AJHS
Asian Journal of Home Science
Volume 7 | Issue 1 | June, 2012 | 148-151

Research Paper

Comparitive study on the effect of starches on crease recovery and stiffness property of bleached cotton material

K. BHAVANI

Received: *26.07.2011*; **Revised:** *11.01.2012*; **Accepted:** *21.05.2012*

ABSTRACT : 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. An attempt has been made to study the effect of starches on the crease recovery and stiffness property of bleached cotton material using cold and hot method of starching. The results of the study showed that, fabric became stiffer with increased starch concentration and hence there was reduction in crease recovery angle. The stiffness values were higher in warp direction when compared with weft direction for all starched fabric samples. There was a significant difference in fabric stiffness with increasing starch concentration and also with different starches in both warp and weft way.

AUTHOR FOR CORRESPONDENCE :

K. BHAVANI
Krishi Vigyan Kendra, BIDAR
(KARNATAKA) INDIA

KEY WORDS : Starches, Crease recovery, Fabric stiffness, Warp and weft

HOW TO CITE THIS PAPER : Bhavani, K. (2012). Comparitive study on the effect of starches on crease recovery and stiffness property of bleached cotton material. *Asian J. Home Sci.,* **7** (1) : 148-151.

Creasing is the phenomenon of development of folds or deformations not removable or recoverable completely. The recovery or resistance towards creasing largely depends on the resilience and elastic property of the material of the fabric itself. It also depends upon the formation of second valancy forces that determine propensity of creasing and recovery. The degrees of orientation and polymerization, synthetic materials as well as the structure of woven fabric affect the creasability of textile material (Tarafder and Ali, 1996). All the textiles as clothing and even starched fabrics must be flexible and capable of being creased and folded to conform to the figure and be comfortable to the wearer.

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. An attempt has been made to study the effect of starches on the crease recovery and stiffness property of bleached cotton material using cold and hot method of starching.

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 cm 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 specimen were conditioned to moisture equilibrium and tested in standard atmospheric conditions of 65 ± 2 per cent relative humidity and 27 ± 2^{0}C temperature in conditioning cabinet. Then the preconditioned samples were tested for crease recovery and bending length.

Statistical analysis:

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

■ RESEARCH FINDINGS AND DISCUSSION

The data presented in Table 1 show the effect of sizing agents on crease recovery angle, using cold process of starching. It is clear from the table that, when compared to control samples, crease recovery angle of starched samples decreased considerably. The crease recovery angle in warp direction was less as compared to crease recovery angle in weft direction (Fig.1).

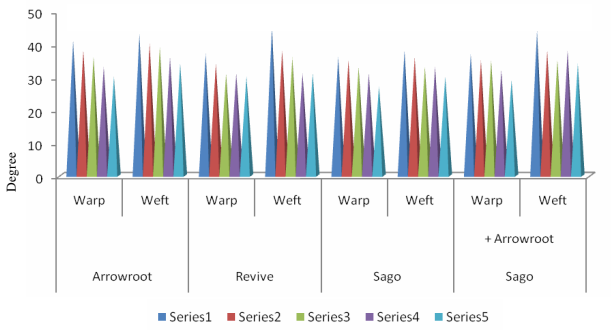

Fig. 1 : Effect of siziing agents on crease recovery angle in cold method

Among the starched samples, crease recovery angle was more for samples treated with arrowroot, followed by sago+ arrowroot, revive and lastly sago. There was decrease in crease recovery angle as concentration of starch increased, which indicates that fabric became stiffer with increased starch concentration and hence there was reduction in crease recovery angle.

The analysis revealed that, there existed a significant difference in crease recovery angle between warp and weft direction of different starched fabrics and also between varying starch concentrations. Significantly lower crease recovery values were noticed in both warp way and weft way as the concentration of starch increased.

Stiffer fabrics have lesser ability to recover from the crease formed. Hence, the crease recovery values decreased soon after starching.

Table 2 indicates the effect of sizing agents on crease recovery using hot process of starching. It is clear from the table that, arrowroot starched samples had shown good crease recovery followed by sago+ arrowroot, sago and lastly revive in both warp and weft directions.

When compared with hot and cold process of starching, the crease recovery angle of fabric samples starched with hot process showed lesser crease recovery than fabric samples starched with cold process. This might be due to better gelatinization of starch during hot process and proper deposition of starch on yarns making the fabrics stiffer and thus lowering crease recovery angle. Crease recovery values indicted that, samples at 1per cent revive starch concentration i.e. even after absorbing less amount of revive starch granules have exhibited lower crease recovery angles when compared to other natural sizing agents which is because of higher stiffness values.

Statistical analysis revealed that, there was significant difference at 1 per cent level of significance between warp and weft crease recovery angles of the fabric samples treated with different sizing agents using different concentrations. Significantly lower crease recovery values were observed in revive and sago starched samples than arrowroot and sago +

Table 1: Effect of sizing agents on crease recovery angle in cold method

Sizing concentration (%)	Arrowroot		Revive		Sago		Sago+ Arrowroot	
	Warp	Weft	Warp	Weft	Warp	Weft	Warp	Weft
1	41	43	37	45	36	38	37	44
	-10.86	-15.68	-19.56	-11.76	-21.73	-25.49	-19.56	-13.72
2	38	40	34	38	35	36	35	38
	-17.39	-21.56	-26.08	-25.49	-23.91	-29.41	-23.91	-25.49
3	36	39	31	36	33	33	35	35
	-21.73	-23.52	-32.60	-29.41	-28.26	-35.29	-23.91	-31.37
4	33	36	31	31	31	33	32	38
	-28.26	-29.41	-32.60	-39.21	-32.6	-35.29	-30.43	-25.49
5	30	34	30	31	27	30	29	34
	-34.78	-33.33	-34.78	-39.21	-41.30	-41.17	-36.95	-33.33

*Figures in the paranthesis indicate percentages

arrowroot (50:50) samples.

Quantitatively, the stiffness of a fabric is measured in terms of the bending length but the feel of the cloth is judged on the stiffness or limpness, hardness or softness and roughness taken together as explained (Booth 1962). Stiffness is the key factor that determines handle and drape. The bending length of a fabric is dependent upon the energy required to produce a given bending deformation under its own weight. The nature of fibre, compactness of weave, cloth weight, cloth thickness and finishes applied are the constructional features which influence the stiffness of a cloth.

The data presented in Table 3 show the effect of sizing on fabric stiffness, using cold process of starching. Among the starched samples, higher or maximum stiffness was exhibited by revive samples in both warp (2.56 cm) and weft (1.90 cm) direction. Among the natural sizing agents, fabric samples starched with sago exhibited higher stiffness in both directions when compared to arrowroot and sago + arrowroot (50:50).

The stiffness values were higher in warp direction when compared with weft direction for all starched fabric samples. This might be because, starch gets more deposited on warp yarns when compared to weft yarns increasing the stiffness in warp direction. In other words the cloth stiffness is inversely proportional to crease recovery angle.

Statistical analysis revealed that there was significant difference in fabric stiffness between fabric samples starched with varying concentrations of starches and also between fabric samples treated with different starches. As the concentration of starch increased, stiffness values increased

Table 2 : Effect of sizing agents on crease recovery angle in hot method

Sizing Concentration (%)	Arrowroot		Revive		Sago		Sago + Arrowroot	
	Warp	Weft	Warp	Weft	Warp	Weft	Warp	Weft
1	37	44	30	31	32	34	35	37
	-19.56	-13.72	-34.78	-39.21	-30.43	-33.33	-23.91	-27.45
2	35	42	28	30	29	36	33	34
	-23.91	-17.64	-39.13	-41.17	-36.95	-35.29	-28.26	-33.33
3	31	40	27	27	28	31	32	34
	-32.60	-21.56	-41.30	-47.05	-39.13	-39.21	-23.33	-33.33
4	28	31	27	26	28	31	30	36
	-39.13	-33.33	-41.30	-49.01	-39.13	-39.21	-34.78	-29.41
5	28	33	25	25	26	32	30	36
	-39.13	-35.29	-45.65	-50.98	-43.47	-37.25	-34.78	-29.41

*Figures in the paranthesis indicate percentages

Table 3: Effect of sizing agents on on fabric stiffness in cold method

Sizing Concentration (%)	Arrowroot		Revive		Sago		Sago+ Arrowroot	
	Warp	Weft	Warp	Weft	Warp	Weft	Warp	Weft
1	1.75	1.4	1.85	1.45	1.8	1.32	1.85	1.27
	(34.61)	(44.32)	(42.30)	(49.48)	(38.46)	(36.08)	(42.30)	(30.92)
2	1.78	1.65	2.32	1.6	1.87	1.42	1.75	1.35
	(36.92)	(70.10)	(78.46)	(64.94)	(43.84)	(46.39)	(34.61)	(39.17)
3	1.85	1.72	2.37	1.72	1.95	1.40	2.05	1.52
	(42.30)	(77.31)	(82.30)	(77.31)	(50.00)	(44.32)	(57.69)	(56.70)
4	1.77	1.67	2.47	1.82	2.32	1.77	2.12	1.67
	(36.15)	(72.16)	(90.00)	(87.62)	(78.46)	(82.47)	(63.07)	(72.16)
5	1.8	1.65	2.56	1.9	2.52	1.85	2.2	1.67
	(38.46)	(70.10)	(96.92)	(95.87)	(93.84)	(90.72)	(69.23)	(72.16)

*Figures in the paranthesis indicate percentages

Table 4: Effect of sizing agents on fabric stiffness in hot method

Sizing Concentration (%)	Arrowroot		Revive		Sago		Sago + Arrowroot	
	Warp	Weft	Warp	Weft	Warp	Weft	Warp	Weft
1	1.77	1.60	1.85	1.72	1.85	1.32	2.35	1.35
	(36.15)	(64.94)	(42.30)	(77.31)	(42.30)	(36.08)	(80.76)	(39.17)
2	1.77	1.70	2.12	1.77	1.92	1.40	2.42	1.47
	(36.15)	(75.25)	(63.07)	(82.47)	(47.69)	(44.32)	(86.15)	(51.54)
3	1.82	1.77	2.27	1.92	2.15	1.60	2.55	1.57
	(40.00)	(82.47)	(74.61)	(97.93)	(65.38)	(64.94)	(96.15)	(61.85)
4	1.97	1.77	2.37	1.92	2.32	1.72	2.57	1.92
	(51.53)	(82.47)	(82.30)	(97.93)	(78.46)	(77.31)	(97.69)	(97.93)
5	1.92	1.82	2.47	1.93	2.30	1.72	2.57	1.92
	(47.69)	(87.62)	(90.00)	(98.96)	(76.92)	(77.31)	(97.69)	(97.93)

*Figures in the paranthesis indicate percentages

in warp and weft direction.

Table 4 presents the data on effect of sizing agents on fabric stiffness, when starched using hot process. Maximum stiffness was exhibited by sago + arrowroot starched fabric samples in both warp and weft way for varying starch concentrations followed by revive, sago and arrowroot. Revive also showed better stiffness almost similar to sago + arrowroot combination starch. Arrowroot starched fabric samples were not as stiff as other samples. However, it was clear from data that as the percentage concentration of starch increased stiffness values also increased.

When compared between warp and weft stiffness, stiffness was more for warp yarns than weft yarns (Fig. 2). Stiffness values for sago + arrowroot combined starch; sago and arrowroot were higher in hot process than in cold process of starching. This might be due to proper gelatinization of starch which takes place during boiling and when applied, uniform spreading takes place adding to better and even distribution on fabric further increasing the stiffness. Not much change in the values was noticeable for fabric samples starched with revive. Statistical analysis showed that, there was a significant difference in fabric stiffness with increasing starch concentration and also with different starches in both warp and weft way.

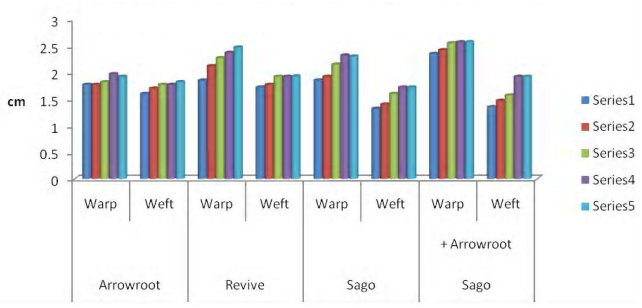

Fig. 2 : Effect of siziing agents on fabric stiffness in hot method

Conclusion :

When compared to control samples, crease recovery angle of starched samples decreased considerably. The crease recovery angle in warp direction was less as compared to crease recovery angle in weft direction. Fabric became stiffer with increased starch concentration and hence there was reduction in crease recovery angle. When compared with hot and cold process of starching the crease recovery angle values of fabric samples starched with hot process showed lesser crease recovery than fabric samples starched with cold process. The stiffness values were higher in warp direction when compared with weft direction for all starched fabric samples. There was a significant difference in fabric stiffness with increasing starch concentration and also with different starches in both warp and weft way.

■ REFERENCES

Tarafdar, N. and Ali, Kauser (1996). Stiffness and crease recovery. *Indian Textile J. February*, **106** (5): 34-39.

Dantyagi, Susheela. Fundamentals of textiles and their care, (IV Ed.)

■ WEBLIOGRAPHY

http: // www.freessays.cc/ cb/41/sxm54.shtml

****