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Comparison of Whiteness Index of Pesticide Contaminated Cotton and Cotton/ Polyester

Sandeep Bains — Scientist, Department of Clothing and Textiles, Punjab Agricultural University, Ludhiana

Rajdeep Kaur — Research Associate, Department of Clothing and Textiles, Punjab Agricultural University, Ludhiana

ABSTRACT

A study was conducted to compare the whiteness index of unstarched and starched cotton and cotton/ polyester blended fabric. In the study out of the total, half of the samples were given barrier treatment with 10% starch solution while half of these were kept unstarched and pesticide was sprayed on all these samples. These pesticide contaminated samples were given different laundering treatments with 5% salt solution and 2% heavy duty detergent at 50°C and 80°C. By comparing starched cotton and cotton/ polyester blended fabric, it was found that the cotton/ polyester samples were whiter than the cotton samples laundered with 2% detergent at 80°C.

KEYWORDS: Cotton, Cotton/ polyester blended fabric, Starch, Whiteness index.

The pesticide application methods being used result in relatively high contamination of the fabric. Starch acts as a pesticide trap on the fabric surface to decrease pesticide transfer and to enhance pesticide removal (Obendorf, Kasunick, Ravichandran, Borsa & Coffman, 1991). Maintaining the level of whiteness of the fabric for an aesthetic value is the also vital. The level of whiteness is computed by an instrument that indicates the Whiteness Index. Therefore, the whiteness index of unstarched and starched, pesticide contaminated cotton and cotton/ polyester blended fabric was compared.

METHODOLOGY

Pure white cotton and cotton/ polyester blended fabric with plain weave were used for the experiment. Half of the each type of fabric were given barrier treatment with the application of 10% starch solution while the rest were left unstarched. All the samples were sprayed with Fenvalerate 20 EC pesticide. The undisturbed samples were allowed to dry overnight.

All the samples were laundered as per the following laundering conditions:

1. Control – Unwashed samples
2. 5% salt water at 50°C for one hour
3. 5% salt water at 80°C for one hour
4. 2% detergent at 50°C for one hour
5. 2% detergent at 80°C for one hour

These samples were separately steeped in salt and heavy duty detergent and separately washed in 50°C and 80° C temperatures. Later, each sample specimen was rinsed separately in a beaker to avoid cross contamination and dried in sunlight.

A solution of hexane : acetone was prepared. Each sample was separately dipped in separate beaker and the solution was allowed to evaporate till only 5 ml of hexane : acetone was left. The experiment was repeated three times for each condition.

The per cent transmittance was observed for all the samples i.e., their control samples and the samples when washed under different laundering conditions using UV/VIS spectrophotometer (UV 3000+). The whiteness index of these samples was found using Hunter Lab Colorimeter (ColorFlex Spectrocolorimeter).

RESULTS AND DISCUSSION

The results depicted that the whiteness index was the maximum in the case of control unstarched cotton sample (109.50) when compared with the fabric given laundering treatments. From the table 1 it can be elicited that the whiteness index of unstarched cotton fabric laundered with 2% detergent at 50°C was the highest with the value of 100.40. The least whiteness index was observed in 5% salt at 80°C (93.88).

Table 1 Comparison of whiteness index between unstarched cotton and cotton/ polyester blended samples

Treatments	Cotton	Cotton/ polyester
Control	109.50	109.16
5% salt at 50°C	98.23	108.69
5% salt at 80°C	93.88	103.25
2% detergent at 50°C	100.40	110.58
2% detergent at 80°C	98.40	104.97

CDA = 0.24
CDB = 0.38
CDAB = 0.54

(CD- Critical Difference, A – Cotton and Cotton and Cotton/polyester samples, B – Laundering treatments, AB – Interaction among both A and B)

The trend of whiteness index was also observed for unstarched cotton/ polyester blended fabric. The samples laundered with 2% detergent at 50°C had the highest value of 110.58. The least whiteness index was observed in 5% salt at 80°C (103.25). By comparing unstarched cotton and cotton/ polyester blended fabric, it was found that the cotton/ polyester samples were whiter than the cotton samples laundered with 2% detergent at 50°C.

Table 2 Comparison of whiteness index between starched cotton and cotton/ polyester blended samples

Treatments	Cotton	Cotton/ polyester
Control	102.35	104.71
5% salt at 50°C	103.66	111.94
5% salt at 80°C	95.34	105.63
2% detergent at 50°C	105.47	112.47
2% detergent at 80°C	92.26	116.18

CDA = 0.24
CDB = 0.38
CDAB = 0.54

(CD- Critical Difference, A – Cotton and Cotton and Cotton/polyester samples, B – Laundering treatments, AB – Interaction among both A and B)

As evident from table 2, the whiteness index of starched cotton fabric laundered with 2% detergent at 50°C was the highest with the value of 105.47. The least whiteness index was observed in 2% detergent at 80°C (92.26). Regarding the starched cotton/ polyester blended sam-

ples, it was recorded that the whiteness index of fabric laundered with 2% detergent at 80ºC was the highest with the value of 116.18. By comparing starched cotton and cotton/ polyester blended fabric, it was found that the cotton/ polyester samples were whiter than the cotton samples laundered with 2% detergent at 80ºC. In a study conducted by Sandeep and Rajdeep (2011), it was also noticed that the starched fabric laundered with detergent solution for one hour was found to be the best condition to protect the pesticide applicators as it gave the maximum reduction in pesticide contamination.

The interaction among the five treatments given to both unstarched and starched, cotton and cotton/ polyester blended samples was studied. The difference among the values shows that there is an interaction among the cotton and cotton/ polyester blended samples. By applying the analysis of variance on the experimental data of the unstarched and starched samples both, it was concluded that the difference among all the values of whiteness index of cotton and cotton/polyester blended samples was significant ($p \leq .05$).

Overall it was viewed that the cotton/ polyester blended samples were whiter as compared to cotton samples.

REFERENCES

1. Bains, S. & Kaur, R. (2011). Barrier treatment to cotton fabric for securing health problems for pesticide applicators. J Family Ecology. 6(2): 63 – 66. 2. Obendorf, S.K., Kasunick, R.S., Ravichandran, V., Borsa, J. & Coffman, C.W. (1991). Starch as a renewable finish to improve the pesticide protective properties of conventional work cloths. Archives of Environmental Contamination and Toxicology, 21(1): 10-16.