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Effect of sizing agents on handle properties of bleached cotton material

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ABSTRACT

Sizing agents are applied on cloth in order to build up the apparent weight, impart thickness to improve luster and also to prevent the fabric from soiling quickly. Unless proper care is exercised in the selection of sizing ingredients and subsequent preparation of size paste, the performance of sizing process will not be to the desired level. Results of the study showed that, the trend of increase in the fabric weight % was not similar among the sizing agents and within the sizing concentrations. Among the natural sizing agents, higher weight gain was observed among the samples sized with sago at four per cent concentration and among all starched fabric samples, samples starched with sago were thicker.

KEY WORDS : Sizing agents, Weight, Thickness, Size concentration

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Sizing is defined as the process of application or coating of size film onto the warp yarn. The amount of size applied will however depends on the factors like surface characteristics of warp yarn, the expected cover in fabric, types of weft insertion etc. Unless proper care is exercised in the selection of sizing ingredients and subsequent preparation of size paste, the performance of sizing process will not be to the desired level. It is very well understood that sizing improves the weave ability of warp yarns through increase in the tensile strength and thus prepares the warp to withstand the various stresses and forces acting on the yarn (Hayavadana, 2003).

Starching of cottons is an age old aristocratic and well known process for giving a fabric stiff and smooth finish, elegant look and good drape. Stiffening agents are applied on cloth in order to build up the apparent weight, impart thickness to improve luster and also to prevent the fabric from soiling quickly. The present study was conducted to study the effect of sizing agents on fabric weight and thickness properties of bleached cotton material.

RESEARCH METHODS

Bleached white cotton material was selected for the study. Sizing agents arrowroot powder, sago, commercial starch revive were selected for the study. Fabric samples were cut into 40 x 40 cms and were starched using arrowroot powder, sago, sago combined with arrowroot (50: 50), and commercial starch revive (Dantayagi,). The fabric was treated with 1, 2, 3, 4 and 5 per cent concentrations using hot and cold processes.

Preparation of fabric samples for testing:

After starching, the fabric samples were cut the warp and the weft way to the test specimen of the required size with the help of template from different portions of the sample under the test. Prior to testing, the specimens were conditioned to moisture equilibrium and tested in standard atmospheric conditions of 65 ± 2 per cent relative humidity and 27 ± 2^{o} temperature in conditioning cabinet. Then the preconditioned samples were tested for fabric weight and thickness properties.

Statistical analysis:

Percentages and ANOVA tests were used for statistically analyzing the data.

RESEARCH FINDINGS AND DISCUSSION

The values of gain in fabric weight have been expressed in terms of percentage in Table 1. It was observed that after starching there was increase in the weight of all the samples tested. In cold process of starching maximum weight gain was seen with 5 per cent revive followed by 5 per cent sago and minimum values were observed for 1 per cent sago + arrowroot (50:50) starch followed by 1 per cent sago.

However, it was observed that as the concentration of starch was increased, the per cent gain in weight of the samples also increased. It was evident from the Table 1 that, the fabric weight suddenly increased when the

concentration of sago was increased from 1-2 per cent. The gain in weigh per cent values was higher for revive, followed by sago, sago + arrowroot, and arrowroot starched samples when compared with control values.

The statistical test results indicated that there was significant difference at 1 per cent level of significance, in weight of all the starched fabric samples starched using cold process. Further, it was learnt that irrespective of the sizing agents, the gain in fabric weight per cent was directly proportional to the concentration of the size. But, the trend of increase in the fabric weight percent was not similar among the sizing agents and within the sizing concentrations.

The values of gain in fabric weight expressed in terms of percent age are shown in Table 2.

Here, it was noticeable that there was increase in weight of fabric samples after starching using hot process. In case of arrowroot starch and sago+arrowroot, highest increase in per cent weight was seen when concentration of starch was increased from 2-3 per cent. The commercial sizing agent revive showed maximum increase in fabric weight at 1 per cent when compared to other starches and was almost equal to 4 per cent arrowroot, 3% sago, 5 % sago+arrowroot. Similar results were seen in a study conducted to compare the efficiency of homemade and commercial stiffening agents by Thomas (1981).

It is evident here that, in case of revive and sago starches, the weight gain % increased up to 4 per cent concentration then decreased at 5 per cent concentration. The gain in the fabric weight % might be because of absorption of starch granules by the fibre or mechanical deposition or physical adherence of starch particles on the yarn surface and within the yarn interspaces. Among the natural sizing agents, higher weight gain was observed among the samples sized with sago at 4 per cent concentration, might be because sago contained higher per cent of carbohydrates (87.1g) compared to arrowroot which contained 83.1 g and also there was saturation at 4 per cent starch concentration and hence there was no absorption of starch at increased concentration. No significant difference was noticed in the weight of the

Table 1: Effect of sizing agents on fabric weight (cold method)

	Gain in fabric weight (%)			
Sizing concentration (%)	Arrowroot	Revive	Sago	Sago + arrowroot
1.	16.13 (5.85)	18.29 (19.96)	16.08 (5.47)	15.95 (4.65)
2.	16.48 (8.08)	18.79 (23.26)	19.29 (26.56)	16.85 (10.52)
3.	16.92 (10.98)	20.06 (31.58)	19.76 (29.64)	17.56 (15.19)
4.	16.98 (11.42)	21.31 (39.76)	19.95 (30.85)	17.82 (16.91)
5.	18.19 (19.32)	21.85 (43.37)	20.56 (34.85)	19.34 (26.85)

* Figures in the paranthesis indicate percentages

Table 2: Effect of sizing agents on fabric weight (hot method)

	Gain in fabric weight (%)			
Sizing concentration (%)	Arrowroot	Revive	Sago	Sago + arrowroot
1.	16.43 (7.78)	19.99 (31.19)	18.04 (18.32)	17.20 (12.85)
2.	16.69 (9.54)	20.36 (33.58)	18.49 (21.32)	17.38 (14.01)
3.	18.87 (23.80)	20.78 (36.35)	20.05 (31.54)	18.34 (20.28)
4.	20.07 (31.69)	21.85 (43.40)	21.61 (41.75)	18.89 (23.96)
5.	21.09 (38.39)	21.08 (38.29)	20.89 (37.07)	19.55 (28.25)

* Figures in the paranthesis indicate per centages

Table 3: Effect of sizing agents on fabric thickness (mm) in cold method

Sizing concentration (%)	Arrowroot	Revive	Sago	Sago + arrowroot
1.	0.25 (4.16)	0.27 (12.50)	0.32 (33.33)	0.31 (29.16)
2.	0.27 (12.50)	0.29 (20.83)	0.34 (41.66)	0.33 (37.50)
3.	0.29 (20.83)	0.32 (33.33)	0.32 (33.33)	0.33 (37.50)
4.	0.30 (25.00)	0.32 (33.33)	0.33 (37.50)	0.35 (45.83)
5.	0.30 (25.00)	0.33 (37.50)	0.34 (41.66)	0.35 (45.83)

* Figures in the paranthesis indicate per centages

Table 4: Effect of sizing agents on fabric thickness (mm) in hot method

Sizing concentration (%)	Arrowroot	Revive	Sago	Sago + arrowroot
1.	0.25 (4.16)	0.28 (16.66)	0.31 (29.16)	0.31 (29.16)
2.	0.28 (16.66)	0.28 (16.66)	0.34 (41.66)	0.32 (33.33)
3.	0.29 (20.83)	0.29 (20.83)	0.35 (45.83)	0.34 (41.66)
4.	0.29 (20.83)	0.31 (29.16)	0.33 (37.50)	0.33 (37.50)
5.	0.31 (29.16)	0.33 (37.50)	0.35 (45.83)	0.33 (37.50)

* Figures in the paranthesis indicate per centages

starched samples with varying concentrations, but significant difference at 1 per cent level of significance was observed between starch treatments.

Thickness and surface thickness of the fabrics are useful indicators of any change or variation in the fabric handle and appearance (Booth, 1983). Fabric thickness affects the fabric properties such as resiliency, cloth stiffness, drapability, abrasion resistance, crease recovery angle and cloth geometry that intern is influenced by fibre content, yarn count, yarn type and weave density and the type of finishes applied. Thus, thicker the fabric longer it takes to wear. Starching the fabric increases the fabric thickness, which can withstand few wears.

The results of Table 3 indicate the effect of sizing agents on fabric thickness on sizing with 1-5 per cent concentrations of arrowroot, sago, sago+arrowroot and revive using cold process. Fabric thickness values were maximum at 2 per cent sago, 4 per cent sago+arrowroot, 4 per cent arrowroot and 3 per cent revive. In arrowroot and sago+arrowroot combinations thickness remained almost constant after 4 per cent concentration. In case of sago fabric, thickness values came down at 3 and 4 per cent but at 5 per cent there was again increase in the fabric thickness value.

When compared with control samples, maximum thickness values were observed for 1 and 2 per cent sago starch concentration followed by sago+arrowroot combination. There existed a non significant difference in fabric thickness when treated with different starches and with different concentrations.

A perusal of Table 4 reveals the effect of sizing agents on fabric thickness using hot process of starching. It was observed that, when compared to control sample, maximum thickness values were noticed among sago and sago + arrowroot starched samples. Thickness was maximum at 3 per cent sago and 3 per cent sago + arrowroot starch concentration. Among revive and arrowroot starched fabric samples 5 per cent starch concentration showed maximum values.

Among all starched fabric samples, samples starched with sago were thicker, may be because sago probably having higher per cent of carbohydrate composed of finer starch particles which could easily be gelatinized and easily penetrate into the fibre core when applied heat. Hence, sago makes the fabric relatively stiff and thicker than other starches. A statistical analysis showed that there existed a non-significant difference in fabric thickness, when treated with different starches and with different concentrations.

Conclusion:

As the concentration of starch was increased, the per cent gain in weight of the samples also increased. The trend of increase in the fabric weight per cent was not similar among the sizing agents and within the sizing concentrations. Among the natural sizing agents, higher weight gain was observed among the samples sized with sago at four per cent concentration and among all starched fabric samples, samples starched with sago were thicker. Hence, sago makes the fabric relatively stiff and thicker than other starches.

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