International Conference on Inter Disciplinary Research in Engineering and Technology 2016
[ICIDRET 2016]

ISBN	978-81-929866-0-9	**VOL**	01
Website	icidret.in	**eMail**	icidret@asdf.res.in
Received	22-December-2015	**Accepted**	30-December-2015
Article ID	ICIDRET013	**eAID**	ICIDRET.2016.013

Essential Oil Impregnation on Wool Fabric for Aromatherapy

Shivani Srivastava[1], Sangita Srivastava[2]
[1]Research Scholar, Department of Home Science, University of Allahabad, Allahabad U.P
[2]Professor, Department of Home Science, University of Allahabad. Allahabad. U.P

Abstract: *Aromatherapy is a form of an alternative medicine. In recent years fragrance embedded textiles are being developed in areas of sustainability, environment consciousness, for healthy life style and well-being. Essential oil of several best known aromatic plants have therapeutic and sedative properties. It is important to develop such type of finished textile material in order to promote healthy and eco-friendly life style. Correct selection of oil and aroma must be considered before finish application. All fabrics take up and release oil & aroma differently depending upon their fibre structure. In present study wool fabric was identified best suitable for aromatherapy.*

Keywords*:* Aromatherapy, Essential oil, Wool, Silk.

INTRODUCTION

Aromatherapy is also known as essential oil therapy. It is an art of using essential oil extracted from plant sources like herbs and flower to produce pharmaceutical and sedative effect on body's immune system. A study reported effect of each fragrance on human health[1]. Essential oil is secondary plant metabolites and these are synthesized in different part of plants such as leaves, flowers, stems, roots and seeds. An oil essence can impart medicinal effect separate from the aroma but more often they are intertwined[2]**.** Aromatic plants and essential oil are eco-friendly and generally there is absence of any side effect arising by use of essential oil[3]. In present study two aromatherapy oils viz. lemongrass (***Cymbopogon flexuous)*** and citronella (***Cymbopogon winterianus)*** were used. Lemongrass is a medicinal aromatic plant which is used for its different pharmaceutical and sedative properties. The pharmaceutical effect of lemongrass is that it is used for treating digestive tract spasms, high blood pressure, convulsions, vomiting, and as mosquito repellent and for sedative effect like it reduce anxiety and stress[4]**.** Citronella is also a medicinal aromatic plant and its essential oil is rich in citronellal, citronellol & geraniol[5]**.** Citronella oil is most importantly used as mosquito repellent**.** All fabric takes up oil and aroma differently we should have better understanding of which fabric is better receptor of oil and aroma. Protein fibres are excellent media to transfer fragrance and to retain it for longer time. Under present study pure wool and pure silk fabric were chosen to compare aroma retention property of wool.

Wool is natural protein fibre and polymer system of wool fibre consists of salt linkage and hydrogen bonding. Hydrogen bonds are very weak bond which are formed between the hydrogen and nitrogen atom which breaks easily as water or any substance like oil and aroma enter into the fibre polymer system. Wool is very hygroscopic in nature it has more amorphous areas than that of silk however the scaly structure of wool makes it partially water repellent but once water or other substances like oil and aroma penetrate the fibre surface it get absorbed quickly and has good retention for a longer time. Wool is an amphoteric substance in nature this means that it will unite with and react toward both acid and bases[6].

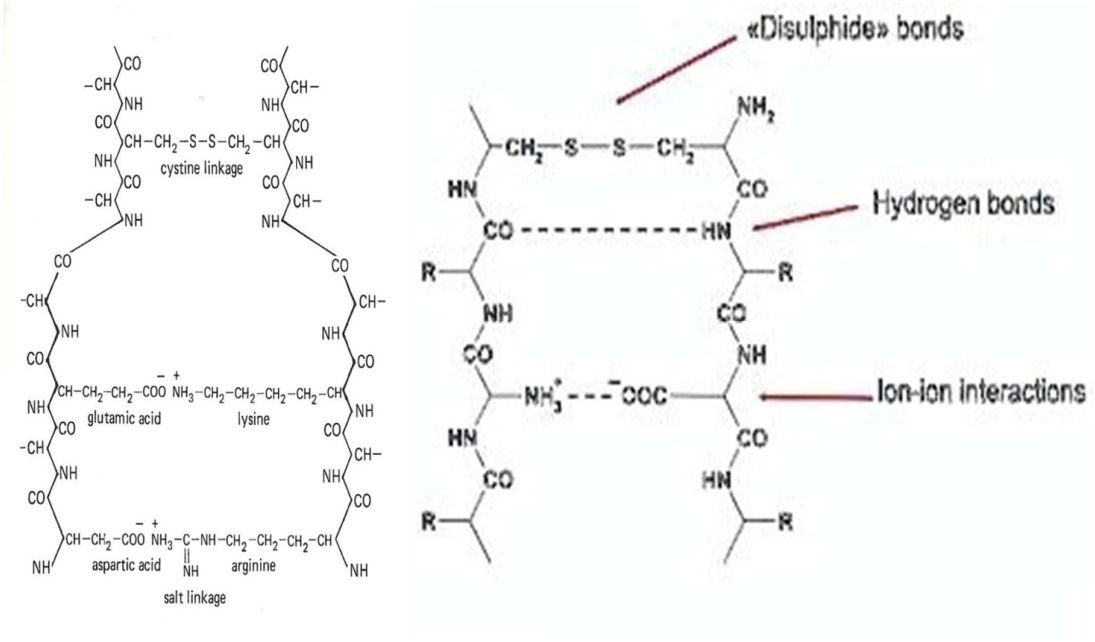
Silk is also a protein fibre like wool. Silk differs from the wool polymers as follows[7]:

- Silk composed of 16 amino acids with the 20 amino acid of wool.

Cite this article as: Shivani Srivastava, Sangita Srivastava. "Essential Oil Impregnation on Wool Fabric for Aromatherapy". *International Conference on Inter Disciplinary Research in Engineering and Technology (2016)*: 59-62. Print.

- The silk polymer does not composed of any sulpher containing amino acids. Hence the polymer system of silk does not contain any disulfide bond.
- The silk polymer occurs only in the beta-configuration.

Salt linkage enables to absorb moisture and other substances. Silk has very crystalline structure and it has less amorphous areas than wool therefore it is less absorbent than wool[6]. Fibre polymer system of wool and silk fibre is given in figure: 1.



(a) **(b)**

Fig: 1

a) Salt linkage between two wool polymer and the formula for silk polymer is same but silk does not contain disulphide bond as wool.

b) Hydrogen bond formation between two wool polymers. Dotted line indicates hydrogen bond and formula for hydrogen bond formation is same for silk polymer.

MATERIALS AND METHOD

Materials

Two aromatherapy oils citronella and lemongrass oil mixed with 80% ethyl alcohol solution of varied concentration were used as impregnation material on fabric. Pure wool and pure silk fabric were taken for study.

Preparation of fabric

All preliminary processes such as desizing scouring bleaching were done prior to finish application. All these process removes the impurities and enhance the ability for proper impregnation of finishing solution to the fabric. Then the samples were cut of size 2"×2" each and weighted wool 1.53 gm and silk 0.50 gm.

Preparation of solution and impregnation on fabric

80% of ethyl alcohol was used with varying concentration of two different aromatic essential oils viz. citronella and lemongrass oil. All fabrics weighing wool 1.53 gm & silk 0.50 gm were kept immersed in the given solution of varied oil concentration for 24 hours then squeezed dried and cured.

Olfactrometery analysis

It is a kind of sensory evaluation done by a group of panelist after treatment at intervals of 5th day 10th day 20th day and 30th day. The intensity of aroma categorized as follows: 0-no order, 1- very weak, 2-weak, 3-medium strong, 4-strong, 5- very strong.

Result and Discussion

Physical properties of treated fabric were assessed to compare changes occur after finish application.

Cite this article as: Shivani Srivastava, Sangita Srivastava. "Essential Oil Impregnation on Wool Fabric for Aromatherapy". *International Conference on Inter Disciplinary Research in Engineering and Technology (2016)*: 59-62. Print.

Fabric weight (gm)

The fabric weight of control wool fabric was observed as 1.53 gm and change in weight of treated wool was fabric observed as 2 gm, weight of control silk fabric was observed as 0.50 gm and treated silk fabric was 1 gm. It is clear from table 1 that wool fabric absorbed more oil in comparison to silk.

Fabric Thickness (mm)

Thickness of controlled wool fabric was noticed as 0.81 mm. and after treated with aromatherapy oil average increase in thickness was observed as 0.95 mm, control silk fabric thickness was 0.42 mm and after treatment it was observed as 0.57 mm.

Table: 1 Physical property of controlled and treated fabrics

Type of fabric	Type of sample	Fabric weight (gm)	Fabric thickness (mm)
WOOL	controlled	**1.53**	**0.81**
	treated	**2**	**0.95**
SILK	controlled	**0.50**	**0.42**
	treated	**1**	**0.57**

Evaluation of aroma intensity

Table 2 represents the olfactory analysis of aroma present in fabrics treated with aromatherapy oils combined with ethyl alcohol at intervals of 5th day 10th day 20th day 30th day. For proper identification of fragrance coffee beans were used to sniff between smelling of samples.

Table 2 shows that intensity of aroma remains same by increasing percentage of concentration of solution. So it can be concluded that 10% concentrations have as much aroma as 50% concentration. This makes cost effective use of essential oil because we cannot use much quantity of oil.

Table: 2 evaluation of aroma intensity treated with essential oil

Type of fabric	Type of essential oil	concentration	Evaluation day Aroma intensity			
			5th	10th	20th	30th
WOOL	**Citronella**	**10%**	**5**	**4**	**4**	**3**
		20%	**5**	**4**	**4**	**3**
		30%	**5**	**4**	**4**	**3**
		40%	**5**	**4**	**4**	**3**
		50%	**5**	**4**	**4**	**3**
	Lemongrass	**10%**	**5**	**4**	**3**	**3**
		20%	**5**	**4**	**3**	**3**
		30%	**5**	**4**	**3**	**3**
		40%	**5**	**4**	**3**	**3**
		50%	**5**	**4**	**3**	**3**
SILK	**Citronella**	**10%**	**4**	**4**	**4**	**3**
		20%	**4**	**4**	**4**	**3**
		30%	**4**	**4**	**4**	**3**
		40%	**4**	**4**	**4**	**3**
		50%	**4**	**4**	**4**	**3**
	Lemongrass	**10%**	**4**	**4**	**3**	**3**
		20%	**4**	**4**	**3**	**3**
		30%	**4**	**4**	**3**	**3**
		40%	**4**	**4**	**3**	**3**
		50%	**4**	**4**	**3**	**3**

0-no order, 1- very weak, 2-weak, 3-medium strong, 4-strong, 5- very strong.

Evaluation of wash durability

The wash durability of washed sample is shown in table 3. The wool sample treated with both essential oil shows good intensity of aroma after 10 and 20 wash cycles compare to silk sample

Cite this article as: Shivani Srivastava, Sangita Srivastava. "Essential Oil Impregnation on Wool Fabric for Aromatherapy". *International Conference on Inter Disciplinary Research in Engineering and Technology (2016)*: 59-62. Print.

Table: 3 evaluation of wash durability

Type of fabric	Type of essential oil	Before washing	10 wash cycles	20 wash cycles
wool	Citronella	5	4	3
	Lemongrass	5	3	3
Silk	Citronella	4	4	3
	Lemongrass	4	3	3

CONCLUSION

Aromatherapy is an alternative medicine and essential oil of aromatic plant is used to treat several types of ailment. All fabric retains and release aroma differently depending upon fibre structure. We should have better understanding of which fabric is better receptor of oil and aroma therefore correct selection of fabric is very important prior to finish application for better aromatherapy results. In present study impregnation of essential oil was done on pure wool fabric. Silk fabric was also chosen to compare aroma retention property of wool. Fabric sample were kept immersed in varied solution of essential oils containing 80% ethyl alcohol for 24 hours. Physical properties like weight and thickness of fabric also changed after finish application which is given in table 1. An evaluation of intensity of aroma was done at intervals of 5^{th} day, 10^{th} day, 20^{th} day, & 30^{th} day for both the oil by a panel of expert which is given in table 2 and it was found that wool fabric has better retention of aroma compare to silk.. Wash durability evaluation was also done which is given in table 3 wool fabric shows good wash durability after 10 and 20 wash cycles for both essential oil compare to silk Fig. 1 shows the molecular structure of wool and silk fibre. Wool is highly hygroscopic in nature as it has more amorphous areas than that of silk so when water or other substances like oil and aroma once penetrate the fibre surface it get absorbed quickly and has good retention for a longer time. By all the tables it is clear that wool fabric is higher absorber of aroma and also retains aroma for a longer time than silk therefore wool fabric is best suitable for aromatherapy.

REFERENCES

1. Brown D. *Aromatherapy, Lincolnwood (NTC Publishing Group, Chicago)* 1996, 51
2. Buchbaur, G. & Jirovetz, L Aromatherapy-use of fragrance & essential oil as medicaments, *Flavour Fragr. J.* (1994) 9. 212-222.
3. Verdet (1989) *why phytotherapy? Aromatherapy study trip lecture notes.* Hinckley: Price.
4. Satyabrata & K A Geetha Floriculture (Ornamental, Medicinal & Aromatic Crops).
5. Katiyar, R., Gupta, S., Yadav, K.R. (2011): *Cymbopogon winterianus*: an important species for essential java Citronella oil and medicinal values, National Conference on Forest Biodiversity: Earth‟s living treasure, 22 May, FRI, Kanpur.
6. Norma Hollen & Jane Saddler, (Textiles) pp. 29.
7. E.P.G Gohl & L. D Vilensky *the Protein Fibre* (Textile Science) pp 83-86.

Cite this article as: Shivani Srivastava, Sangita Srivastava. “Essential Oil Impregnation on Wool Fabric for Aromatherapy”. *International Conference on Inter Disciplinary Research in Engineering and Technology (2016)*: 59-62. Print.