

## Antimicrobial and Aroma Finishing of Organic Cotton Knits Using Vetiver Oil Microcapsules for Health Care Textiles

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**Abstract :** Eco-friendly textiles are gaining importance among the consumers and textile manufacturers in the healthcare sector due to increased environmental pollution which leads to several health and environmental hazards. Hence, the research was designed to cultivate and develop the organic cotton knit, to prepare and characterize the Vetiver oil microcapsules for textile finishing and to access the wash durability of finished knits. The cotton *SAHANA* variety grown under organic production systems was processed and spun into 30 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. *Vetiveria zizanioides* is an aromatic grass which is being traditionally used in medicine and perfumery. Vetiver essential oil was used for preparation of microcapsules by interfacial polymerization technique subjected to Gas Chromatography Mass Spectrometry (GCMS), Fourier Transform Infrared Spectroscopy (FTIR), Thermo Gravimetric Analyzer (TGA) and Scanning Electron Microscope (SEM) for characterization of microcapsules. The knitted fabric was finished with vetiver oil microcapsules by exhaust and pad dry cure methods. The finished organic knit was assessed for laundering on antimicrobial efficiency and aroma intensity. GCMS spectral analysis showed that, diethyl phthalate (28%) was the major compound found in vetiver oil followed by isoaromadendrene epoxide (7.72%), beta-vetivenene (6.92%), solavetivone (5.58%), aromadenderene, azulene and khusimol. Bioassay explained that, the vetiver oil and diluted vetiver oil possessed greater zone of inhibition against *S. aureus* and *E. coli* than the coconut oil. FTIR spectra of vetiver oil and microcapsules possessed similar peaks viz., C-H, C=C & C=O stretching and additionally oil microcapsules possessed the peak of 3331.24  $\text{cm}^{-1}$  at 91.14 transmittance was attributed to N-H stretches. TGA of oil microcapsules revealed that, there was a minimum weight loss (5.835%) recorded at 467.09 $^{\circ}\text{C}$  compared to vetiver oil i.e., -3.026% at the temperature of 396.24 $^{\circ}\text{C}$ . The shape of the microcapsules was regular and round, some were spherical in shape and few were rounded by small aggregates. 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 20<sup>th</sup> wash and better aroma retention compared to knits finished with the exhaust method of application. Further, the group of respondents rated that the 5<sup>th</sup> washed samples had the greater aroma intensity in both the methods than the other samples. Thus, the vetiver microencapsulated organic cotton knits are free from hazardous chemicals and have multi-functional properties that can be suitable for medical and healthcare textiles.

**Keywords :** exhaust and pad dry cure finishing, interfacial polymerization, organic cotton knits, vetiver oil microcapsules

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