

Effect of Natural Dye (*Cocos nucifera* calyx) on Cotton Fabric

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Introduction

Today the world is endangered with countless environmental hazards. The textile processing and dyeing is one area, which appears to cause enormous damage to the environment. The undue pollution load created by the use of synthetic dyes and their hazardous effects have prompted researchers to look for eco-friendly, eco-conservation and eco-production products. Natural dyes offer an important alternative in this regard.

Methodology

Hundred percent cotton material with plain weave of 40's count, bleached fabric was selected for this study. Fifteen meters of the fabric was purchased for this study from a reputed mill in Coimbatore district.

Selection of the natural dye

Coconut palm (*Cocos nucifera*) is a member of the family Arecaceae. Fruit, large brown or reddish fibrous drupe upto or exceeding 30 cm in length, explains Prajapali et al. (2003). The calyx, which is outer floral envelope of the flowering plants usually green in colour remains attached to the mature fruits. These are usually thrown as a waste. The dried calyx were collected, ground to powder in a dry grinding machine and it was used as the natural dye source

Selection of Mordants

Two natural mordants namely Eucalyptus bark and Amla fruit were selected on the basis of high tannin content in them. They were dried and powdered separately in a dry grinding machine to be used for this study .Two chemical mordants namely Aluminium sulphate (Alum) and sodium chloride (common salt) were selected for this study

Selection of various parameters for dyeing

The following optimised parameters were selected for dyeing of the cotton fabric in the liquor ratio 1 : 50 at boiling temperature.

The optimum concentration of dye was 4 per cent, optimum time for dye extraction and dyeing was found to be 60 minutes, the optimum concentration of

mordants were 2 per cent and the optimum mordanting time was identified as 40 minutes.

Procedure for Dyeing the Fabric

Pre-Mordanting and Dyeing

Three meters of desized cotton fabric was pre-mordanted in eucalyptus bark mordant solution and another three meters in aluminium sulphate solution. The two pre-mordanted fabrics were dyed separately in two different coconut calyx dye bath. The dyed fabrics were thoroughly rinsed to remove the excess dye and dried shade.

Simultaneous Mordanting and Dyeing

The dye bath containing mordant and dye was prepared by boiling both the eucalyptus bark mordant and aluminium sulphate mordant with coconut calyx dye source as two different dye baths.

Three meters of desized cotton fabric was dyed in the two separate dye baths and then thoroughly rinsed to remove the excess dye, mordant stuff and dried under shade.

Wear Study

The dyed fabrics were constructed as pillow covers utilising 50 cm of the dyed fabric for each sample. They were given for daily use for a period of 20 days. The used samples were given one wash a day. The dyed and washed samples were evaluated both subjectively and objectively.

Results and Discussion

The four dyed (unwashed) and 16 washed samples were evaluated both subjectively and objectively.

- The washed samples were rated to be good in general appearance, bright, evenly dyed having soft texture and medium lustre.
- The fabric thickness washed samples had greater increase in thickness when compared to dyed (unwashed) samples.
- All the dyed and washed samples had increase in weight over original sample.
- Dyed (unwashed) samples had minimum loss in breaking strength along warp direction when compared to washed samples
- All the dyed samples had loss in breaking strength along weft.
- The washed samples had greater increase in elongation along warp direction than dyed ones.
- All the samples had loss in stiffness along warp and weft direction.

- Both dyed and washed samples had loss in crease recovery along warp way. dyed samples showed loss in crease recovery along weft direction but washed samples had both loss and gain
- Dyed samples had increase in the value of drape coefficient. Washed samples showed both loss and gain
- All the samples had loss in weight due to abrasion.
- All the samples had very good absorbency
- The original bleached sample had good wickability. As regards dyed samples all the samples had good wickability.
- Colourfastness of the dyed samples were found to be very good to pressing and crocking, good to washing and fair colourfast to sunlight.

Conclusion

Coconut calyx was found to be good natural dye source and has better affinity with various mordants. The dye was found to have good colourfastness.