TECHNICAL TUESDAYS

PRE-TREATMENT OF DIFFERENT FIBERS – PART VII

REF: TT/ JANUARY 2021/ WK 1

D) Pre-treatment of Cotton fiber

Cotton fibers are composed of approximately 90-95% cellulose and 5-10% non-cellulosic materials. These 5-10% non-cellulosic materials are natural impurities and are located mainly in the cuticle and primary cell wall. These impurities are fats, wax, pectic substances, organic acids, coloring matters, sugars and ash-producing organic salts.

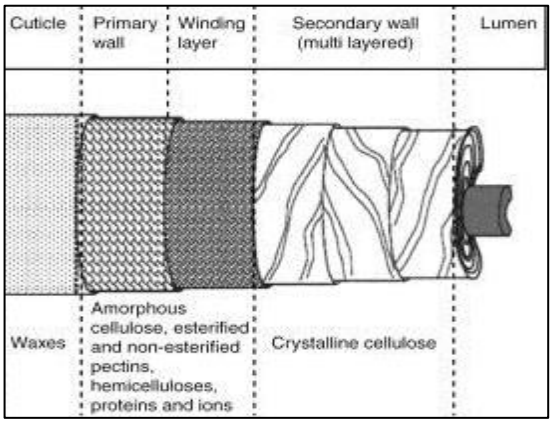

Fig 1.1 Impurities on a Cotton fiber cell wall

Natural impurities in Cotton

- **FATS AND WAXES**
- **HEMI CELLULOSE AND PECTINS**
- **PROTEINS**
- **MINERAL MATTERS**
- **COLOURING MATTERS**
- **ASH**

Ref: sciencedirect.com

Key words from fig 1.1

- **CUTICLE** - The outer waxy layer, which contains fats, waxes, pectins and proteinaceous materials.
- **PRIMARY WALL** - The original thin cell wall. It contains mainly cellulose and pectins.
- **WINDING LAYER** - The winding layer is the first layer of secondary wall. It also contains mainly cellulose and pectins.
- **SECONDARY WALL** - The secondary wall consists of multi layers of cellulose and constitutes the main portion of the cotton fibre.
- **LUMEN** - The hollow canal that runs the length of the fibre.

The natural fatty substances in cotton balls act as a protective barrier both to water penetration and to microbial degradation of cotton fibre during its growth on cotton plant. Fatty substances also act as lubricant that is essential for proper spinning of cotton fibre into yarn. However, fatty substances are not desirable in the chemical processing and finishing of the cotton yarns and fabrics because they interfere with wetting of the fibre

and penetration of chemicals and dyes. Thus removal of fatty substances during pre-treatment processes is essential for better performance and quality of the cotton fabric.
Similarly, other non-cellulosic materials like Pectin present in cotton are derivatives of pectic acid.
These derivatives are insoluble in water. Miscellaneous impurities such hemicelluloses and reducing sugars are also removed from the fabric by scouring, since their hydrophobic nature negatively affects the enhancement of the fabric's wettability and absorbency.
Presence of colouring matters is responsible of cream colour of grey cotton fabric. It is necessary to remove these impurities to improve the whiteness and brightness of cotton. The coloured pigments which make the fibre creamish are -

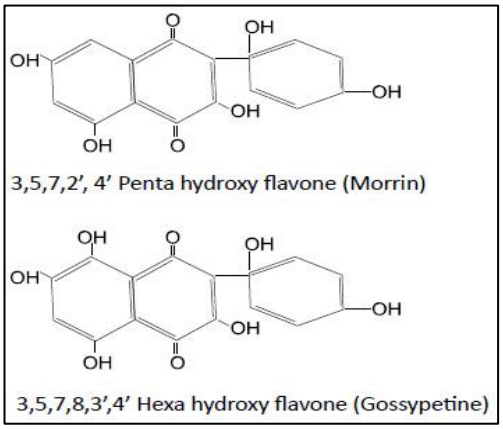

Fig 1.2 Chemical composition of colouring matter of cotton fiber
Ref: handsprintingguiderajasthan.in

Other than natural impurities, cotton fibers also contain additive impurities. These are acquired by the fibre during processing stages right from its cultivation.

References:

1. www.fibre2fashion.com
2. http://nopr.niscair.res.in/
3. https://nptel.ac.in/
4. www.sciencedirect.com
5. https://onlinelibrary.wiley.com/

.....To be continued.....

UNSCRAMBLE THE JUMBLE WORDS
TICLECU
ENLUM
ENTPIGM
VONEFLA

Last week`s Answers: 1) PECTIN 2) LIGNIN 3) LACCSE 4) DEMINERALISATION

Wishing you a great week ahead!

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