

Cotton Fibre Quality Requirements for Sustainable Growth of Indian Textile Industry



Dr. S. K. Shukla
Director

ICAR-Central Institute for Research on Cotton Technology, Mumbai

ICAR-CIRCOT Celebrates Centenary Year

*Technological
Laboratory
(Indian Central Cotton
Committee)
(1924)*

*Cotton Technological
Research Laboratory
[ICAR-CTRL]
(1966)*

*Central Institute for
Research on Cotton
Technology [ICAR-
CIRCOT]
(1991)*



Centenary Year (2023-24)



Pan India Presence of ICAR-CIRCOT



www.circot.icar.gov.in



Research Divisions

1. Quality Evaluation and Improvement
2. Mechanical Processing
3. Chemical & Biochemical Processing
4. Technology Transfer

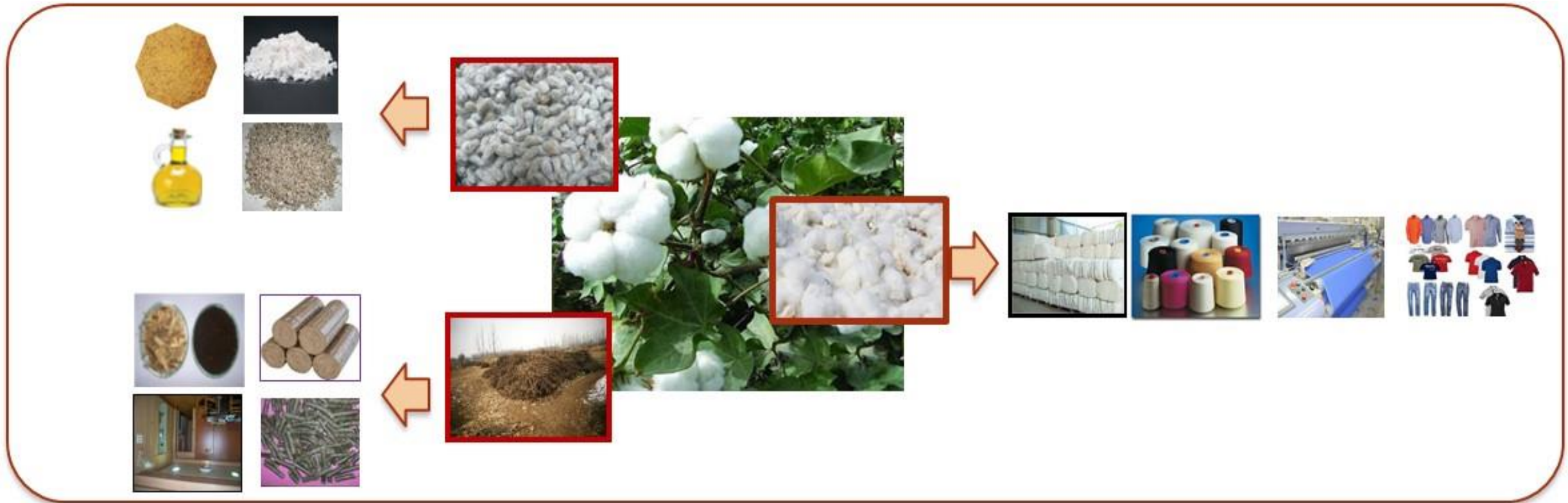
Major CIRCOT Activities

Research

**AICRP on
Cotton**

**Commercial
Services**

**Testing
Consultancy,
Contract research**

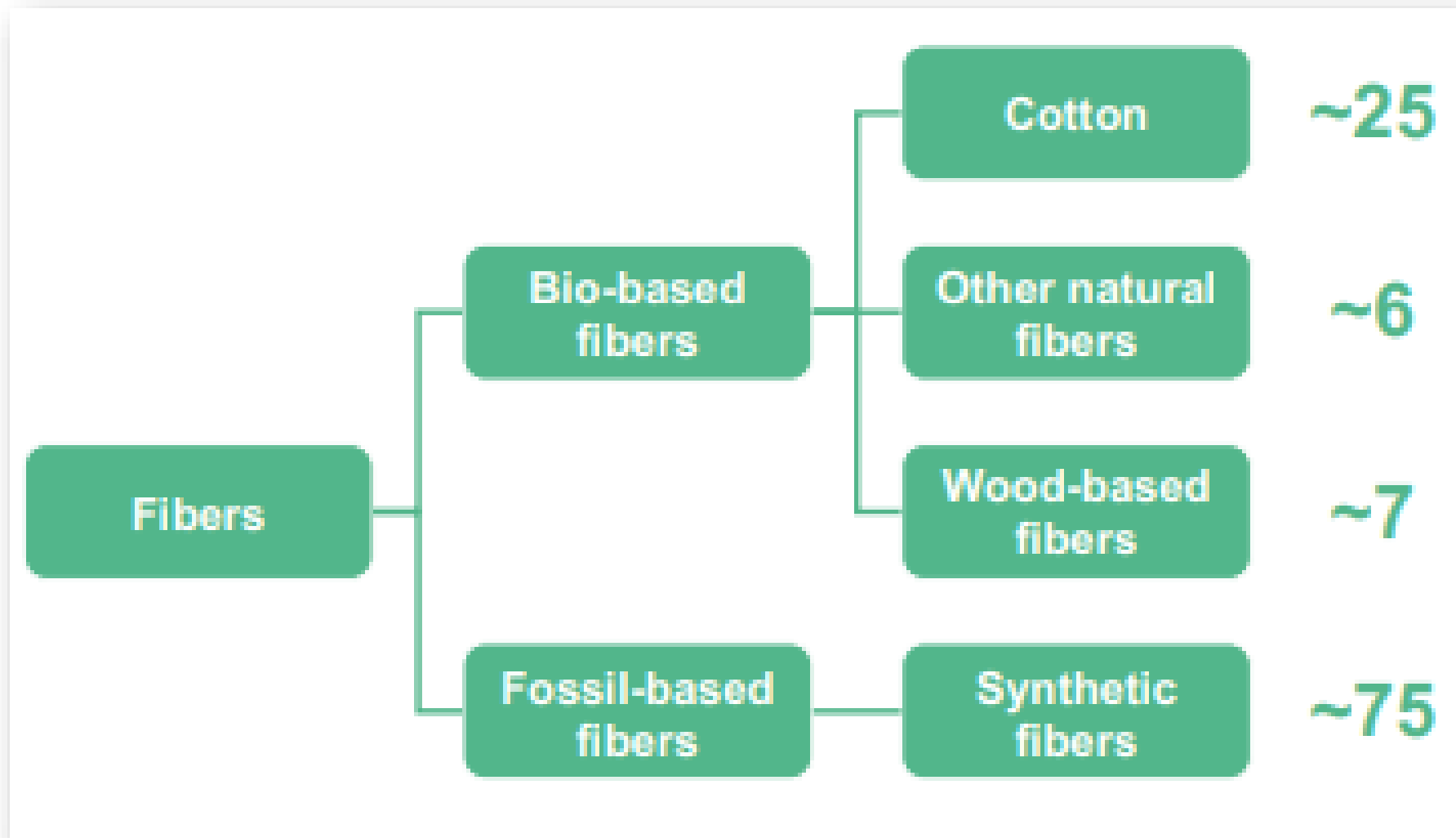


**Skill Development
Programmes**

Business Incubation

Funding Agri-Start-ups

Global Fibre Scenario





Cotton

Global Scenario

- Plays a vital role as an **Agricultural commodity** and **Industrial Commodity**
- Supports Livelihood of over **100 million farm families world over**
- Accounts for about **25%** of the total fibre consumption
- Raw material [Lint] worth **\$ 50 billion** is produced annually
- Global area under cotton cultivation relatively stable

Indian Scenario

- Important Commercial Crop
- Grown in three distinct zones (North, South and Central) covering over **11 States**
- **Unlike global scenario** caters to **60%** fibre requirement of the textile sector
- **5 million farm families** dependent on cultivation of cotton crop
- Robust Cotton value chain employing over 45 million people

Global and Indian Cotton Production (2020-21)

	Acreage (million hectares)	Production (million tons)	Productivity lint yield (kg/ha)
Australia	0.90	0.17	1889
Mexico	0.24	0.36	1644
Brazil	1.66	2.75	1658
China	3.30	5.80	1758
United States	4.17	4.37	1048
Uzbekistan	0.90	0.64	712
Pakistan	2.63	1.35	513
India	12.70	6.00	472
World	33.62	25.92	771

India Cotton Scenario

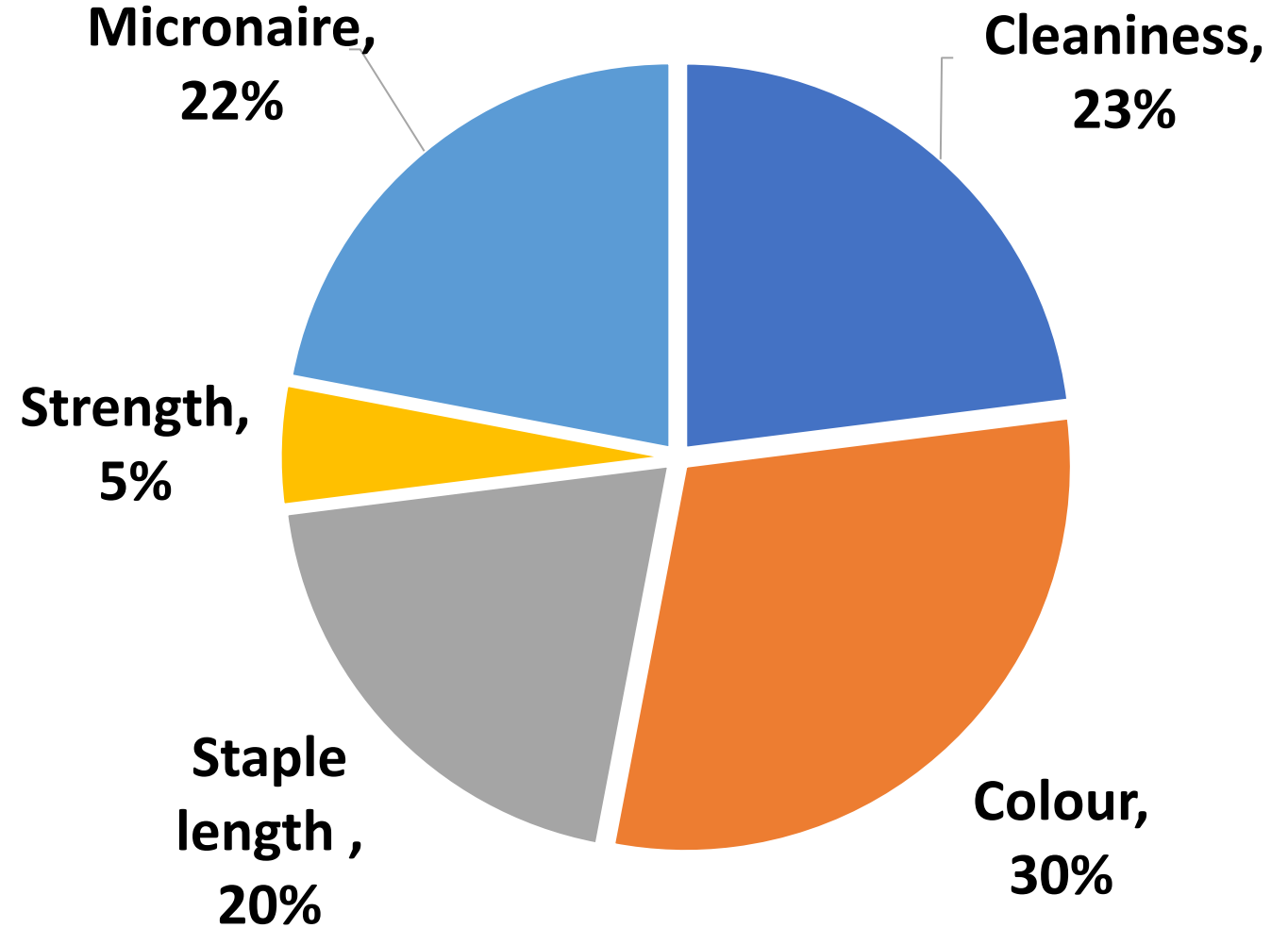
Production: 350 lakh bales in 9-10 states

Indian Spinning Industry- 2000 mills	
Spindles	47 million
Rotor	0.75 million
Total Yarn production	4.7 million tonne
Total cotton yarn	3.4 million tonne (73%)

Weaving Mills	4.0 lakh units
Handloom	2.30 millions
Power loom	2.52 millions
Shuttle less	0.13 millions
Knitting Mills	0.5 Lakhs units
Garmenting	0.7 lakh Units
Wet processing	5000 units

Indicators of Fibre Quality Parameters

- **Ginning Percentage, SFC, Mixing of cotton**
- **Moisture content (Not more than 12%, dry cotton before storage)**
- **Trash & Contaminants (Polypropylene, Hairs, Plastic pieces)**



COTTON CANDY RATES (May 28, 2022)

29MM

75RD: 103,000-1,04,000

74RD: 102,000-1,03,000

73RD: 1,01,000-1,02,000

72RD: 1,00,000-1,01,000

Rs. 1000 per candy
Rs. 90-100 per quintal

Rs. 3000 per candy
Rs. 270-300 per quintal

28MM

72RD: 94,000-95,000

70RD: 92,000-93,000

27MM

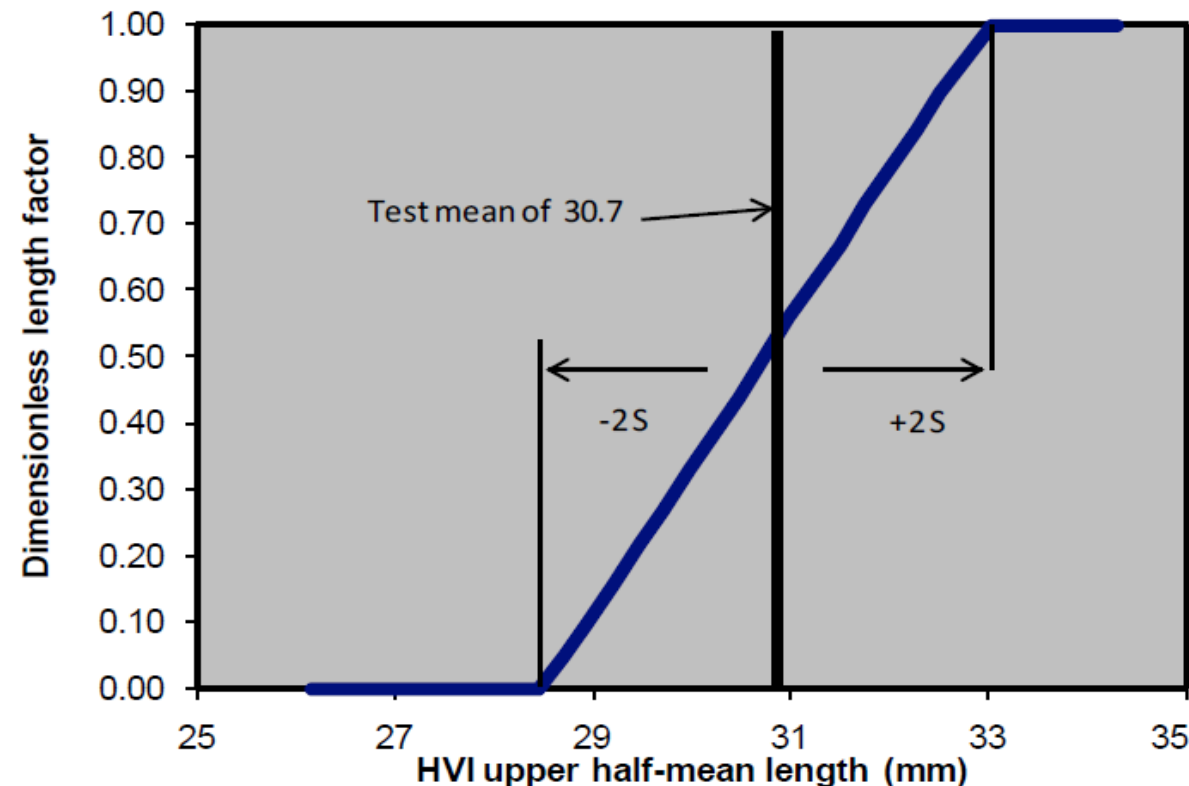
68RD: 85,000-86,000

65RD: 82,000-83,000

STAPLE LENGTH

- It is a major factor for deciding the cotton **selling price**
- Decides the count of yarn to be produced
- One mm increase in staple length fetches around **Rs.100-150** per quintal
- Length requirement: **28-32 mm**

Requirement of length: 28.7 – 32.7 mm



Staple Length Wise Production

S.No	Staple length (mm)	Share (%)	Bales (Lakh)
1	Below 22 (SS)	0.5	1.68
2	22-25 (MS)	3.00	10.08
3	26-27 (MLS)	2.00	6.72
4	28-32 (LS)	94.5	317.5
5	Above 32 (ELS)	1	3.36

COTTON FIBRE PROPERTIES FOR MODERN SPINNING MILLS

Count*(Ne)	Fiber Length (mm)	Micronaire	Strength (G/Tex)	Maturity Index
Karded Yarn				
Below 20s Ne	26 - 27 mm	4.0 - 4.6	24 - 27	0.85
Combed & Karded Yarn				
20s to 32s	28 - 30 mm	3.6 - 4.2	27 - 30	0.84
33s to 45s	30 - 32 mm	3.5 - 3.8	29 - 31	0.84
46s to 60s	32 - 34 mm	3.3 - 3.6	30 - 32	0.84

*Count: No. of hanks of 840 yards prepared from 1 pound of yarn

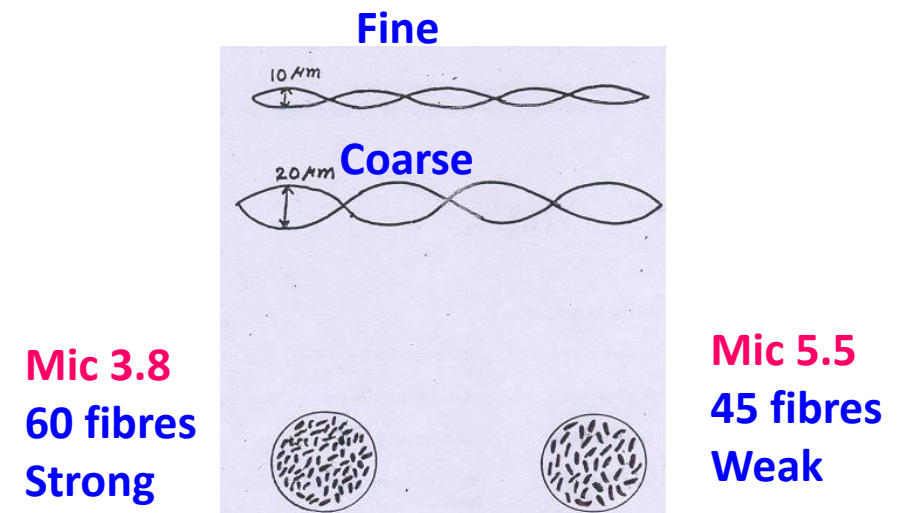
Length Uniformity Index

- ❑ It is the ratio between the mean length and the upper half mean length of the fibres
- ❑ LUI affects yarn evenness, yarn strength and the efficiency of the spinning process

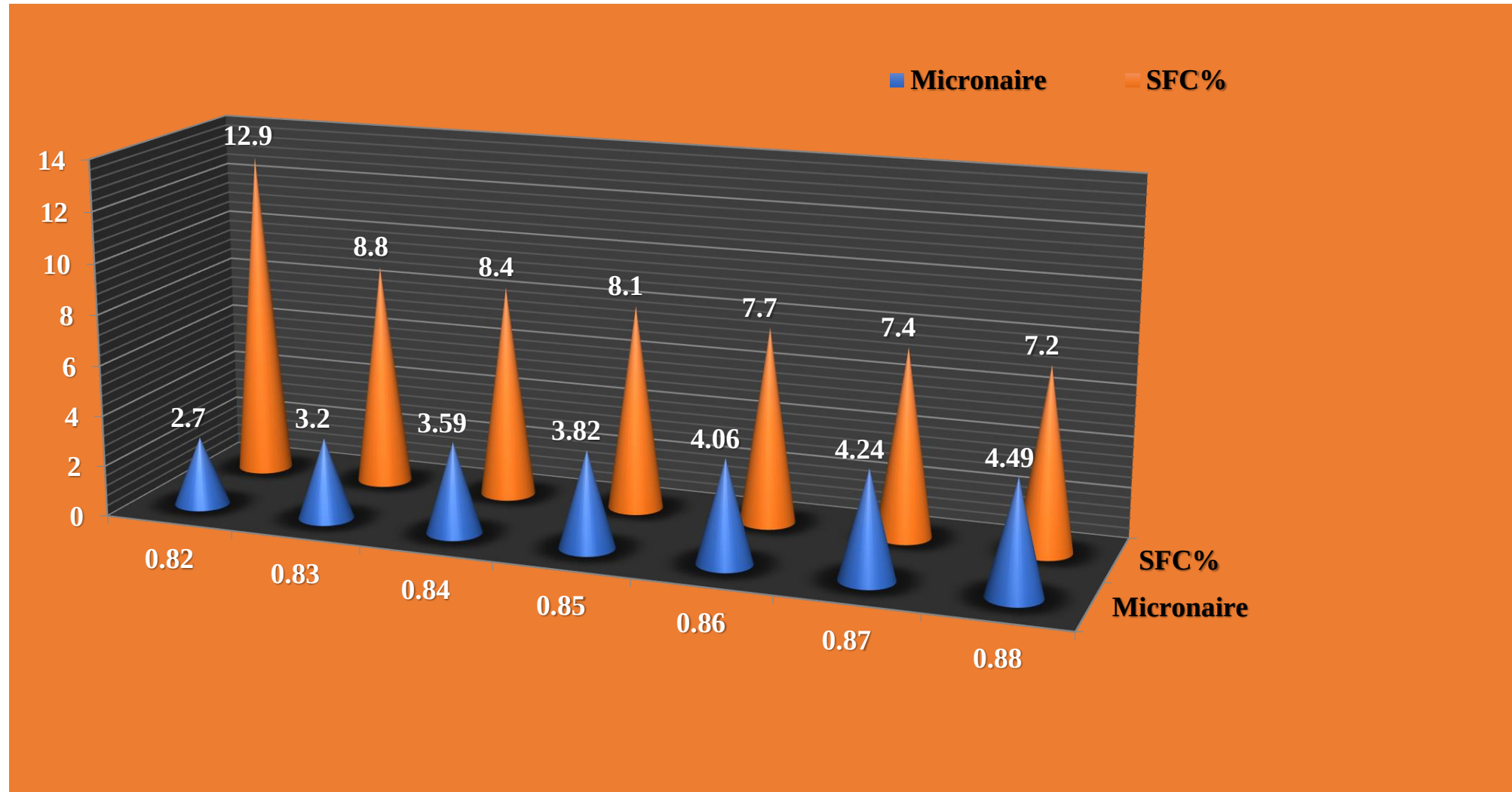
Category	UI (%)
Very High	Above 85
High	83 – 85
Intermediate	80 – 82
Low	77 – 79
Very Low	Below 77

MICRONAIRE

- ❑ Represents the fineness and maturity of fibres
- ❑ Next to length in importance in deciding the spinnable count
- ❑ Lower MIC: may be less deposition of cellulose (poor colour absorption, higher losses and neps)
- ❑ Higher MIC: less fibres per bundle causing low count



Graphical representation of Micronaire & SFC% wrt Maturity Index



Fibre Strength

Category	Strength (g/tex)
Very Strong	31 and above
Strong	29 – 30
Average	26 – 28
Intermediate	24 – 25
Weak	23 and below

- Long staple: 28 to 34 g/tex
- ELS : 42 g/tex and above

Cotton Stocks in Spinning Mills

Grade	Fiber Length	MIC	Maturity Index	SFC%	Stock%
A++	> 31	3.5 - 4.2	> 0.85	< 7.5	13
A+	30-31	3.5 - 4.3	> 0.85	< 8.0	30
A	29-30	3.6 - 4.3	> 0.85	< 9.0	35
B	28-29	3.6 - 4.3	> 0.84	> 9.0	20
C	Out of above range				2

Requirement of the cotton for Indian spinners

Count	Million Bales	Type (Staple)	Requirement (%)	Production (%)
1s-10s	4.7	Short	15	0.5
11s-20s	5.5	Medium	19	3.0
21s-30s	7.2	Medium Long	23	2.0
31s-40s	8.9	Long	38	93.5
41s-60s	2.8			
61s-80s	0.9	Extra Long	5	1

Mixing of comber noil wastes, under spinning (increasing production & improving quality)

Thrust Areas of R&D in Cotton Quality

- ***High Ginning Out-Turn (GOT)***
 - *Indian ginner: 33-34% lint realization*
 - *Egypt: 39-40%; Africa: 36-37%; long staple cotton*
 - *3% increase – 10 lakh bales, Rs 1000 cr*
- ***Optimum Micronaire of cotton (Range: 4.0-4.5)***
- ***Production of ELS cotton (34-35 mm, 40-42 gpt, 4 MIC)***
- ***High Strength of Cotton (32, 40-42 gpt)***
- ***Amenable hybrid/variety for machine harvesting***

Mechanical Harvesting Requirements

- Compact genotypes, **Sympodial branching**, Length: 0.20 - 0.25 m
- Erect, Minimum braches and bushes
- **Synchronous Boll bearing and bursting**
- HDPs: 90 x15 cm, **1 to 1.2 m height**
- Canopy: 0.5 to 0.6 m, **first boll: 0.20 m**
- Around 15 bolls/plant, weight 4 -5 gm,
- Synchronized opening, duration **140-150 days**, Amenable for shedding of leaves
- Length: **29-30 mm**, MIC: **4.0-4.5**,
Strength: > 32 g/tex



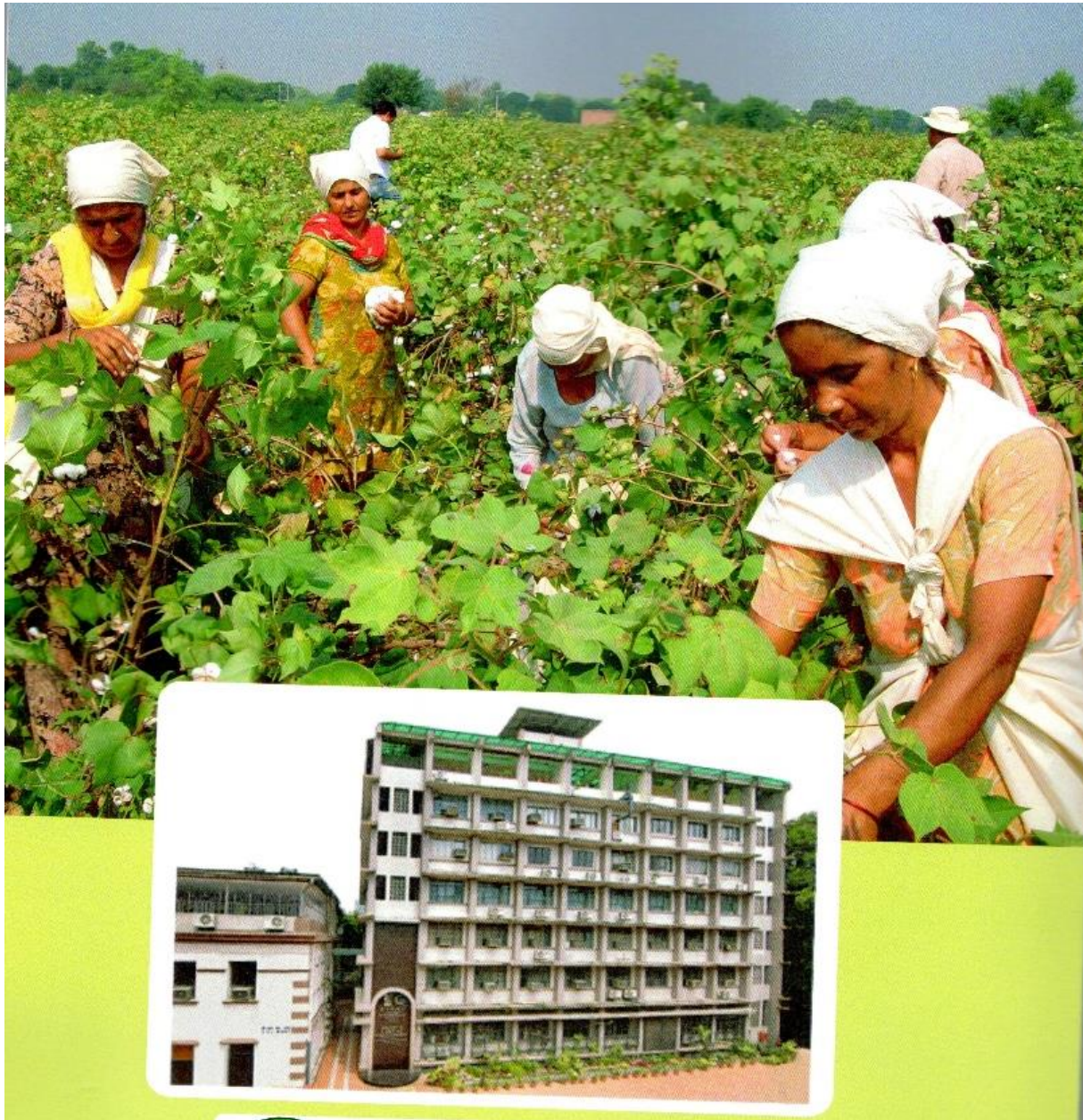
Benchmark Settings

Giza 95

- **Ginning Out-Turn (GOT): 41%**
- **MIC: 4.1 $\mu\text{g}/\text{inch}$**
- **Length: 29+mm**
- **Strength (35+ gpt)**
- **Productivity (800 kg/ha)**

Giza 94

- **Ginning Out-Turn (GOT): 40%**
- **MIC: 4.1 $\mu\text{g}/\text{inch}$**
- **Length: 34+mm**
- **Strength (42+ gpt)**
- **Productivity (800 kg/ha)**



THANKING YOU

ICAR-CIRCOT, Mumbai

...a bridge between cotton farmers and industry