

Effect of Fragrance finish of the 100% Bamboo knitted fabrics finished with herbal extracts

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ABSTRACT - Fragrance finishing on textiles is one of the processes which enhance the value of the textile products by adding various odours to it. This research involves in enhancing the 100% bamboo knitted fabrics with fragrance treatment using the selected herbal extract of *Eucalyptus cinerea* by Microencapsulation method. The finished samples were assessed by Organoleptic method and the presence of the fragrance compound in the herb is confirmed by the GC-MS analysis of the herb. The finished samples showed very good results on fragrance after finishing and the fragrance retained in the fabrics after repeated launderings.

Keywords: Fragrance finish, Bamboo fabric, Organoleptic method, GC-MS, etc

I. INTRODUCTION

In today's environmentally conscious times, there is a revival of interest in chemical free raw materials which is handled minimally and involves eco-friendly production strategies. Moreover, consumers demand more value for money through different levels of comfort, durability and functionality. The expectations have led to major opportunities for the textile industry in general and textile finishes in particular. The challenge is to meet all these demands without harming the environment. This emphasizes is on safe cleaner alternative like biodegradable chemical.

Medicinal plants are a gift of nature to cure a limitless number of diseases among human beings. The conservation of medicinal plants has to be viewed not as an end itself, but as a means to enhance the conservation and cultivation of our precious bio-wealth for sustainable sharing of the benefits derived from the use of biodiversity. However, there has been a resurgence in usage of herbal medicine in the past few years, not only among the traditional medicine users (ethno-medicine) but also among the modern consumers of herbal products.

The human body generates sweat during various conditions of activity leading to sensory and thermal excitation. The bacterial contamination of sweat results into foul smell and stains which can generate from various parts of the body like armpit, back and forehead. Hence, fragrance finishing on textiles is one of the processes which enhance the value of the textile products by adding various odours to it. major issue.

Even though many of the herbal extracts have shown good fragrance after applying on textile fabrics, their wash durability is poor. Hence in this study microencapsulation technique was used to fix the herbal extracts on the fabrics. Microencapsulation is one of the novel methods of getting

functional finishes on textiles. It is a process by which very tiny droplets of liquid or particles of solid are covered with a continuous film of polymeric material. Microencapsulation is more advantageous to conventional processes in terms of economy, energy saving, eco friendliness and controlled release of substance. The agents reside in colloidal suspension within the amorphous zone of the binder so that a reservoir of agent is preventing in solid solution within the polymer matrix. Such treated fabrics were reported to be durable to a few number of wash cycles. The present study aims at developing an eco-friendly and natural fragrance finish on textile fabrics using the extract of *Eucalyptus cinerea*. The extracts were applied to the bamboo knitted fabric by microencapsulation method. An extensive study was conducted to assess the fragrance applied and their wash durability by employing standard test methods.

II. MATERIALS AND METHODS

For the purpose of the study, 100% Bamboo yarns of 40's count were knitted with Single Jersey structure was selected. The *Eucalyptus cinerea* was chosen and collected from Nilgiris district for the study.

Herbal extraction

The collected herb were cleaned, dried in shade and grind into a fine powder. For extraction, 3 g of dry powder was taken and mixed into 50 ml of 80% Methanol. The container was closed and kept for overnight. After overnight incubation, the extract was filtered through filter paper and evaporated to concentrate the extract.

Finishing Process by Micro Encapsulation method

Microcapsules containing the herbal extract were prepared employing Sodium alginate. Ten grams of Sodium alginate (wall material) was allowed to swell for half an hour by mixing with 100 ml of hot water. To this mixture 50 ml of

hot water was added and stirred for 15 minutes maintaining the temperature between 40°C and 50 °C. This mixture was added to 10 ml of herbal extract (core material), then transferred to a centrifuge and rotated at 300-500 rotations per minute speed for 15 minutes. This was sprayed into 2% of calcium chloride solution by means of a sprayer. The droplets were retained in calcium chloride collection bath for 15 minutes. In this bath, the calcium ions were diffused with the alginate solution, thereby hardening the matrix and forming a solid hydro gel system. The microcapsules were obtained by decantation and repeated washing with isopropyl alcohol followed by drying at 45°C for 12 hours.

The microcapsules were then used for finishing on the bamboo knitted fabric with Exhaust Method. The fabric was finished with microcapsules along with citric acid as binder solution for 30 minutes under 50°C in oven. After 30 minutes, the fabric was removed and air dried under shade aseptically.

Assessment Method of the herbal extracts for Fragrance activity:

Organoleptic method was used to assess the fragrance activity of the controlled and the finished samples. The selected male panellists were each given a finished fabric daily during the test period. Each sample was to be kept under socks on a specific foot. At the end of the stipulated period of time, panellists reported to the lab, and the

samples were removed and sealed in plastic bags, and incubated till next day. The selected four Judges (Odour judges) evaluated the samples after 14 hours of removal on each test day. The judges used individual and new scoring sheets everyday for evaluation. The Odour grading scale was 0 to 10 (“no odor” to “very intense and disagreeable odor”), shown in table 1.

Table 1: Odour grade interpretation of the Organoleptic method

Mark	Grade
0	Repulsive
1	Very poor
2	Poor
3	Poorly Fair
4	Fair
5	Acceptable
6	Fairly Good
7	Good
8	Very Good
9	Excellent
10	Ideal

Assessment of the Fragrance activity of the finished fabric

The *Eucalyptus cinerea* extract’s efficacy on the fragrance finished fabrics was assessed by organoleptic method and the ratings are depicted in the following table 2.

Table 2: Assessment of Fragrance activity by Organoleptic method

Fabric Sample	Ratings of Odour control Evaluation				Average of Ratings
	Judge 1	Judge 2	Judge 3	Judge 4	
Controlled Sample	3.5	4	4	4	3.9
Finished Sample	7	7	7	7.5	7.1
10 washes	7	7	7	7	7.0
20 washes	6	7	7	6	6.5
30 washes	5	6	6	6	5.8

From the table 2, it was clear that the finished sample received a good rating of 7 and 7.5 and 7 for fragrance activity from the judges whereas the controlled sample received a poor rating of 3.8. This is mainly due to Eucalyptol, the bioactive compound present in the extract which plays an important role in fragrance activity. While comparing the finished and washed samples, there was a gradual decrease in ratings in the laundered samples, the average ratings noted was 7, 6.5 and 5.8 for ten, twenty and thirty washes respectively by microencapsulation method.

Scanning Electron Microscopic (SEM) analysis

The surface topography of the deodorant finished knitted fabric by direct application method and microencapsulation method were observed through scanning electron microscope and the results are given in figure 1. The images from the scanning electron microscope shows the deposition of the extracts in the deodorant finished knitted fabric. The imaging was done with 500 X and 2000 X

magnifications. It was clearly seen that the fixations of the extract are in the form of microcapsules in the microencapsulation method.

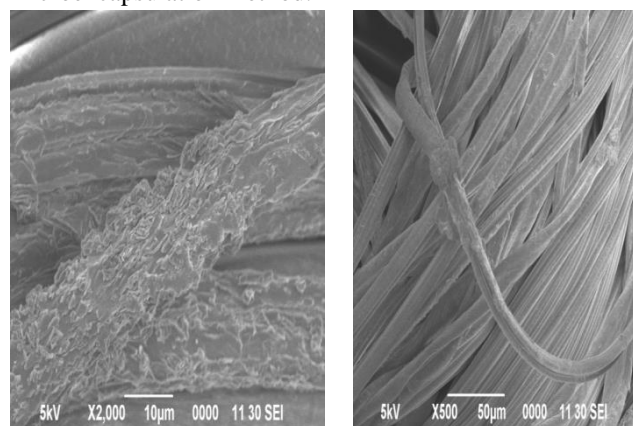


Fig 1: SEM images of Fragrance finished sample

Gas Chromatography- Mass Spectrum (GC-MS) analysis

The spectral data of the components of the *Eucalyptus cinerea* extract by GC-MS analysis is given in the table... and its chromatogram is given in the figure.2

Table 3: Gas Chromatography-Mass Spectrum (GC-MS) analysis of *Eucalyptus cinerea* extract

15	Vitamin e	1.22
16	Phosphoric acid, bis(trimethylsilyl)monomethyl ester	1.13
17	Guaiol	1.12
17	(+,-)-2-exo-hydroxycineole	1.01
19	Cyclohexane, 1-ethenyl-1-methyl-2-(1-methylethenyl)-4-(1-methylethylidene)-	0.95
20	Methane, Sulfinylbis-	0.37
21	Neryl phenyl acetate	0.29
22	Cycloeucaleanol acetate	0.29
23	(1s,2e,4s,5r,7e,11e)-cembra-2,7,11-t	0.22
24	Stigmastane-3, 6-dione,(5.alpha.)-	0.16

S. No	Components	Compositions (%)
1	1,1,4,7-tetramethyldecahydro-1h-cyclopropa[e]azulen-4-ol (globulol)	23.31
2	Eucalyptol	17.32
3	Alloaromadendrene	11.15
4	2-naphthalenemethanol, 1,2,3,4,4a,5,6, (γ – Eudesmol)	9.31
5	3-cyclohexene-1-methanol,,alpha,,alpha	7.23
6	Benzamide,2,3,4-trimethoxy-n	3.90
7	2,6-octadien-1-ol,3,7-dimethyl-(e)-	3.47
7	7-hydroxy-3-methoxy-2-meth	3.41
9	4h-1-benzopyran-4-one,5,7-dimethoxy	2.77
10	Bicyclo(3.1.1)heptane-2,3-diol,2,6,6-trimethyl	2.79
11	Rosifoliol	2.71
12	2,4-diamino-5-[3,4,5-trimethoxybenzox	2.59
13	N-(2-phenaziny)l acetamide	1.67
14	Phytol	1.51

In the table 3, GC-MS analysis, the *Eucalyptus cinerea* extract showed 24 components with its chromatogram showing 35 peaks in the retention time ranging from 5.53 minutes and 46.03 minutes. The major compound identified was 17.32 percent of Eucalyptol which is responsible for the fragrance of the herbs, reported by Varinia et al (..) in their research. The next major compound identified was 1,1,4,7-tetramethyldecahydro-1h-cyclopropa[e]azulen-4-ol named as Globulol by NIST Manliang Tan et al (..). The other major compound identified was 2-naphthalenemethanol, 1,2,3,4,4a,5,6, (γ – Eudesmol) (..). This analysis clearly shows that the extract has an aromatic property, which acts as the deodorant.

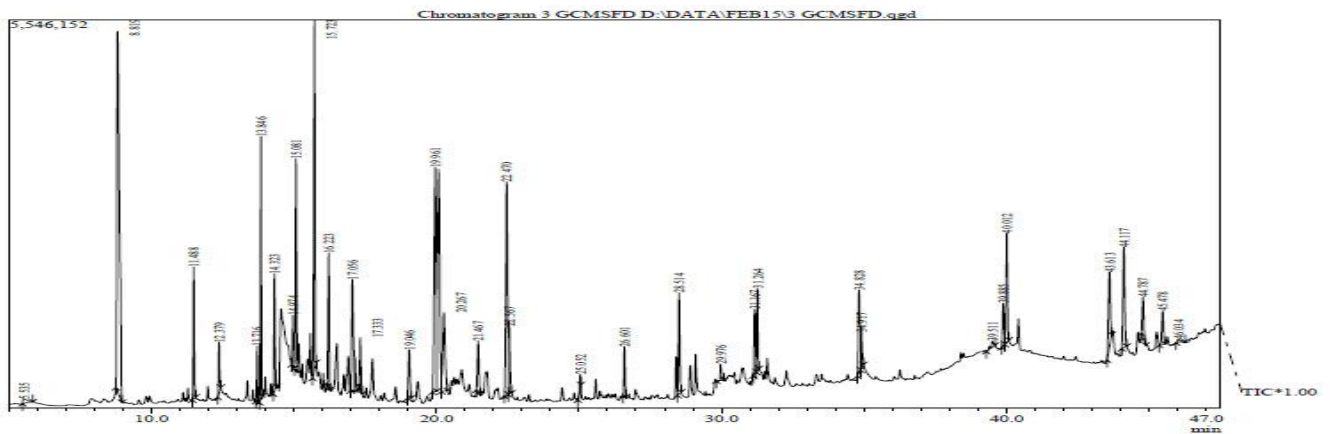


Fig 2: Chromatogram of GC-MS analysis of *Eucalyptus cinerea* extract

III. CONCLUSION

The fabrics samples treated with *Eucalyptus cinerea* extracts showed good fragrance finish and also showed good wash durability. Hence The fabrics finished with the herbs are natural, eco-friendly and cost effective. Also these herbs are available in abundance and the growth of these herbs does not require much of pesticides, water and plantation area. This may lay a small founding for the medical textiles, where the research may extend over the application of herbal treated fabrics as a remedy for the skin infections and diseases, bad odours, protection against mosquitoes, also refrigerant and for eco-friendly medicated fabrics and apparels.

IV. REFERENCES

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