Weekly Publication of

Cotton Association of India

COTTON STATISTICS & NEWS

Edited & Published by Amar Singh

2021-22 • No. 41 • 11th January, 2022 Published every Tuesday

Cotton Exchange Building, 2nd Floor, Cotton Green, Mumbai - 400 033
Telephone: 8657442944/45/46/47/48 Email: cai@caionline.in
www.caionline.in

Cotton for Comfort

EXPERT's Column

Dr. Rajan P. Nachane
Retired Principal Scientist & Head, Quality Evaluation & Improvement Division, CIRCOT, Mumbai.

Having worked in Central Institute of Research on Cotton Technology (CIRCOT) for 38 years, Dr. R.P. Nachane retired as Principal Scientist and Head Quality Evaluation & Improvement Division. He was the first scientist to have observed and reported the phenomenon, "Inverse Relaxation" and to have reported the phenomenon, "Inverse Creep". He has carried out research in various fields like Development of Yarn Theory, Development of Bundle Strength Theory, Jaws to be attached to lea strength tester for testing parallelised yarn bundles, Theory for Bulk Resiliance of Fibres, Weak Link Effect in Cotton Yarns, Theory for Maturity of Cotton Fibres, Development of a Single Stage Process for Preparation of Absorbent Cotton, Structural and Mechanical Properties of Banana Fibres Belonging to Different Genotypes, etc. He has done a number of Research projects (including World Bank Funded), including A Value Chain for Cotton Fibre, Seed and Stalks: An Innovation for Higher Economic Return to Farmers and Allied Stakeholders and A Value Chain on Banana Psudosteam for Fibres and Other Value Added Products, Preparation and marketing of CIRCOT Calibration Cotton Standards, among others. He has published more than 50 research papers in National and International Journals and has presented more than 50 research papers in National and International conferences. He has been Chartered Fellow of the Textile Institute, Manchester, UK. Fellow of the Textile Association of India.

He is a Member of Faculty Selection Committee of VJTI as well as that of DKTE, Ichalkaranji. Presently he is President of the Indian Fibre Society, an organisation of professionals working in the field of textiles.

To start with, we have to first understand what is meant by comfort. Here, when we talk about comfort, it is with reference to apparels we wear.

Body Temperature and Comfort

Life, as we know it, is not possible without water. Our body consists of almost 70% water by weight. When our body temperature is maintained at normal, we feel comfortable. Evaporation of water through skin is an essential physiological process to keep body temperature at normal. To keep us away from dehydration, we feel thirsty and are indicated by our body to drink water. In most cases, excess heat produced in the body is dissipated to the surrounding. Rate of dissipation of heat to surrounding should be same as excess heat generated in the body.

This depends on the physical activity of the person and atmospheric conditions in which he is placed. Our clothes form a sort of barrier to control this heat dissipation.

Heat dissipation takes place by one or more of the three processes, namely, radiation, conduction and convection. To maintain temperature, body gives out sweat from the skin which is mostly water. This water evaporates taking away heat from the body. Rate of evaporation depends on the moisture present in the surrounding air, ambient temperature and also on the air current or the wind speed.

What is Relative Humidity?

Moisture means the water vapour available in the air in the form of individual molecules just like the molecules of oxygen and nitrogen present in the air. This moisture in the air is also known as humidity. These water molecules exert pressure just like air molecules (giving atmospheric pressure) and this pressure is known as vapour pressure. At a given temperature, there is a limit up to which number of water molecules can remain in the air. This limit is reached in an enclosed chamber when air is in equilibrium with the water present in the chamber. At this point, vapour pressure is the limiting or saturation vapour pressure. Ratio of vapour pressure at given temperature to the limiting/ saturation vapour pressure at that temperature, is known as relative humidity (RH).

Need to Wear Clothes

Why do we need to wear clothes? Animals do not require any clothes. Their skin along with hair on it, is able to protect them from whatever natural conditions they are in. But that is not the case with us, human beings. We need clothes to cover our bodies, because it is our social need. Also, it is required for protection from the harsh nature in some cases. Animals try to remain in natural conditions which are suitable and comfortable for them. A snow leopard does not venture on to low plains where temperatures are high and not suitable for its survival. But we humans try to remain in any natural condition, which may not be generally suitable for us without covering our bodies. For example, we stay in very hot and extreme conditions such as a desert and also inhabit very cold climates such as the Arctic region. For this, we require clothing cover.

Water Vapour Transport Through Fabric

Whatever clothing covers we wear, a part of it will always be in contact with our skin. These clothes are made from different textile fibres. Most of these fibres can absorb and adsorb water molecules depending upon their chemical composition. While adsorption is only a surface phenomenon, absorption is not. In absorption, water molecules penetrate into the fibre. The amount of water absorbed while in equilibrium with atmosphere in a given fibre mass depends on the relative humidity (RH) and ambient temperature. This moisture absorbed is also called equilibrium moisture regain. It does not vary much with change in temperature keeping RH constant. But for a given temperature, moisture regain varies considerably with change in RH. Actual amount of water found in the fibre under any given set of conditions varies quite largely from one kind of fibre to another. A fibrous material such as fabric, exposed to unchanging external conditions attains ultimately a moisture content that remains constant as long as these conditions remain unaltered.

The amount of water in the textile material depends on the constitution and structure of the fibrous material and also on the ambient conditions, i.e., RH and temperature. Passage of moisture through fabric depends on the open spaces in the fabric which is through diffusion in the air. In addition, if the fibre is hygroscopic, water molecules can diffuse through the material of the fibre. Thus, for fabrics made from hygroscopic fibre material, water vapour diffusion takes place through open spaces in the fabric and also through fibre. But in case of fabric made from hydrophobic fibre material, water vapour diffusion takes place only through open air spaces. Thus, for a given fabric thickness and surface density (GSM – gram per square meter), clothes made from hygroscopic material generally have higher rate of water vapour diffusion through the fabric as compared to the clothes made from hydrophobic fibre material.

Ability to move water vapour away from skin is one of the key physical properties required for the maintenance of the heat balance of the body and for comfort. In the presence of moisture, fabrics alter their properties considerably and thereby modify the comfort of the clothing made from it. Rates of moisture sorption and desorption are more decisive factors than the equilibrium

sorption characteristics for the clothing wear comfort. During transients, moisture flux occurs chiefly through the fabric air spaces and the fibres act as a moisture source or sink depending on the air surrounding the fabric. The sweat evaporated from the wet skin surface moves away from the skin surface carrying along with it the latent heat of evaporation. If excess sweat is generated, it has to get absorbed by the fabric and transported from skin to the external atmosphere.

Clothing Comfort

Clothing comfort is one of the most important attributes of wearable textile materials. Comfort is inherently subjective. It is entirely a perception

in the mind of the individual wearer. This perception differs from person to person and may depend on climate.

Sensorial comfort means the effect of fabric properties on human sense. Our sense works by a nervous system based upon neuron. A neuroendocronic gland called hypothalamus is responsible for the heat mechanism of body and can receive any signal created on skin to the neuron and send command in its response. The contact between the skin and the inner clothing layer determines the subjective perception of clothing comfort, especially at high skin humidity. Strong friction between skin and clothing, which may be due to sticking of the fabric to skin because of wetting, results in greater displacement of the skin during body movements, and thus leads to a higher degree of discomfort.

Why Cotton?

Cotton is comfortable because nature made it that way. Cotton has been known for its high level of comfort and has been worn for over a few thousand years in the past and will continue to be used in future also. It is well known that in the Mohanjodaro –Harappa civilization about six thousand years back, cotton fabrics were obtained during excavation. These were tested and confirmed in 1930s at CIRCOT, which was then known as CTRL.

Cotton consists of about 98% cellulose. Because of the hydroxyl group, it has good affinity for water molecules. This gives it moisture regain of 7.5 to 8.5 % at 65 % RH and 27^{0}C. But that is not all. Cotton's affinity for water is so much that it can hold water even above 20 times its own weight.

Cotton fibres are very fine with diameter of the order of 10 to 20 microns. This gives it very good flexibility. Also, its peculiar morphology consisting of convolutions gives its fibres good gripping with each other while in the yarn. This gives more than 50% of single fibre strength realisation in its yarns. Cellulose in the fibres exists in the form of crystalline and amorphous regions. Percentage of crystallinity varies from variety to variety in the range 50% to 65%. Crystalline region gives the fibres strength, while amorphous region gives it flexibility. It is this amorphous region which swells with the absorption of water molecules. It is able to hold these water molecules with the van-der-wall's forces between hydroxyl group and water molecules. With the absorption of water molecules and swelling, fibres in yarns become tighter, increasing the yarn strength. This is in addition to the increase in fibre strength due to water absorption.

When yarns are interlaced, we get a woven fabric. In the knitted structure, loops are entangled, giving the knitted fabric suppleness and high flexibility, including stretch-ability. Woven fabrics are comparatively stiff, less extensible, but easier for manufacturing. Also, though weaving can be accomplished for yarns of any linear density/ count, i.e., fine or coarse, we cannot do apparel grade fabric knitting for very coarse yarns. Cost wise also, weaving is cheaper as compared to knitting. But both have advantages in different usages.

Cotton fabrics, whether woven or knitted, do not give any etching feeling even when in contact with the skin. This is not the case with synthetic fibre fabrics as well as many of the natural fibre fabrics. For under garments, there is no fibre which can replace cotton.

Comparison with Other Fibres

Man-made cellulosic fibres, such as viscose, can feel comfortable being cellulosic in nature like cotton fibres. But generally, these are week in strength as compared to cotton. Strength of these fibres decreases when wet. But strength of cotton fibres increases when wet. This gives cotton fabrics many cycles of wash as compared to viscose fabrics and therefore, cottons have a much longer life. Also, production of viscose fibres is not environment friendly.

Most of the synthetic fibres are hydrophobic. They cannot absorb or transport moisture easily. They create static electric charge on their surface which causes irritation. Some of the synthetic fibres can be allergic when in direct contact with the skin.

Polyester is the most used synthetic fibre in apparels. Moisture content in polyester fibres at standard atmospheric conditions is generally estimated to be around 0.4% by weight. As compared to this, cotton has moisture content of about 7.5% to 8.5%. My experimental estimation of moisture content on polyester happens to be even less than 0.1% by weight. Polyester

fibres being hydrophobic, do not transport moisture through them by diffusion. A study was conducted at CIRCOT, in which moisture transfer through cotton and polyester fabrics of similar construction and GSM were used. The study was conducted on an apparatus designed and fabricated by us at CIRCOT. The apparatus was checked for its evaluation using standard control dish method, giving confirmation to the results obtained.

Moisture transport through cotton fabrics strongly depended on fabric thickness and GSM and to a smaller extent on cover factor, which determines the open space in the fabric. In the case of polyester fabrics, moisture transport depended only on cover factor. Cotton polyester blended fabrics showed intermediate behavior. This clearly showed that transport of moisture and therefore, heat through cotton fabric is better than that through polyester fabric.

Of the natural plant fibres, most of the fibres are thick and rigid as compared to cotton. Ramie and pineapple fibres are the finest with tex value around two, which is almost 10 to 20 times that of cotton fibres. It is very difficult to make apparels from fabrics made of these fibres. Fabrics made from these fibres can damage the skin, give feeling of irritation. However, some of these fibres can be used for outer wear.

Of the natural animal fibres, only silk is very fine and is being used in apparels. But overall silk production in the world is very small as compared to that of cotton. Also, since the cost of silk production is very high, it sells in the niche market. While cotton is affordable for the general people, none of the animal fibres are. Of course, animal fibres like wool have their specific use, particularly, in very cold climates. As stated above, for direct skin contact, there is no fibre other than cotton, which can be used.

Cotton is biodegradable. In India it gives livelihood directly to more than 60 million people. Considering all these facts and many more which have not been included here, there is no replacement to cotton for comfort.

(The views expressed in this column are of the author and not that of Cotton Association of India)

ITMF Annual Conference 2022 in Davos, Switzerland postponed to September 18-20, 2022

Due to the uncertain and unpredictable outlook with regard to travel and event restrictions caused by the new Covid-19 variant "Omicron", the ITMF Board together with the two co-hosts – Swiss Textiles and Swiss Textile Machinery – have decided to postpone the ITMF Annual Conference in Davos, Switzerland from April 10-12, 2022 to September 18-20, 2022.

Regular updates on the ITMF Annual Conference 2022 can be found at:
ITMF Annual Conference 2022 in Davos, Switzerland
https://www.itmf.org/conferences/annual-conference-2021

ITMF is an international forum for the world's textile and related industries founded in 1904. ITMF members are associations and companies covering the entire textile value chain – producers of fibres, textile machinery, chemicals, textiles, apparel, and home textiles. The membership is from more than 40 countries and is representing around 90% of global production.

Revision in Testing Charges at CAI Laboratories

The following are the charges for cotton testing in the laboratories of the Cotton Association of India with effect from 1st October 2020.

Particulars	Per Sample Testing Fees in Rs.		
	Testing Fees	GST	Total
HVI Test	145	26	171
Micronaire Test	85	15	100
Colour Grade on HVI	85	15	100
Gravimetric Trash Test on HVI	85	15	100
Moisture	85	15	100
Grading (Manual Classing)	235	42	277

VOLUME BASED DISCOUNTS

Particulars	Per Sample Testing Fees in Rs.		
	Testing Fees	GST	Total
For 250 samples and above but less than 500 samples	140	25	165
For 500 samples and above but less than 750 samples	135	24	159
For 750 samples and above but less than 1000 samples	130	23	153
For 1000 samples and above but less than 2000 samples	125	23	148
For 2000 samples and above but less than 5000 samples	120	22	142
For 5000 samples and above but less than 10,000 samples	115	21	136
For 10,000 samples and above	100	18	118

The fees under the above volume based discount scheme is payable within 15 days from the receipt of the invoices to be raised on monthly basis.

We would also like to inform that the parties can avail the benefit of testing of cotton at multiple laboratories of the Associations against the CAI Credits made by them.

We earnestly request you to avail the facility of testing at the Association's laboratories.

COTTON ASSOCIATION OF INDIA
Established 1921
ISO 9001:2015

Cotton Association of India
Cotton Exchange Building, 2nd Floor, Opposite Cotton Green Railway Station,
Cotton Green (East), Mumbai - 400 033.
Tel.: +91 8657442944/45/46/47/48 • E-mail: cai@caionline.in • www.caionline.in

Since 1921,
we are dedicated to the cause of Indian cotton.

Just one of the reasons, you should use our Laboratory Testing Services.

The Cotton Association of India (CAI) is respected as the chief trade body in the hierarchy of the Indian cotton economy. Since its origin in 1921, CAI's contribution has been unparalleled in the development of cotton across India.

The CAI is setting benchmarks across a wide spectrum of services targeting the entire cotton value chain. These range from research and development at the grass root level to education, providing an arbitration mechanism, maintaining Indian cotton grade standards, issuing Certificates of Origin to collecting and disseminating statistics and information. Moreover, CAI is an autonomous organization portraying professionalism and reliability in cotton testing.

The CAI's network of independent cotton testing & research laboratories are strategically spread across major cotton centres in India and are equipped with:

- State-of-the-art technology & world-class Premier and MAG cotton testing machines
- HVI test mode with trash% tested gravimetrically

LABORATORY LOCATIONS

Current locations : • **Maharashtra** : Mumbai; Yavatmal; Aurangabad; Jalgaon • **Gujarat :** Rajkot; Ahmedabad • **Andhra Pradesh :** Adoni • **Madhya Pradesh :** Khargone • **Karnataka :** Hubli • **Punjab :** Bathinda • **Telangana:** Warangal, Adilabad

COTTON ASSOCIATION OF INDIA
Established 1921
ISO 9001:2015

COTTON ASSOCIATION OF INDIA
Cotton Exchange Building, 2nd Floor, Opposite Cotton Green Railway Station, Cotton Green (East), Mumbai - 400 033, Maharashtra, INDIA
Tel.: +91 8657442944/45/46/47/48 • E-mail: cai@caionline.in • www.caionline.in

UPCOUNTRY SPOT RATES

(Rs./Qtl)

Sr. No.	Growth	Grade Standard	Grade	Staple	Micronaire	Gravimetric Trash	Strength /GPT	Spot Rate (Upcountry) 2020-21 Crop January 2022 3rd	4th	5th	6th	7th	8th
3	GUJ	ICS-102	Fine	22mm	4.0 – 6.0	13%	20	11951 (42500)	12232 (43500)	12373 (44000)	12373 (44000)	12654 (45000)	12654 (45000)
								Spot Rate (Upcountry) 2021-22 Crop					
1	P/H/R	ICS-101	Fine	Below 22mm	5.0 – 7.0	4%	15	13020 (46300)	13020 (46300)	13020 (46300)	13020 (46300)	13020 (46300)	13020 (46300)
2	P/H/R (SG)	ICS-201	Fine	Below 22mm	5.0 – 7.0	4.5%	15	13188 (46900)	13188 (46900)	13188 (46900)	13188 (46900)	13188 (46900)	13188 (46900)
3	GUJ	ICS-102	Fine	22mm	4.0 – 6.0	13%	20	- -	- -	- -	- -	- -	- -
4	KAR	ICS-103	Fine	23mm	4.0 – 5.5	4.5%	21	- -	- -	- -	- -	- -	- -
5	M/M (P)	ICS-104	Fine	24mm	4.0 – 5.5	4%	23	15607 (55500)	15888 (56500)	16141 (57400)	16281 (57900)	16563 (58900)	16563 (58900)
6	P/H/R (U) (SG)	ICS-202	Fine	27mm	3.5 – 4.9	4.5%	26	18559 (66000)	18672 (66400)	18868 (67100)	18868 (67100)	19262 (68500)	19206 (68300)
7	M/M(P)/ SA/TL	ICS-105	Fine	26mm	3.0 – 3.4	4%	25	- -	- -	- -	- -	- -	- -
8	P/H/R(U)	ICS-105	Fine	27mm	3.5 – 4.9	4%	26	18700 (66500)	18812 (66900)	19009 (67600)	19009 (67600)	19403 (69000)	19346 (68800)
9	M/M(P)/ SA/TL/G	ICS-105	Fine	27mm	3.0 – 3.4	4%	25	- -	- -	- -	- -	- -	- -
10	M/M(P)/ SA/TL	ICS-105	Fine	27mm	3.5 – 4.9	3.5%	26	- -	- -	- -	- -	- -	- -
11	P/H/R(U)	ICS-105	Fine	28mm	3.5 – 4.9	4%	27	19065 (67800)	19150 (68100)	19346 (68800)	19346 (68800)	19712 (70100)	19656 (69900)
12	M/M(P)	ICS-105	Fine	28mm	3.7 – 4.5	3.5%	27	- -	- -	- -	- -	- -	- -
13	SA/TL/K	ICS-105	Fine	28mm	3.7 – 4.5	3.5%	27	- -	- -	- -	- -	- -	- -
14	GUJ	ICS-105	Fine	28mm	3.7 – 4.5	3%	27	- -	- -	- -	- -	- -	- -
15	R(L)	ICS-105	Fine	29mm	3.7 – 4.5	3.5%	28	18868 (67100)	18981 (67500)	19178 (68200)	19178 (68200)	19403 (69000)	19375 (68900)
16	M/M(P)	ICS-105	Fine	29mm	3.7 – 4.5	3.5%	28	19796 (70400)	20246 (72000)	20387 (72500)	20387 (72500)	20781 (73900)	20696 (73600)
17	SA/TL/K	ICS-105	Fine	29mm	3.7 – 4.5	3%	28	19853 (70600)	20303 (72200)	20443 (72700)	20443 (72700)	20837 (74100)	20752 (73800)
18	GUJ	ICS-105	Fine	29mm	3.7 – 4.5	3%	28	19768 (70300)	20106 (71500)	20274 (72100)	20274 (72100)	20668 (73500)	20584 (73200)
19	M/M(P)	ICS-105	Fine	30mm	3.7 – 4.5	3.5%	29	20190 (71800)	20612 (73300)	20752 (73800)	20752 (73800)	21146 (75200)	21090 (75000)
20	SA/TL/K/O	ICS-105	Fine	30mm	3.7 – 4.5	3%	29	20331 (72300)	20752 (73800)	20893 (74300)	20893 (74300)	21287 (75700)	21231 (75500)
21	M/M(P)	ICS-105	Fine	31mm	3.7 – 4.5	3%	30	20640 (73400)	21062 (74900)	21231 (75500)	21231 (75500)	21652 (77000)	21596 (76800)
22	SA/TL/ K / TN/O	ICS-105	Fine	31mm	3.7 – 4.5	3%	30	20724 (73700)	21146 (75200)	21315 (75800)	21315 (75800)	21737 (77300)	21680 (77100)
23	SA/TL/K/ TN/O	ICS-106	Fine	32mm	3.5 – 4.2	3%	31	N.A. (N.A.)	N.A. (N.A.)	N.A. (N.A.)	N.A. (N.A.)	N.A. (N.A.)	N.A. (N.A.)
24	M/M(P)	ICS-107	Fine	34mm	2.8 - 3.7	4%	33	31494 (112000)	31775 (113000)	32029 (113900)	32169 (114400)	32310 (114900)	32310 (114900)
25	K/TN	ICS-107	Fine	34mm	2.8 - 3.7	3.5%	34	31775 (113000)	32057 (114000)	32310 (114900)	32591 (115900)	32732 (116400)	32732 (116400)
26	M/M(P)	ICS-107	Fine	35mm	2.8 - 3.7	4%	35	32478 (115500)	32760 (116500)	33013 (117400)	33153 (117900)	33322 (118500)	33322 (118500)
27	K/TN	ICS-107	Fine	35mm	2.8 - 3.7	3.5%	35	33603 (119500)	33884 (120500)	34138 (121400)	34138 (121400)	34306 (122000)	34306 (122000)

(Note: Figures in bracket indicate prices in Rs./Candy)