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Research Paper

Effect of *Karanja* extract treatment on weight per unit area of fabric

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■ **ABSTRACT :** The objectives of this study were to determine physical property of control and treated samples were tested to analyze the effect of *Karanja* extracts on the samples. The fabric samples were conditioned. Samples were cut from scoured cotton fabric with 54 warp yarns (ends) and weft yarns (picks) per inch were (ASTM 123 test method). The tests were performed for different types of samples *viz*., control (scoured), samples treated with leaves and seed extracts in viscous and dry state; and samples treated with an antiseptic containing chloroxylenol. The samples were subjected to tests for weight per unit area (g/m^2) physical property test. It was concluded that as the concentration of extract increased, significant increase at 1% level of significance was observed in all treated samples except SDLP. This may be due to the fact that increase in concentration of *Karanja* extract, lead to absorption of more amount of extract by the sample.

■ **KEY WORDS:** Viscous, Chloroxylenol, Antiseptic, Methanol, Soxhlet method

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Adaptation of covering our bodies pre-dates to the historic age. Clothes have fulfilled a variety of functions, ranging from primarily awarding protection and warmth to being a symbol of fashion statement as of today (Farida and Bhumika, 2015). India is the world's second largest producer of textiles and garments after China (Devaraja, 2011). Increasing global competition in textiles created many challenges for textile researchers and industrialists. Textiles play an important role in the daily lives of humans, and the demand for various quality attributes of them are based on enhancing the properties through proper finishing. Textile goods are excellent substrate for growing micro-organisms. The prevention of microbial attack on textile materials has become increasingly important to consumers and textile producers (Nadiyar and Gotmare, 2011). Consumers are increasingly becoming aware of the hygienic life and health (Mahesh *et al*., 2011). There is a great demand for eco-friendly antimicrobial finishes on textiles. Natural finishes have many advantages such as non toxic, non irritant, biodegradable, cost effective, easy availability, etc. (Malik and Pawan, 2008).The antimicrobial components from the plant origin have therapeutic potential as they are effective against numerous infectious diseases. The herbal extract finished fabrics were considered as significant for the textile application. The finishing of natural compounds would be a best alternative for the synthetic antimicrobial agents and

heavy metals on the hygienic health care textiles (Joshi *et al.*, 2009). Cotton fabrics are generally worn next to skin hence direct contact of textiles with human body provides warmth, humidity and nutrients; an excellent environment for micro-organism growth. These micro-organisms create unpleasant odour, discoloration, staining, degradation of textile materials and spread of diseases.

Pongamia pinnata has also been recognized as a viable resource of agro-forestry and urban landscaping. *Pongamia pinnatta* belongs to leguminosae family, and descried as one of the main sources of potentially active metabolites. Many of these active compounds are well known for excellent effects on insect pest control (Katole *et al.*, 1993). There is a long tradition of *Pongamia pinnata* being used as medicinal plant, particularly the Ayurveda and Siddha medicine system of India (Muthu *et al.*, 2006). Fresh bark of *Ponganua pinnata* is used internally to cure bleeding piles. The root and bark are bitter, anthelmintic and are used for vaginal and the skin diseases. A poultice of the leaves is applied to ulcers infested with worms (Kiritikar and Basu, 1984). Seed of Indian beech are anthelmintic, bitter, acrid and carminative. Aqueous extract of stem bark exhibits CNS sedative and antipyretic activity (Pillai and Vijayamma, 1988). All the parts of the *Karanj* tree have medicinal properties and are thus commercially exploitable. Therefore, keeping the above facts in mind the present study was planned to develop renewable treatment from *Karanja* plant and to study the effect of treatments on weight per unit area (g/m^2).

■ RESEARCH METHODS

Material used:

Hundred % cotton (scoured) fabric and -an antiseptic containing chloroxylenol were procured from local market of Hisar city. Leaves and seeds of *Karanja* plant were collected from different places in campus CCS HAU Hisar.

Pre-treatment of fabric :

Cotton fabric was desized in a solution containing 1% H_2SO_4 at 50°C for 60 minutes with material to liquor ratio 1:40. The fabric was rinsed thoroughly to remove any starch and acid residues. The fabric was weighed, soaked, squeezed, and treated in a solution containing 1 per cent soap, 3 per cent soda ash and 0.5 per cent sodium sulphite at boiling temperature (100^{0}C) with 1:40 material to liquor ratio for 60 minutes. After that the fabric was rinsed thoroughly and dried on a flat surface (Gaba, 1999) Sample taken from scoured cotton was kept as control sample.

Preparation of *Karanja* Extract :

Extraction was carried out by refluxing (soxhlet) and distillation methods. Half quantity of leaves and seeds extracts separately converted from viscous to dry form by keeping in open place for four to five days. Through silica gel viscous extracts were converted in dry state.

Application of *Karanja* extracts on cotton fabric :

Solution of *Karanja* extracts of leaves and seeds in viscous and dry state in two concentrations *i.e.* 2.5g/l were prepared. The concentrations of 2.5g/l and 5g/l for treatments were selected on the basis of review. On the basis of weight of the fabric quantity 1:20 material to liquor ratio of *Karanja* extracts were calculated. Four pieces of scoured cotton fabric were sterilized and impregnated with these four prepared solutions separately. The samples were immersed in the treatment bath for 30 minutes. Without squeezing the fabric was placed in the dry place.

Preparation and application of an antiseptic containing chloroxylenol on cotton fabric :

Solution of an antiseptic containing chloroxylenol was prepared in distilled water in 2.5g/l and 5g/l concentrations. Material to liquor ratio was taken as 1:20. Another piece of cotton fabric was sterilized and immersed in the solution for 30 minutes. Without squeezing the fabric was kept overnight for drying. The antiseptic treatment was taken as standard.

Determination of physical properties :

Fabric weight per unit area:

Physical property of control and treated samples were tested to analyze the effect of *Karanja* extracts on the samples. The fabric samples were conditioned. Samples were cut from scoured cotton fabric with 54 warp yarns (ends) and weft yarns (picks) per inch were (ASTM 123 test method) fabrics treated with extracts of leaves and seeds extract in viscous and dry state and fabric treated with antiseptic containing chloroxylenol in two concentrations were cut according to test methods requirements. The samples were conditioned and

weighed separately on the Paramount Precision Scale for GSM (grams per square meter) using ASTM D3776-90 test method. An average of five readings was calculated.

■ RESEARCH FINDINGS AND DISCUSSION

The results obtained from the present investigation as well as relevant discussion have been summarized under following heads :

Assessment of physical properties of control and treated samples :

The physical (weight per unit area) property of control (scoured) and treated samples were measured to assess the change in the weight per unit area due to the treatments with leaves extracts in viscous state (LEVS), seeds extracts in viscous state (SEVS), solution of dry leaves powder (SDLP) and solution of dry seeds powder (SDSP) of *Karanja* plant and antiseptic containing chloroxylenol (standard). The samples were tested for physical properties before and after treatments. Physical properties after treatment were compared with in the same concentrations of treatments, between treatments with leaves and seeds extracts in viscous state, between treatments with solutions of dry leaves and dry seeds powder, among all treatments from *Karanja* plant parts, and all treatments with antiseptic containing Chloroxylenol (standard). The results were as follows:

Effect of *Karanja* extract treatment on weight per unit area (gm/m^2) of fabric samples :

It was observed from the data in Table 1 and Fig.1 that the weight of control sample was 99.00±0.01 g/m^2. The weight of the sample treated with 2.5g/l concentration of leaves extract in viscous state was 107.18±0.01 g/m^2 and there was 8.21% increase from the weight of control sample. The weight of the sample treated with 5g/l concentration of leaves extract in viscous state was 115.26±0.01 g/m^2. There was 16.42%

Table 1 : Effect of *Karanja* extract treatment on weight per unit area (gm/m^2) of fabric samples

Concentration	Weight per unit area (g/m^2)				
	2.5 g/l		5 g/l		
Treatments	Mean±S.E (m)	Per cent change	Mean±S.E (m)	Per cent change	t-value
LEVS	107.18±0.01	+8.21	115.26±0.01	+16.42	5.96**
SEVS	104.25±0.01	+5.30	113.45±0.01	+14.60	8.22**
SDLP	106.33±0.01	+7.40	111.52±0.01	+12.64	0.56NS
SDSP	104.56±0.01	+5.61	112.36±0.01	+13.50	4.78**
Chloroxylenol (standard)	100.29±0.01	+1.30	102.17±0.01	+3.20	1.54 NS
Control	99.00±0.01	-	99.00±0.01	-	-

** indicates significance of value at P=0.01 level NS = Non-significant
LEVS – Leaves Extract in Viscous State treated sample, SEVS – Seed Extract in Viscous State treated sample
SDLP – Solution of Dry Leaves Powder treated sample, SDSP – Solution of Dry Seeds Powder treated sample

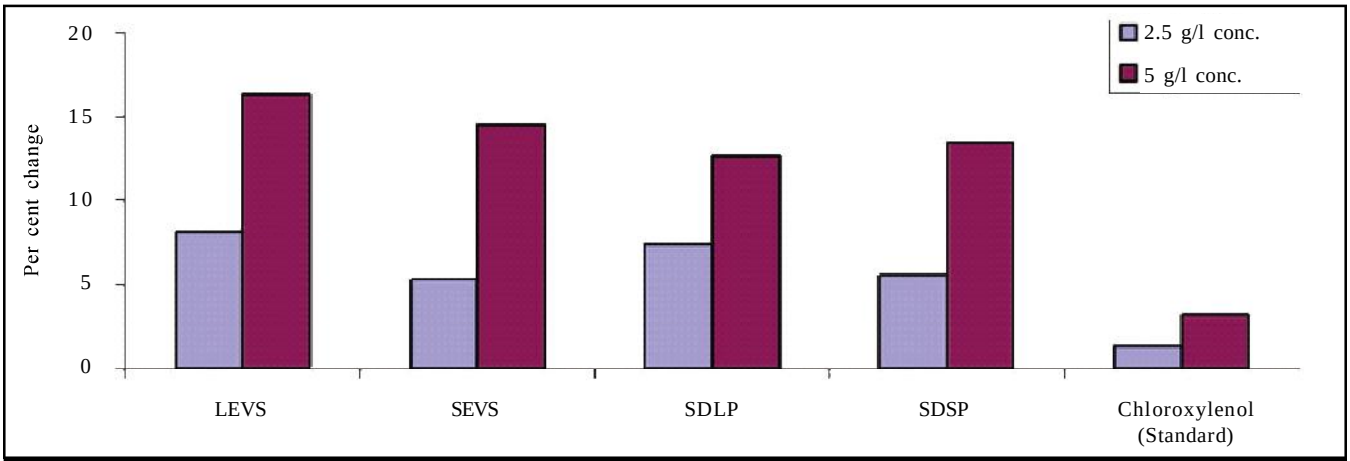

Fig. 1 : Effect of *Karanja* extract treatment on weight per unit area (g/m^2) of fabric samples

increase from the weight of control sample. The increase in weight per unit area in both concentrations were found to be significant at 1% level of significance.

The weight of the sample treated with seeds extract in viscous state with 2.5g/l and 5g/l concentrations was 104.25±0.01 g/m^2 and 113.45±0.01 g/m^2, respectively. There was 5.30% and 14.60% increase from the weight of control sample and found to be significant at 1% level of significance. The gain in weight of the samples treated with leaves extract in viscous state in both concentrations was more than the gain in weight of samples treated with seeds extract in viscous state.

Sample treated with solution of dry leaves powder with 2.5g/l concentration weighted 106.33±0.01g/m^2. There was 7.40% increase from the weight of control sample. Similarly in 5g/l concentration sample weight was 111.52±0.01 g/m^2. There was 12.64% increase and found to be non-significant.

Weight of the samples treated with solution of dry seeds powder with 2.5g/l and 5g/l concentrations was 104.56±0.01 g/m^2 and 112.36±0.01 g/m^2. There were an increase of 5.61% and 13.50%, respectively. The gains in weight of the samples were found to be significant at 1% level of significance.

The weight of the samples treated with 2.5g/l and 5g/l concentrations of antiseptic containing chloroxylenol (standard) was 100.29±0.01 g/m^2 and 102.17±0.01 g/m^2, respectively. There was 1.30% and 3.20% increase, respectively from the weight of control sample and found to be non-significant. On comparing the gain in weight of the samples in all treatments minimum gain in weight was observed in antiseptic containing chloroxylenol (standard) treated samples.

It was discernible from the results presented in Table 1 that weight increased in all treated samples as compared to control sample. As the concentration of extract increased significant increase at 1% level of significance was observed between the samples treated with 2.5g/l and 5g/l concentrations except in case of treatment with extract of dry leaves powder and antiseptic containing chloroxylenol. The gain in weight of the samples treated with extracts in viscous state was more than the samples treated with solutions of dry powders.

Change in fabric weight and performance properties of treated fabrics were compared with contemporary literature.

Weight per unit area:

The change in the physical property of controlled and treated fabrics was assessed. It was found that the weight per unit area treated fabric increased an acceptable level Verma (2013). Significant increase in weight of polyester non-woven fabrics observed after treatment may be due to the absorbance of the herbal extracts into the fabric. The results are supported by the findings of Sumithra and Raaja (2012) that weight of herbal finished denim fabric was higher as compared to untreated fabric due to absorbance of the extract in the fabric structure. Santosh (2012) also reported increase in weight of the neem and aloe vera treated cotton and woollen fabrics. The degree of finish, the weight gain % of finished fabric samples was determined (Viswanath and Ramachandran, 2010). In a study conducted by Nan *et al*. (2013) the fabric weight of the treated cotton fabric (3.7673 oz./yd^2) was heavier than that of the untreated cotton fabric (3.405 oz./yd^2).

Conclusion :

It was concluded that on comparing the gain in weight of the samples in all treatments minimum gain in weight was observed in antiseptic containing chloroxylenol (standard) treated sample. This may be because of fineness and of the particles of solution. As the concentration of extract increased, significant increase at 1% level of significance was observed in all treated samples except SDLP. This may be due to the fact that increase in concentration of *Karanja* extract, lead to absorption of more amount of extract by the sample.

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