

# Comparative Analysis of Coating and Encasing Techniques Using Turmeric: A Two-Method Study

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**Abstract:** Turmeric, scientifically known as *Curcuma longa* L., is a highly valued spice with a rich history of use across Asia. Originating from South East Asia, this perennial herb belongs to the ginger family and is widely cultivated throughout the continent. India stands out as the leading producer, consumer, and exporter of turmeric. Renowned for its vibrant colour and distinctive flavour, turmeric serves as both a culinary staple and a natural dye. Beyond its culinary applications, turmeric holds significant medicinal value, boasting a wide array of pharmacological properties. These include antimicrobial, antioxidant, chemopreventive, antimutagenic, and bioprotective qualities, among others. All these characteristics demonstrate its reputation as a versatile and beneficial herb. [1]

Drawing upon the aforementioned potentialities, two methods were applied to impregnate (dip-pad-dry) or coat (knife coating) cotton fabric (CF) with a polyurethane bio-based matrix, including turmeric to gain antioxidant and antimicrobial protective characteristics, among others.

**Keywords:** turmeric; dye; dip-pad-dry; knife coating.

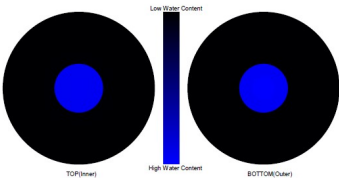


Figure 1 Moisture management test of the CF.

The control, a 100% cotton *Jersey* knit, was examined for its moisture management properties, being clear that CF is a water repellent fabric showing no wettability, no absorption, and no spreading. This is a substrate with a poor one-way transport capability without external forces.

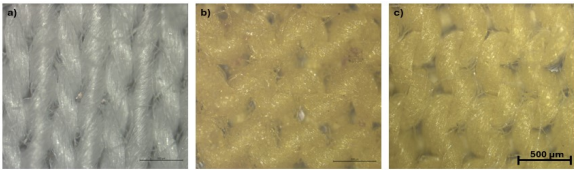


Figure 2 a) CF control, b) CF coated by knife coating, c) CF impregnated by dip-pad-dry (scale bar represents 500 μm).

**Table 1** Characterization of the CF (control and coated with two methods, dip-pad-dry or knife coating), measurements of thickness, areal mass density, air and water vapor permeability, as well as resistance to abrasion after 10 000 cycles.

	CF (control padding)	CF (coated padding)	CF (control knife coating)	CF (coated knife coating)
Thickness (mm)	0.45 ± 0.01	0.46 ± 0.01	0.47 ± 0.01	0.45 ± 0.01
Areal Mass Density (g/cm <sup>2</sup> )	216.63 ± 0.03	221.29 ± 0.01	208.43 ± 0.09	208.17 ± 0.06
Air Permeability	438.00 ± 15.57	373.30 ± 11.26	313.60 ± 19.33	314.10 ± 35.02
Water Vapour Permeability Index (%)	90.03 ± 3.30	89.03 ± 3.55	88.95 ± 0.54	86.77 ± 1.00
Abrasion (%) mass loss 10000 cycles	0.13 ± 0.06	0.48 ± 0.35	0.52 ± 0.04	0.81 ± 0.21



Figure 3 (a) Impregnated by dip-pad-dry (b) Impregnated by dip-pad-dry after one wash (c) Coated by knife coating (d) Coated by knife coating after one wash.

After the coating and impregnation procedure, the substrate exhibits a low decrease in the air permeability, the water vapour permeability is above 80% which mean that both methods can be considered for proximity scenarios with the human skin. As for the abrasion tests, 10 000 cycles were made, and the mass loss was below 1%. Washing fastness must be improved, as seen in fig.3.

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## REFERENCES

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