

Highest standard warp counts spinnable from Pakistani cotton

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The spinning limit of a cotton variety is indicated by the Highest Standard Warp count (H.S.W.C.) of yarn which can be spun at commercially competitive and industrially profitable output rate. H.S.W.C. is directly proportional to the spinning potential of cotton varieties. The spinning potential of a given cotton variety is determined by its fibre properties as explained in this editorial article.

1. Fibre length

The machines in a spinning mill with their settings are primarily sensitive to the fibre length, which is therefore recognized as the most important fibre property.

Measurement of fibre length is generally based on the concept of span length which represents the distance fibres extend into the drafting zones of machines. The measure most commonly used for the machine settings is 2.5% Span Length (S.L), which represents the distance 2.5% of the fibres extend into to drafting zones. Max Preysch⁽¹⁾ reports that in addition to 2.5% S.L.

The Uster Fibro graph 730 measures following fibre properties:

- ❖ 50% Span Length (S.L).
- ❖ Uniformity Ratio (UR).
- ❖ Short Fibre Index.

Whereas, Uniformity Ratio is 50% S.L., expressed as percentage of 2.5% S.L.

W. Klein⁽²⁾ reports that fibre length, i.e. 2.5% S.L. and U.R. influences:

- ❖ Spinning limit or spinning potential.
- ❖ Yarn strength, evenness and fullness.
- ❖ Handle and hairiness of yarn.
- ❖ Productivity.

On the basis of 2.5% S.L. Pakistani cotton are classified as following:

1. Short staple = Less than $\frac{13}{16}$ inch (20.64 mm).
2. Medium staple = $\frac{13}{16}$ inch to 1.0 inch (20.64 mm to 25.4mm).
3. Medium long staple = $1\frac{1}{32}$ inch to $1\frac{3}{32}$ inch (26.19 to 27.78 mm).
4. Long staple = $1\frac{1}{8}$ inch to $1\frac{10}{32}$ inch (28.58 to 33.34 mm).

2. Fibre fineness

Fibre fineness is as important property as fibre length in the determination of spinning potential of a given variety of cotton. Fibre fineness is measured in micrograms per inch by testing the sample of cotton on Micronaire, the Fibre Fineness Tester.

Fineness can also be measured by testing sample of cotton on Uster HVI – Spectrum which has been available since 1999 as reported by Joseph M. Yankey⁽²⁾.

Yarn characteristics influenced by fibre fineness in addition to those influenced by fibre length (2.5% S.L. & U.R.) are drape, luster and handle of textile products. On the basis of fibre fineness gms / inch cottons are classified as follows:

- ❖ Upto 3.1 very fine.
- ❖ 3.1 to 3.9 fine.
- ❖ 4.0 to 4.9 medium.
- ❖ 5.0 to 5.9 slightly coarse.
- ❖ Above 6 coarse.

3. Fibre strength

Fibre strength is also one of the most important fibre characteristics, however, full contribution of fibre strength cannot be realized in yarn strength. Gregory⁽³⁾ has clarified that maximum strength in the twisted strand is a compromise reached between the increasing cohesion of fibres as twist increases and a decrease in the effective contribution to the axial loading of the strand due to the obliquity of fibres.

Since the fibres are inclined to the axis of the twisted strand, only component of the fibre stress resolved in the direction of the axis of the strand effectively balances the applied load and full contribution of the fibre strength is not realized.

This effect of obliquity is small at first, increasing more rapidly as the twist builds up. Consequently, all spinners use twist factor for spinning a particular count of yarn very carefully with the object of achieving maximum yarn strength. A twist factor which fulfils this object is known as Optimum Twist Factor.

Fibre strength by testing a sample of cotton on Pressley Fibre strength Tester. Cottons are classified on the basis of fibre strength as follows:

Pressley Strength in 10³ LBS / Sq. inch.

- ❖ 93 and above = Excellent.
- ❖ 87 to 92 = Very strong.
- ❖ 81 to 86 = Strong.
- ❖ 75 to 80 = Medium.
- ❖ 70 to 74 = Fair.
- ❖ Below 70 = weak.

4. Fibre maturity

Maturity of cotton fibre is determined by the degree thickening of the cell walls resulting from deposition of cellulose layers successively inside the walls during the second half of the growth period. It is equal to the area of the cell walls expressed as ratio of area of the circle of same perimeter.

For the determination of Maturity Ratio (M) of cotton, a sample of separated and parallel cotton fibres is placed on a microscopic glass slide, irrigated with 18% NaOH, covered with another glass slide and placed under the microscope. Image of the sample is projected on the screen. Normal (N) and Dead (D) fibres are counted. Maturity Ratio (M) is calculated as follows:

$$\text{Maturity Ratio } M = \frac{N-D}{200} + 07$$

Value of M above 85 % is considered as good and from 75% to 85% as average.

Another measure of Maturity is Maturity Coefficient which is calculated as follows:

$$\text{Maturity coefficient} = \frac{\text{Mature (M)} + 0.6 \text{ H (Half Mature)} + 0.4 \text{ I (Immature)}}{100}$$

- ❖ 0.85 and above is good.
- ❖ 0.75 is average.
- ❖ 0.65 is poor.

Immature cotton fibres create neppiness, high proportion of short fibres leading to increase in ends-down at the spinning stage, loss of yarn strength and appearance of white specks in dyed fabrics.

4. Highest Standard Warp Count (H.S.W.C)

As already mentioned H.S.W.C. which can be spun from a given variety of cotton is directly proportional to its spinning potential and is determined by its fibre properties. Three most important fibre properties are length, fineness and strength. According to Max Preysch⁽¹⁾ yarn strength can be predicted on the basis of relative effect of these fibre characteristics as follows:

Fibre characteristics	% contribution to yarn Strength
2.5 % S.L. and U.R	39
Fineness (Micrograms/inch)	18
Pressley Strength (LBS/Sq. inch)	20
Unexplained factors	23
Total	100%

Pervez Ali Ismaili⁽⁴⁾ has listed 27 cotton varieties which are currently under production in Pakistan. These varieties have been classified on the basis of 2.5% S.L. into groups and H.S.W.C. spinnable has been indicated for each group respectively as follows:

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References

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3. Gregory, J. "Cotton yarn Structure," Journal of Textile Institute, 41 T (1950)
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The list of 27 cotton varieties in Pakistan			
S No.	Length Group	Cotton Varieties	H.S.W.C.
1	Short Staple Less than $1\frac{13}{16}$ inch (20.64 m.m)	Nil	Not under production
2	Medium Staple From $1\frac{13}{16}$ inch to 1.0 inch (20.64 to 25.4 m.m)	Nil	As above
3	Medium Long Staple $1\frac{1}{32}$ to $1\frac{3}{32}$ inch (28.58 to 33.34 mm)	Niab-78 Rehmani Shaheen Cris -9 Sls-1 CIM - 443 FH - 901 BH-118 CR1S-5A MNH -786 CR CRIS 121	From 20 Ne to 30 Ne (Carded)
4	Long Staple $1\frac{1}{8}$ to $1\frac{10}{32}$ inch (28.58 to 33.34 m.m)	Sarmast K 68/9 MNH - 93 CIM 70 NIAB-86 Reshmi CIM - 448 FVH-53 CIM - 482 CIM - 499 CRIS - 134 NIAB - 111 MS-84 CIM-496 NIBGE-2 SADORI NIAB-999	40 Ne carded 50 Ne combed
5	Extra Long Staple $1\frac{13}{32}$ to $1\frac{20}{32}$ (35.7 to 41.28 mm)	Nil	not under production.

Cotton use records biggest decline since 1920

According to report released at the meeting of the International Cotton Advisory Committee (ICAC) in Cape Town, South Africa,, global cotton consumption declined by 12% in the season ended July 31, 2009, the largest year-to-year percentage decline since 1920.

The reports states that, the decline was considered a direct result of the global

financial crisis, however, according to ICAC, it expects world cotton use to rise modestly during the current season, assuming a gradual improvement in world economic growth.

The secretariat reported that cotton prices were very volatile during the previous season and that the average level of prices had fallen to four year lows. Assuming more normal economic conditions, price volatility

may moderate during the current cotton season.

At the same time, ICAC also forecasts that the average level of world cotton prices is not likely to increase significantly. It also noted that the cotton industry is becoming increasingly resource-constrained and encourages R&D and adoption of new practices that promote productivity.