

Acoraceae Plants Extract on Fabric Finishes

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Abstract: Herbal finishing textiles is the need of great importance eco-friendly materials and attire businesses are not a special case to it. Directly from textile process till the textures are done; the procedures are made eco-friendly. What's more, not just that even explores are made to make the texture dispensable too eco-friendly by herbal materials. At the point when world is moving towards every one of the choices for supportability claim to fame completes too are made utilizing plants with their characteristic properties for new completes like antimicrobial, smell, antibacterial, self-smothering or fire resistant, mosquito repellent, herbal finishes and so on. These variations of herbs have multi medicinal purpose and its application in clothing, clothing accessories etc... The herbs utilized are accessible in wealth in India.

Keywords: Herbal Finish, Neem, Aloe Vera, Antiseptic, Antimicrobial, Aroma finish.

I. INTRODUCTION

Textile materials are vital piece of human life. They are principally to cover the human body for assurance Natural material strands are more helpless to assault than manufactured filaments. Simultaneously human skin underpins development of microscopic organisms, in view of its metabolic side items, for example, acidic and essential perspirations and pee, despite the fact that it is conceivable the most significant boundary to counteract microorganisms entering the body. Mindfulness about eco neighborliness in materials is one of the significant issues lately since materials are utilized beside skin and are called second skin. Inferable from the requests of worldwide shopper the inquires about are being completed for new ecofriendly forms[1].

Due to refined raw materials, manufacturing technique and finished products, textile finishing is a complex field. Fashion trends cause constant changes in coloring and functional finishes. Natural finishes consist of those substances derived from plants and animals. Natural finishes have many advantages, such as non-toxic, non-irritating, biodegradable, and cost-effective and availability.

II. METHODOLOGY

2.1 Selection of Fabric Structure

The method of fabric formation helps determine the shape and texture, consistency during use and treatment. The cycle always decides the fabric name. Hence the selection of plain weave for manufacture was anticipated. In view of all the evidence, for the present study, the selected 40's Cotton yarns have been woven.

2.2 Weaving Structure Selection

The simplest form of weaving is plain weaving. It consists of warp interlacing and wefting up and down the fabric's entire width. Plain weaving fabrics are typically reversible and stronger than other simple weaves because each thread in each yarn series supports another series ' consecutive thread.

2.3 Pretreatment of Fabric Process

Pre-treatment improves fabric wettability, thereby promoting uniform finishing. The object of the preparatory process is the first step towards consistency, removing the starch, natural impurities and natural yellowish gray coloring material present in the fabric and changing the fabric for the follow-up process of bleaching.

2.4 Source of Raw Material

The present investigation aims at developing an Ecofriendly natural antimicrobial finish from an herbal plant of India. Neem, prickly chaff flower, aloe-Vera, thumbai, daisy, kuppaimeni plants are collected fresh leaves and washed thoroughly. Fresh leaves, dry leaves, fresh rhizome and dry rhizome were selected for the study.

2.5 Pilot Study

Pilot study is a preliminary study performed in a limited scale prior to the large scale to obtain some primary knowledge on the basis of which the main study would be designed and formulated. A pilot study was conducted using a direct water soluble system and a method of extraction of methanol to select content, optimize selected herbs, binder, extraction time, temperature.

2.6 Extraction Method

The collected leaves and rhizomes of Acorus Calamus plant were shadow dried with in a temperature range of 38-40 degree Celsius. The moisture content of the leaves was reduced with proper drying since most of the herbs have 60-80 % of moisture content and cannot be stored without drying. After drying, a known amount of dry rhizome and dry leaves were powered in a mixer grinder. The fresh leaf and rhizome extracts are made within 4 hours of harvesting. The fresh leaf and rhizome extracts are made by grinding the entire leaf and rhizome. The grinded fresh leaf and rhizome, as well as dry leaf and rhizome powder were mixed with absolute methanol to extract active substances from the sources. 20g of the powder was extracted with 100ml of methanol (analytically grade). The mixture was allowed to stand for 24 hours. The mixture was now filtered and evaporated carefully and the regulated water bath was maintained at the temperature of 80°C to yield semi-solid extract. It was stored in a refrigerator at 4°C.

2.7 Finishing

The durability of the finish can be enhanced when the herbal extracts of fresh leaf, dry leaf, fresh rhizome and dry rhizome are applied on cotton fabric. The extracted 100% herbal extraction solution is mixed with 1:20 liquor, the application method was optimized with three different timings (1 hour, 1 1/2 hours and 2 hours) at 60 degree Celsius. Finishing was applied directly by pad-dry-cure method with binding agent, citric acid[2]. Hence padding mangle was used to finish all the samples. The treated samples were cured in room temperature and dried in shade. Thus, total 12 samples were prepared.

III. DIFFERENT HERBAL FINISHES

Many researches are working towards herbal finishes on textiles now-a-days. Usually specialized finishes are developed using natural plants and herbs where root, stem leaves, flowers and fruits are utilised and applied on to various textile material like viscose rayon, cotton and wool. The products made out of these textiles are such where human skin comes in contact with the material for the maximum time or when the human body is at rest at maximum. Studies have revealed that when these herbal treated fabrics come in contact with human skin, the body loses toxins and its metabolism is enhanced. So the main objectives of my study was to study and document various sources of natural herbs that can be used as finishes on textiles and report its suitability and sustainability on various textiles. It is also to examine its effective application for varied end uses. Some of the specialized finishes which are tried on to textile materials are summarised in this article.

Many plants like catechu, pomegranate rind, madder, castor oil, sweet basil, lime, wild turmeric, henna leaves, curry leaves, aloe vera, amla powder, peepal leaves, garlic, tulsi, neem, spinach leaves, piper betel leaves, lemon grass leaves, champa, jasmine, lavender, sandalwood, rose water, manjith, rubia cordifolia. Many effective finishes like antimicrobial finish, antiseptic finish, self-extinguishing finish and mosquito repellent finish are newly researched and are eco-friendly which is tested on various textiles by microencapsulation method [3].

3.1 Antimicrobial Finish

Cotton fabrics were used and dyed with natural dyes using amla, myrobalan and garlic as mordants and then were treated with turmeric, neem, tulsi, aloe vera, and banyan and henna herbs by micro-encapsulation method. The results shown the herbs used alone or in combination with each other imparted good antimicrobial property to the fabric. The fabric was tested against non-treated cotton sample. The durability of this finish was evaluated by the number of wash cycles which also showed good results on herbal treated fabric.

3.2 Antiseptic Finish

Chitosan derivatives namely guanidinium salts derivatives guanidine HCL has antimicrobial and antifungal property when applied on wool fabrics and its effectiveness was evaluated by microwave heating. The durability of this finish was observed on 40 washes of the wool fabrics and it is concluded that this derivative has good antimicrobial repellent against e-coli and e- aureus. Also microwave heating showed higher degree of crosslinking and antimicrobial properties without losing its strength.

3.3 Mosquito Repellent Finish

Researches shown that lemon grass leaves and lemon grass oil known as cymbopogon species are natural insect or mosquito repellent. When researched it was seen that the extract of this herbal plant was applied on basket weave cotton fabric and its wash fastness property was evaluated. It was seen that the fabric when treated with lemon grass leaf was excellent mosquito repellent than fabric treated with lemon grass oil extract without hindering the fabric strength, thickness, drapability, weight/square meter and abrasion properties.

3.4 Self-Extinguishing Finish

Spinach aloe vera juice was applied on to the cotton fabric which were used for furnishing products like home window curtain, hospital curtain, table lamp, and as a covering material for non- permanent structure like in book fair, festival, religious purposes, etc. where there are chances of fire hazards. The results obtained were excellent without hindering the inherent properties of the fabric used for this purpose.

3.5 Aroma Finish

This finish was applied on plain weave cotton fabrics. The purpose of this finish is to impart aroma and fragrance which has a soothing effect that helps in fighting stress. This finish is very much beneficial to cancer patients. The airtight hard-shell capsules containing a particular type of aroma have also been developed as a women's wellbeing for fighting against side effects of chemo and radiotherapy. Under suitable conditions aroma finished fabrics showed more durability to 50 wash cycles than thermal curing.

3.6 Uses and Application of Herbal Finished Fabrics

These herbal finishes when applied on textile materials showed good results and accordingly products were made. Products like home furnishings like window curtains, bed linen, yoga mats, carpets, hospital curtain, table lamp, and as a covering material for non- permanent structure like in book fair, festival, religious purposes. Apart from these socks, lingerie, cotton eye pads are also developed where human skin comes in direct contact with the textiles [4].

IV. EVALUATION:

4.1 Testing the Efficacy of Anti-Microbial Finish

Treated samples based on optimized process parameters were tested for their antimicrobial efficacy using standard test, namely agar diffusion method against bacteria cultures of Staphylococcus Aureus and Escherichia coli as per standard procedure cited in literature [5].

4.2 Nomenclature

The nomenclature used for various samples are given in table below.

Table 1

S.NO	SAMPLE	NOMENCLATURE
1.	FL	FRESH LEAF SAMPLE
2.	DL	DRY LEAF SAMPLE
3.	FR	FRESH RHIZOME SAMPLE
4.	DR	DRY RHIZOME

V. RESULT AND DISCUSSION

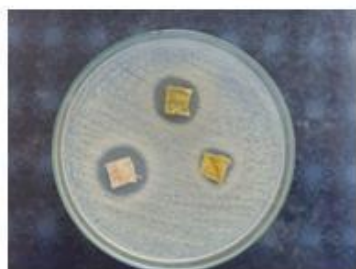
5.1 Antimicrobial Activity

The antimicrobial properties were analysed by using quantitative assessment on cotton samples, which measures the degree of antibacterial activity using agar diffusion method [6]. Antimicrobial activity of Acorus Calamus extract treated fabrics is shown in table 2. The result clearly shows that the samples treated with extracts of fresh leaves, dry leaves and dry rhizome have better zone of inhibition against both s.aureus and E.coli microorganism. fresh rhizome of Acorus Calamus were found zone of inhibition only on E.coli.

Table 2

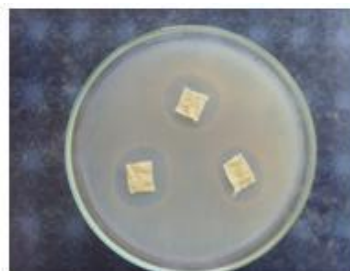
S.NO	SAMPLE	TIMING	AGAR DIFFUSION TEST- ZONE OF INHIBITION (MM)	
			S.AUREUS	E.COLI
1	FL 1	1 HOUR	20	21
2	FL 2	1 ½ HOURS	16	18
3	FL 3	2 HOURS	17	21
4	DL 1	1 HOUR	9	25
5	DL 2	1 ½ HOURS	16	20
6	DL 3	2 HOURS	26	24
7	FR 1	1 HOUR	-	18
8	FR 2	1 ½ HOURS	-	19
9	FR 3	2 HOURS	-	18
10	DR 1	1 HOUR	17	25
11	DR 2	1 ½ HOURS	20	22
12	DR 3	2 HOURS	28	27

5.2 Antibacterial Assessment Against S. Aureus



Agar diffusion method: Dry leaf sample

Fig-7



Agar diffusion method: Dry rhizome sample

Fig-8



Agar diffusion method: fresh leaf sample

Fig-9



Agar diffusion method: fresh rhizome sample

Fig-10

5.3 Antibacterial Assessment Against E.Coli



Agar diffusion method: dry leaf sample

Fig-11



Agar diffusion method: dry rhizome sample

Fig-12



Agar diffusion method: fresh leaf sample

Fig-13



Agar diffusion method: fresh rhizome sample

Fig-14

VI. CONCLUSION

Acorus calamus is a natural plant source. It is nontoxic, non-allergic, biodegradable, cost effective and easily available material. It will not cause any harm to humans even from infants to pregnant women. It smells pleasant and is non irritant to human beings. Fresh and dry leaf, fresh and dry rhizome extract has been found to possess antimicrobial character due to the presence of chemical components such as and B asarone. The active substance was extracted from the plant leaves and rhizomes using methanol. The method of application of this active substance on cotton fabric using citric acid as cross linking agent by padding mangle method. The anti-microbial assessment was carried out by using standard test-agar diffusion method.

From the research it is be found that there is a good anti-bacterial property in the fabric after it has been finished. Fresh leaf, dry leaf and dry rhizome extraction shows better anti-bacterial activity on both aureus and E.coli. Fresh

rhizome found property against only in E.coli. Hence, the scope of implementation and commercialization of the herbal extract as an antimicrobial finish in textile is a novel idea.

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