutions offering Family and Community Science programme contribute as catalyst for sustainable development. It widely covered different areas of community science: viz Foods science and nutrition, Extension education and communication management, Resource management and consumer science, Human development and family studies and Textile and apparel designing under varied 13 sub themes covered in its three days schedule.

Theme I& IIA- Food Supplements, Nutraceuticals, Pharmaceuticals and Functional Foods, Non Nutritional Components- Composition and Products

Theme II B & III-Clinical Applications, Public Health, Nutrition and Food Safety

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Theme IV- Issues and Challenges of Contemporary Families

Theme V & VI- Innovative Strategies for Promoting Family and Community
Well-being & Ascertaining Quality Care in Early Childhood

Theme: VII- Information Technology for Sustainable Development

Theme: VIII- Community Mobilization and Gender Sensitization

Theme IX- Ergonomics and Drudgery Reduction

Theme X - Consumer Rights and Legal Protection

Theme XI-Innovation in Design, Quality Enhancement, Value Addition in
Textile and Apparels

Theme XII- Initiatives in Socio Economic Sustainability of Traditional Textiles
Craft Practices

Theme XIII- Emerging Trends in Environmental Sensitization

Total 450 delegates were registered for the conference. The jam packed technical sessions of scholars, academicians witnessed strong deliberations and discussions during three days of the conference.

Inaugural session

The inaugural session on 1st February, 2018 witnessed the presence of esteemed dignitaries, education laureates and scholars from far and wide. It was graced by the presence of **Mrs. Kiran Maheshwari**, Hon'ble Cabinet Minister, Higher, Technical and Sanskrit Ed., Govt. of Rajasthan., **Smt Anita Bhadel**, State Minister, Women & Child Development. GOR, **Prof.U.S.Sharma**, Vice chancellor, MPUAT, Udaipur, **Dr. Jatinder Kishtwaria**, Former Director, CIWA, Bhuvaneswar, **Prof Anjali Karolia**, President, Home Science Association of India and former H.O.D. of C.T.Department, The M.S.University of Baroda, **Prof Shashi Jain**, Dean & Convener, College of Home Science, Udaipur and **Prof Suman Singh**, Organizing Secretary & SWO, MPUAT,

Udaipur, Rajasthan. The inaugural session began with lighting of lamp by the dignitaries.



Welcome address was delivered by Prof Shashi Jain, Convener & Dean, College of Home Science, MPUAT, Udaipur, Rajasthan. She emphasized that the family and community oriented powerful discipline of Home Science needed a serious deliberation to keep it in tune with the demands and need of the hour. Therefore, hosting this mega event in time with the UNDP'S sustainable development goals became a subject of prime concern.

Inaugural address was given by Prof Anjali Karolia, President, Home Science Association of India where she focused on evolution, activities and achievements of the Association. She said that The Association was formed in 1952 and from its humble beginning it has really grown, however there is much more to be done. She informed that there are over 300 colleges offering Home Science from approximately 100 universities. She said that," We need to establish more branches and chapters and activate the existing ones across the country and they should promote Home Science education by organizing academic programs. We need to increase our membership and only if we stay together as a discipline under one umbrella will be able to increase our visibility."



She elaborated on the theme selected for this conference and remarked that certain considerations and reflections need to be made on the social, economic and environmental realities and current needs of our communities. Some points for

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consideration and their inclusion in the curriculum could be – Interdisciplinary studies with emphasis on environmental issues, skill development and self-employment, researches in indigenous practices and traditional knowledge, consumer advocacy and protection, development of career oriented course, curriculum which would focus on specialization as compared to general courses, empowerment of women and emphasis on gender equality, quality of life, sanitation, safe food and water, health and nutrition.

Key note address was delivered by **Dr. Jatinder Kishtwaria**, Former Director, ICAR-CIWA, Bhuvaneswar on the topic “**Family and Community Science – A Catalyst for Sustainable Development Goals**”. She emphasized that the existing gender stereotypes is hampering the access of women to resources, it is essential to dissolve the rigid gender stereotype through gender sensitization, gender responsive budgeting, gender equity, gender integration, strategic alliances and shifting paradigm on gender transformative approach rather than gender accommodative approach. The informed decision making by women farmers can reduce the burden of malnutrition to a great extent. Extension systems need to facilitate both men and women to become an active change agent for gender sensitive decision making at household level. Therefore, it is worthwhile to capture, integrate and scale out best practices to address gender concern for sustaining agriculture productivity and nutrition security in India.



Smt. Anita Bhadel, State Minister, Women & Child Development, Government of Rajasthan, in her speech as **Guest of Honour**, remarked that the society has a dire need of tackling the burning issues of nutrition, behaviour, improving the standard of living, lowering of the social evils and gender discrimination. The discipline of Home Science has a crucial role to play in this area. She stressed that the recommendations emerging out

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of the conference must be utilized at grass root level too and should become guiding policies when dealing with such vulnerable sections of society.

Chief Guest, Mrs. Kiran Maheshwari, Hon'ble Cabinet Minister, Higher, Technical and Sanskrit Ed., Govt. of Rajasthan,

in her address emphasized the importance of government, private agencies, society and family in building a strong nation and achieving the goals of development. In the current scenario, where the threads of joint family system are in a state of disintegration, the scope of wise words of wisdom from elderly is blurred, the relevance of the Family and community science becomes all the more important. She advocated opening of Family Counselling Centres more emphatically related to pre marriage counselling.



Presidential address was given by Prof U. S. Sharma, Vice chancellor, MPUAT, Udaipur, Rajasthan.

He extended thanks to President HSAI & other HSAI executives for giving this opportunity to host this mega event at M.P.U.A.T. campus. The Vice Chancellor emphasized the need to bring more visibility to Home Science discipline. He stressed that the deliberations should

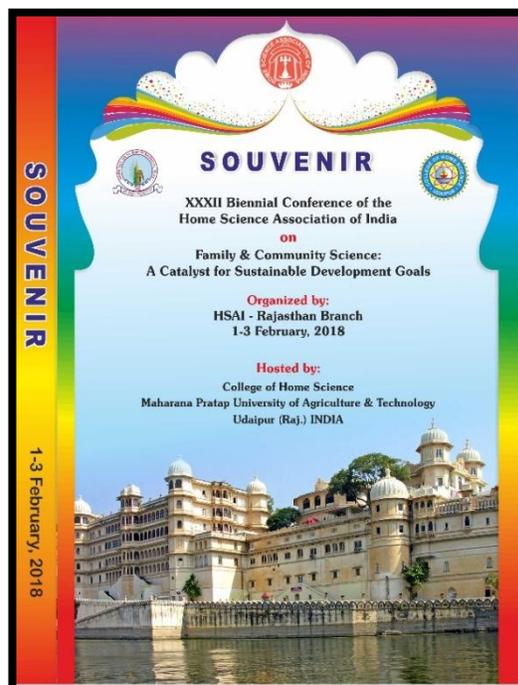


focus on strategies and practices that demonstrates how family and community science programme can contribute as catalyst for the sustainable development of the nation.

Release of Publications

During the inaugural session, **Conference Souvenir** along with **Book** and CDs of **Home Science PG research abstracts** were released. The e- journal of Home Science Association of India “ **The Indian Journal Of Home Science** “ was also released by the HSAI officials.

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Vote of Thanks

The inaugural session was ended up with the **vote of thanks** offered to one & all by **Prof Suman Singh, Organizing Secretary of the conference & SWO, MPUAT, Udaipur.**

Dr Mrunalini Devi Puar Memorial lecture

The Memorial lecture was presented by Dr Premvathy Vijayan, Vice Chancellor, Avinashlingam Institute of Home Science & Higher Education For Women,



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Coimbatore, on the topic-“*Family & Community Science-a Catalyst for Sustainable Development Goals.*” She highlighted the importance of SDGs and their basis of genesis from MDGs. The pressing concern that needs to be addressed is that how a family and community scientist can become instrumental and take up the role of a catalyst in achieving the SDGs. Home



scientist needs to manage common global resources and ensure that individual and collective use of resources contribute to maximum possible to improve human welfare. Ending hunger, achieving food security, improving nutrition and promoting sustainable agriculture must be our utmost priority in agriculture. Poverty eradication, changing unsustainable and promoting sustainable patterns of consumption and production, protecting and managing natural resource base of economic and social development are overarching objectives of essential requirements for sustainable development. She pointed out that, as a life-long process, education is about acquisition of knowledge and information to improve one's life chances and access information and technologies in areas which are important for fulfilling life-health, food and nutrition, productive technologies in agriculture and industry etc. By putting family and households at the centre of the process of education, we can also target other developmental and sustainability goals. Young scientists need to be encouraged, trained and involved to tackle the challenges.

Plenary Session

In the plenary session five key speakers from different areas of Home Science presented their views on how different areas of Home Science can play an important role in meeting out Sustainable Development Goals. Dr S. Kowsalya, Registrar Avinashlingham Institute of Home Scienc, Coimbatore, spoke on the topic- Family And Community Science: A Catalyst For Sustainable Development Goals – Role Of Food Science And Nutrition; Dr Anjali Karolia, Prof. Clothing and Textile, Faculty of Home Science, The M.S. University Baroda, spoke On Addressing Sustainable Development Goals: Future Directions For Clothing And Textiles. Ms. AalaukikaRaje,

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Chairperson Nominating Committee HSAI, Baroda expressed her thought as” Can We Be The Goalkeepers ? A Perspective From The HDFS Point Of View”. Dr Sarita Anand, Assoc.Prof. Lady Irwin College, New Delhi shared her views on the topic “Catalysts Of Change: Role Of Communication And Extension In Achieving Sustainable Development Goals”; Lastly, Dr Suma Hasalkar, Prof & HOD, FRMCS Deptt, College of Community Science, UAS, Dharwad, spoke on “ Family And Community Science A Catalyst For Sustainable Development Goals- Role Of Resource Management And Consumer Science”.

HSAI awards papers

Six short listed paper presentations were also done for HSAI awards under the three categories namely Young scientist Award, Mid-Career award and Senior Scientist Award. The judges were eminent experts from the relevant fields. Among Young scientist category, there was a tie between the two contestants hence the awards were given to both the paper presenters- **Dr. Amrita Doshi and Ms. Mona Verma**. Among Midcareer award category, the award was given to **Dr. Falguni Patel and Dr. Sannapapamma K.J.** Among Senior scientist category, **Dr. Nikhila Bhagwat** received the Award.

Technical session-I, February 2, 2018, was held in Forenoon session where Theme - wise Parallel sessions were conducted at five different venues. The technical sessions were merged into 11 sub themes for the sake of presentations. Under, these themes, total 166 oral presentations were made, which were evaluated by experienced and renowned home scientists from various fields. The best presentations under each theme were awarded in the valedictory function. Technical session-II was held on February 2, 2018 in the Afternoon session in which Theme - wise Parallel sessions were conducted at six different venues.

POSTER SESSION

Along with the oral paper presentations under these 11 sub themes, a poster session was also organized in which 382 poster presentations were done on varied aspects related to Food Supplements, Nutraceuticals, Pharmaceuticles and Functional Foods, Non Nutritional Components- Composition and Products, Clinical Applications, Public Health, Nutrition and Food Safety, :-Issues and Challenges of Contemporary Families, Innovative Strategies for Promoting Family and Community Well- being & Ascertaining Quality Care in Early Childhood, Information Technology for Sustainable Development, Community Mobilization and Gender Sensitization, Ergonomics and Drudgery Reduction, Consumer Rights and Legal Protection, Innovation in Design, Quality Enhancement, Value Addition in Textile and Apparels,, Initiatives in Socio Economic Sustainability of Traditional Textile Craft Practices and Emerging Trends in Environmental Sensitization.

The posters were judged by a panel of judges under each subtheme and the best presenters were awarded in the valedictory function.

General body meeting of HSAI

The general body meeting of Home Science Association of India was held at 9 am in the College Auditorium, which was attended by good number of Home Scientists. All the executives of HSAI were present in the meeting. At the outset, Prof Sunanda Chande, General Secretary, HSAI, welcomed the participants and informed about the activities of HSAI along with new and old enrolments of HSAI membership. It was declared that next Biennial Conference of HSAI will be held at Coimbatore by the end of 2019 or early in 2020.

Valedictory session

In the Valedictory function, Prof Kusum Chopra, Founder Director, NIFT, New Delhi, was the Chief Guest and Hon'ble Vice Chancellor, MPUAT, Prof U.S. Sharma as Chairperson. Other dignitaries present were Prof Shashi Jain, Dean & convener, Prof Suman Singh, SWO, MPUAT and Organising Secretary and HSAI President Dr Anjali

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Karolia. In the Valedictory function, the winners for Young Scientist, Mid-career and Senior Scientist Award received their awards . The winners of best oral and best poster presentation for each sub theme were also felicitated.



MAJOR RECOMMENDATIONS

Major Recommendations that have emerged from the deliberations and discussions held during these three days of presentations encompassing all the 13 sub-themes are as follows-

1. As the existing gender stereotypes is hampering the access of women to resources, it is essential to dissolve the rigid gender stereotype through gender sensitization, gender responsive budgeting, gender equity, gender integration, strategic alliances and shifting paradigm on gender transformative approach rather than gender accommodative approach.
2. Nutrition actions must be evidence based and promote the livelihood. Nutrition interventions must target individual and must be widely covered and nutrition progress must be well measured. Multiple stakeholders must be involved in the nutrition-related agenda framed by SDGs.
3. Low energy, waste-free or waste-reduced processing and preparation operations need to be implemented at household level to a larger extent, including alternative energy sources. In the same context, water decontamination, recycling and preservation tools need to be applied.

4. In order to reduce food losses and wastage, innovations will have to encompass the re-evaluation of existing food processing, storage and home preparation operations employing existing modern tool boxes.
5. In order to achieve six global Nutrition Goals, set by the World Health Assembly in 2012, the discipline need to take up intervention measures which must focus on reduction in Low Birth Weight; increase in the rate of exclusive breast feeding; reduction in the number of children under five year who are stunted and reduction of anaemia in women of reproductive age.
6. Natural Indian foods with added health benefits along with the fortified and other Modified Functional foods with potential health benefits need to be promoted.
7. Entertainment education strategy can be the effective medium for creating awareness and educating the rural women. Interpersonal communication plus mass media is the most sustained strategy for TOT that can be adopted by the extension functionaries. A shift in communication approach from Information-Education-Communication (IEC) to Behaviour Communication Change (BCC) is the need of the day.
8. Information Technology can play a crucial role for promoting sustainable development. For this there is a need to develop competence among extension personnel for optimum utilization of IT for transfer of technology.
9. Entrepreneurship development efforts must emphasize on- developing favourable attitude among women towards entrepreneurship, skills development and market linkages.
10. For the community mobilization women need to be made aware about government schemes through effective extension approaches.
11. Capacity building of farm women is required on ergonomically designed tools to reduce MSD, increase satisfaction, reduce fatigue and strain.
12. Need of family life education and parent education is must in present day scenario to solve the problems experienced by the families in different area. Sex education should be integral part of curriculum which should be included right from the beginning.

13. More and more services are required for the elderly people to reduce incidences of elderly abuse and negligence.

14. Timely measures should be taken at family, community, national and global level to:

- Reduce MMR, IMR/ Improve RCH (Reproductive Child Health).
- Check sexual harassment.
- Decline the incidence of adolescent suicide. Prepare youth for coping strategies.
- Improve the quality of Teaching Learning Material at pre-school level.
- Improve wellbeing of adults through planning the strategies to overcome the loneliness.
- Reduce psycho-social problems of orphans.
- Educate regarding care and management of menopause is required.

15. The Textile and apparel industry must start integrating the SDGs into their business strategies. SDG agenda can be advanced through various ways.

- Facilitating integration of the SDGs into the textile value network;
- Developing industry standards that set global benchmarks and shape the direction of land management and ecosystem services;
- Identifying opportunities for collective industry action;
- Developing a textile-specific industry matrix for preferred fibers and other textile based practices to deliver on the SDGs; and
- Reporting and communicating on the Industry's SDG performance.

16. Research studies must focus on value addition in textiles and apparels.

17. Innovative adaptive clothing designs need to be developed for different groups to ensure safety and comfort.

18. Innovative studies on use of bio degradable farm waste should be undertaken for quality enhancement and developing personal hygiene products.

19. Multi-functional finishes using plant products can be used for developing medical textiles.

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20.Documentation studies need to be undertaken to preserve traditional textile craft practices prevailing in different states and its application in creating textile design innovation for promoting export potential.

21.For promoting entrepreneurship among rural masses, traditional textile craft practices need to be emphasized.

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- The Journal is published only in English language.
- At least one of the authors should be life member of The Home Science Association of India. .
- For the issue intended to be published in January, the last date for the submission of manuscript is 30th November and for issue to be published in June, the last date for the submission is 30th March.
- The submission is to be done ONLY through web site to the Editor.
- The intimation of acceptance will be given in about 15 days after the last date of submission.
- The guidelines for the contributors are uploaded on the website of H.S.A.I. The guidelines must strictly be followed.
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