

COTTON (*Gossypium hirsutum*)



Dr. Ashirbachan Mahapatra
Assistant Professor
Agronomy, MSSSoA, CUTM

IMPORTANCE

- Belongs to family **Malvaceae**
- Cotton is one of the oldest and the most important commercial crop of the world and forms the most important fibre crop.
- Cotton textile industry is the oldest Agricultural industry of India.
- The fibre obtained from seed is used for variety of purpose. But major use of fibre is **manufacturing of textiles which provide clothing to the mankind.**
- Ever since the dawn of civilization, cotton served the purpose of providing this need and even today it dominates despite of the production and marketing of many synthetic fibres Cotton is referred to as **“King of Fibres”** and also known as **“White Gold”**.
- Cotton is also used for several other purposes like making threads, for mixing in other fibres and **extraction of oil from the cotton seed (Oil content is 15-25 percent).**
- Cotton **seed cake** after extraction of oil is **good organic manure contains 6.4% N, 2.9% P₂O₅ and 2.2% K₂O.**
- Cotton seed and pulp obtained during oil extraction and cotton meal are good **concentrated feed for cattle.**

Origin and History

- Cotton has been used as a fabric in India from time immemorial.
- It has been cultivated in the Indus Valley for more than 5000 years before. The excavations of Mohen–jo-daro indicates a high degree of art in spinning and weaving with cotton at that time.
- It finds mention in the Rigveda, the oldest scripture of the Hindus. Manu also refers to it in his Dharma Shastra.
- India appears to have been the centre of an important cotton industry as early as 1500 B.C. The cultivation of Cotton spread from India to Egypt and then to Spain and Italy.
- Every available evidence proves that **India is the original habitat of Cotton.**
- The cultivated Species are divided into two groups.
 1. Old world cotton
 2. New world cotton

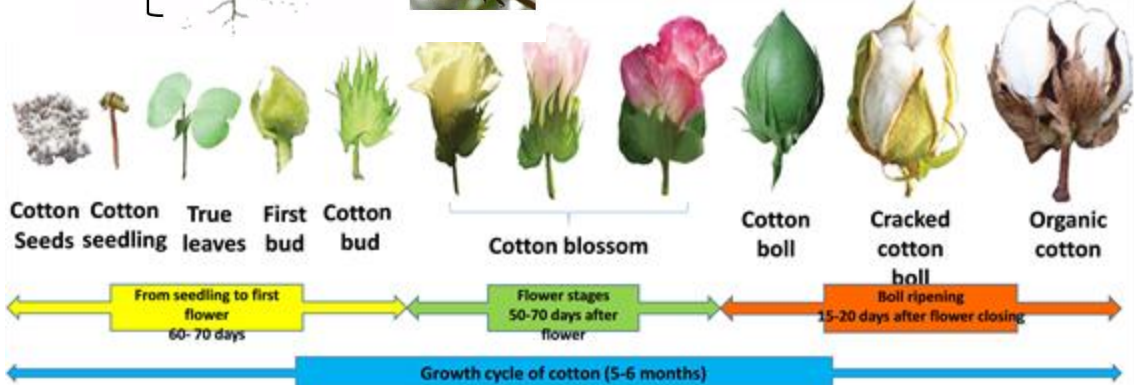
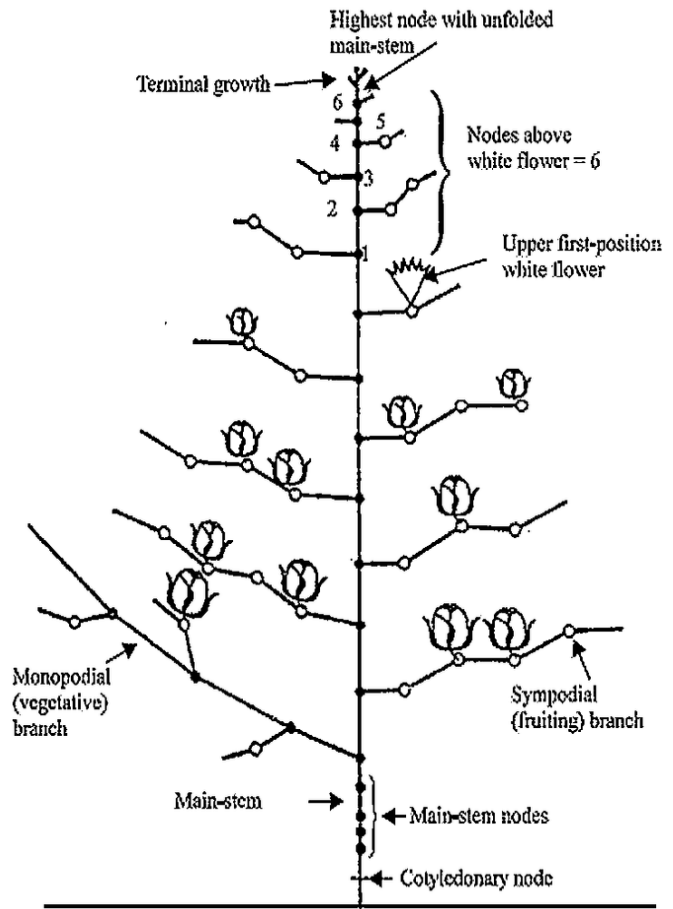
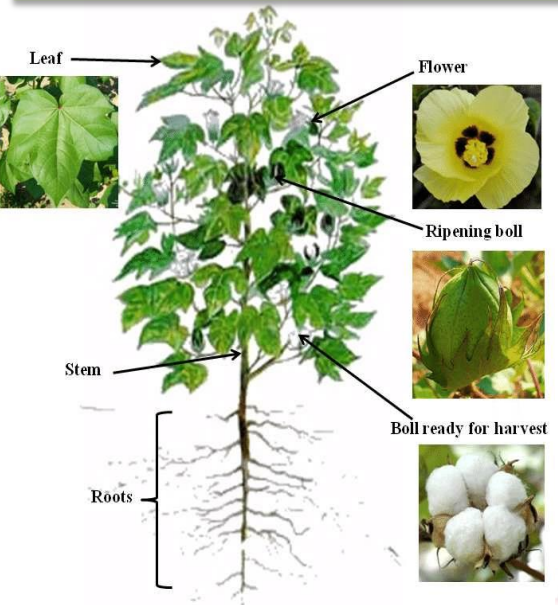
1. Old world cotton

- India is the major cotton growing country, growing all four species of cotton commercially.
- India is considered as **centre of origin of old World cotton** and believed that two Species (*arboreum* and *herbaceum*) belonging to old world cotton have spread along the commercial routes to several countries in the East and also to the Northern countries like Africa to Egypt and other Mediterranean regions through trade and business.

2. New World cotton

- Cotton belonging to species *barbadense* are derived from a perennial cotton, a native of **Peru** called Tangins.
- This variety was introduced into USA and by selection a new type of annual cotton was developed known as **Sea Island Cotton** which was the **longest and finest fibre** of all the cultivated cotton.
- *Hirsutum* species is the native of **Central Mexico** and spread to other parts of USA, Asia, Africa etc. from native place.

BOTANY OF THE CROP



AREA AND DISTRIBUTION

- ❖ Cotton is the most important fibre crop of the world cultivated over an area of 34.5 ha with a total production of 54.5 mt.
- ❖ The important cotton growing countries are India, USA, Russia, China, Brazil, Egypt, Pakistan, Turkey, Mexico and Sudan. These ten countries account for nearly 85% of the total production.

COTTON- ZONES OF INDIA

Based on soil, climate and types of cotton grown, the country is divided into six cotton growing tracts.

1. Northern *hirsutum* – arboreum region: Comprises of Punjab, Western UP, Delhi, Haryana and N.W.Rajasthan. This is most important cotton growing and potential region. More than 90% of the area in this zone is irrigated. Two species of cotton i.e. *hirsutum* and *arboreum* are grown in this region. At present 60% of the total cotton acreage consists of *hirsutum* varieties and growing of *arboreum* has assumed secondary importance. The soils are of **alluvial origin**.

2. Central *arboreum* region: This region comprises of many districts of M.P, Maharastra, Gohilwad, Amreli districts of Gujarat and Adilabad district of A.P. Entire region is characterized by **black cotton soils** locally called REGAR soils which are highly suitable for cotton cultivation.

3. Southern *hirsutum* – arboreum region: Comprise the states of Tamil Nadu and Kerala. Major soil groups are **red soils** but also grown on sandy and heavy black soils.

4. Central herbaceum – arboreum – hirsutum: Comprises A.P and Karnataka. The principal soils on which cotton is grown are coastal alluvium, deltoic alluvium, red, black cotton soils, laterite and loamy soils. The major area of cotton is confined to **black cotton soils (80%)**

5. Western – herbaceum region: Comprises of Gujarat and parts of Bombay and Karnataka. Improved varieties of cotton are grown in this region. Major soil group is **black cotton soil** followed by loamy soil.

6. Eastern region : Comprises the states of Odisha, West Bengal, Bihar, Assam, Manipur and Tripura. Longest zone with respect to area but the production is negligible from this region.

CLASSIFICATION

The predominant species cultivated

- *Gossypium hirsutum* - >90% of the area
- *Gossypium arboreum* - 5%
- *Gossypium herbaceum* - 2%
- *Gossypium barbadense* - negligible

Gossypium hirsutum (American Cotton)

- Species contain haploid number of chromosomes (26)
- Plants are either annual shrubs or large perennial shrubs (1-1.5 m tall),
- Flowers are creamy white in colour when first open and turn pink or red later.
- The capsules are 3-5 locular with 5-11 seeds in each locule.
- Seed contain a thick coat of lint hair besides a thick coat of fuzz hair.
- Fibre is medium coarse and length varies from $\frac{3}{4}$ " to $1\frac{1}{4}$ " (27-30mm)

Gossypium barbadense: (Sea island / Egyptian Cotton)-

- Species contain haploid number of chromosomes (26).
- Plants are either annual shrubs or perennial shrubs.
- Petals are yellow with purple spot at the base.
- Capsules are 3.5 locular with 5-8 seeds, in each locule.
- Seeds bear a thick coat of lint and thick coat of fuzz and fuzz may be absent in some varieties.
- Fibre is fine and extra long ranging from 1/2" to 2" length.
- Lint is readily detachable from the seed.

Gossypium arboreum:

- Species contain haploid number of chromosomes (13).
- Plant may be annual sub shrub or perennial.
- Capsules are tapering with prominent oil glands in the pits and are 3 or 4 locular with 6-17 seed in each locule.
- Seeds are usually covered with two coats of hair (lint + fuzz).
- Fibre is coarse and short and length varies from 1/2" to 7/8"

Gossypium herbaceum:

- Haploid number of chromosomes (13).
- Plants are sub shrubs.
- Capsules are brown provided with beak, smooth surface or with shallow pits with oil glands.
- The capsules are 3-4 locular with 8- 10 seeds in each locule.
- Seeds are covered with two coats of hair (lint+fuzz).
- Fibre is coarse and short with lint length varying from 1/2" to 7/8"

CLIMATIC REQUIREMENT

- ❖ It is a **tropical crop** and thrives well in **hot and humid climate**. **Sun loving (heliophyte)**
- ❖ Temperature requirement for **germination 16°C** and **vegetative growth 21-27°C**. It can **tolerate** temperature as high as **43°C**, but doesn't do well if it falls below 21°C. During **fruiting phase**, the day temperature ranging from **27-30°C** and **cool nights** are needed. Abundant sunshine during the crop growth period particularly the period of boll maturation and harvesting is essential to obtain a good quality produce.
- ❖ Successfully grown in areas receiving an average annual **rainfall** ranging from **700-1300 mm**. If, during the fruiting period heavy showers of rain occur or heavy irrigation is applied, shedding of the flowers and young bolls results. At harvesting also high rainfall is not desirable since it not only affects the quality of lint but also delays harvesting and makes the harvesting difficult.
- ❖ Cotton is **highly sensitive to frost occurrence**. Even for short period, frost will result in killing of plant cells and severe frost situation, death of entire plant occurs. Hence, its cultivation is confined to plains and extends from MSL occurs to an altitude of 1000 m only. For successful crop, it **requires a frost free period of a minimum of 180-200 days**, starting from the emergence of the plant.

SOIL REQUIREMENT

- Cotton is a **deep rooted crop**. As the tap root extends even **up to a depth of 200-250 cm**, deep soils are ideal for better root penetration and development.
- Soils should have **good water retention capacity** as most of the cotton is confined to rainfed conditions.
- Soils must be **well drained and well aerated** since the crop is sensitive to water logging.
- Crop can tolerate **pH of 5.5 to 8.5**.
- The Principle soil types for cotton cultivation in the country are
 - a) Alluvial Soils:** Punjab, Rajasthan , Haryana, U.P, Bihar, West Bengal, Odisha, Assam, Godavari, Krishna region (A.P)
 - b) Black Cotton Soils:** Central and Western M.P, parts of M.S, South Odisha, South and Coastal A.P, North Karnataka
 - c) Red Soils:** Tamilnadu, Karnataka, N-E parts of AP, Parts of MP, Odisha, Assam, UP, West Bengal, Rajasthan
 - d) Laterite Soils:** Madhya Pradesh, Odisha, Karnataka, E Parts of A.P, Tamil Nadu, Assam, and Kerala.

LAND PREPARATION

- ❖ The field, after the harvest of the preceding crop, should be ploughed 15-20 cm deep with mould board plough.
- ❖ There after two to four harrowings depending upon the soil type are done. After each ploughing, harrowing is essential to make soil pulverized, leveled.
- ❖ No stubbles of the previous crop should be left in the field.
- ❖ For irrigated crop, particularly in North, the field should be prepared by applying heavy pre-sowing irrigation.

SEEDS AND SOWING

Time of Sowing

- Time of sowing season of cotton varies considerably from tract to tract and is generally early **April – May in North India** and is **delayed as one goes down to south**.
- Cotton is essentially grown as ***Kharif* crop in the major parts of the country** - Punjab, Haryana, Rajasthan, U.P, M.P, Gujarat, MH and parts of A.P and Karnataka.
- In these areas, Irrigated crop – March to May, Rainfed Crop – June/July.
- In parts of Gujarat and M.P, pre-monsoon dry sowings are practiced in the end of May or early June to give early stand to the crop.
- T.N. – Irrigated and rain fed – Sept/Oct, Summer sowings – Feb/March
- A.P. Northern region – June/July, Central region – Aug/Sept, July/Aug(Hybrids)
Eastern region – July/Aug, Rice fallows – Dec/Jan

Seed Rate

- Seed rate is influenced by the variety and method of sowing.
- High yielding variety – 10 to 15 kg/ha,
- Hybrids – 2.5 to 3.0 kg/ha

Spacing:

- Straight varieties
 - 45 to 60 X 15cm (Rainfed)
 - 90 to 120 X 45 to 60 cm (Irrigated)
- Hybrids
 - 90 to 150 X 45 to 60 cm

Method of Sowing:

- Seed drill /behind the plough, dibbling (hybrids)
- Depth of Sowing: 4 to 6cm
- No. of seedlings/hill: HYV 2, Hybrids 1

Seed treatment

Delinting:

- Delinting is the **process of removal of fuzz from the seed coat in cotton.**

Methodology

- Take one kg of the cotton (fuzzy seeds) in a plastic bucket
- Add concentration H_2SO_4 at the rate of 100ml / kg of seed
- While additions it should be constant stirring by using wooden stick for 2-3 minutes to facilitate uniform coverage and better treatment effect.
- After 3 minutes all seeds will turn into coffee brown in colour
- Wash the seeds immediately for 4-5 times with cold water until the acid nature of the seed is removed.
- Care should be taken while washing the improper washing will affect the viability of the seed.
- After thorough washing the entire seed should be placed in water in 1:10 ratio to remove floaters.
- For complete removal of acid seeds can be dipped in 0.5% $CaCl_2$ solution for 10-15 minutes.
- The sinkers seeds can be used for sowing purpose.
- For large scale delinting of cotton, cotton delinting machine can be used.

- Delinting can be done mechanically in the cotton gin or chemically or the seed is rubbed with mud or a mixture of earth and fresh cow dung. By this treatment, the fuzz on each individual seed becomes pasted on the seed itself and the seeds no longer cling to each other.
- In order to control the seed borne diseases the seed is treated with 0.01% Streptomycin or Oxytetracyclin (Paushamycin or Agrimycin) and with 0.1% Systemic fungicide like carboxin (vitavax) solutions for 6-8 hours. The treated seed should be dried in shade before sowing.



GAP FILLING AND THINNING

- To maintain optimum population, gap filling is done with the same stock of seed which was used at the time of sowing.
- This is done on the **10th day**.
- Wherever seed has not germinated to fill the gaps, the water soaked seeds are dibbled so as to have quick emergence or seedlings are raised in polythene bags at the time of sowing and these are used for gap filling. So that crop growth is uniform.
- Thinning should be done **within 3 WAS**, by removing the excess seedlings that are weak, diseased or damaged and retaining robust and strong plants. The main objective is to maintain optimum plant population per unit area.

MANURES AND FERTILIZERS

- 15 to 20 t FYM/ha at last ploughing
- All P_2O_5 at basal dose N and K_2O in three splits at 30, 60 and 90 DAS.
- Top dressing – Fertilizer should be placed at 7-10 cm away from the plant with depth 7-10 cm
- For the irrigated crop, provide irrigation soon after application of fertilizers.

	N (kg/ha)	P_2O_5 (kg/ha)	K_2O (kg/ha)
Rainfed			
Desi	40	20	20
American	60	30	30
Hybrid	90	45	45
Irrigated			
American	120	60	60
Hybrid	150	75	75

WATER MANAGEMENT

- Cotton is a **drought tolerant crop** due to its deep root system.
- Water requirement of the crop is **700 to 1300 mm**.
- Cotton **cannot tolerate excess moisture** in the soil and so frequent irrigation is not necessary.
- Interval between two irrigations depends on the soil type, rainfall and others related climatic factors.
- The crop must not be allowed to suffer from water stress during flowering and fruiting period, otherwise excessive shedding of flower buds and young bolls may occur resulting in loss of yield.
- The crop **cannot tolerate water logging conditions at any stage of growth**.
- Critical Stages : **Square formation stage**
: **Flowering stage**
: **Boll developing stage**

WEED MANAGEMENT

- First **50 -60 days after sowing** is the critical period of Crop Weed Competition,
- Initially the crop growth is very slow, thus more vulnerable to weed competition.
- During this period, the field should be free from weeds for better growth and higher yields.
- **5 – 6 intercultural operations** should be done depending on the intensity of weeds.
- Weeds near the plant should be removed by manual labour.
- Chemical method of managing weeds helps in maintaining the field weed free.
- Following herbicides can be used in cotton.

PPI	Fluchloralin @ 1.5 kg/ha
PE	Pendimethaline @ 1.5 – 2.0 kg/ha
	Alachlor @ 1.5 kg/ha
	Pronamide @1.5 – 2.5 kg/ha
	Cinmethylin @ 0.5 -1.5 Kg /ha
POE	Paraquat @ 0.5 kg/ha
	Glyphosate – 3.5 – 4.5 kg/ha

TOPPING

- Cotton is **indeterminate plant**, to check **excessive vegetative growth** topping is practiced.
- Topping refers to the **removal of the terminal bud or shoot tip by farmers**.
- Level of topping or at what node topping is to be done differs with cotton plant type.
- MCV –5: Topping at 15th node level (70 – 80 DAS) resulted in better yields
- MCV 7: 10 – 12th node (90DAS)
- Topping is done manually. In USA machines are used.
- Excessive vegetation growth can also be controlled by using chemicals which are growth retardant like **cyocel (ccc)**.
- It restricts excessive vegetative growth retards by senescence, keeping the leaves green for longer time thus prolonging their effective period.
 - American Cotton – 40 to 60 ppm
 - Desi cotton - 60 to 80 ppm at 50 to 80 DAS

BUD AND BOLL SHEDDING

- It is a **natural phenomena** in cotton.
- Heavy shedding of flower buds and young bolls occur which is aggravated under **adverse conditions of soil, climate and management** under such situation it may be as high as 60% but under **natural conditions 10 to 15% loss** occurs.
- Various reasons for bud and boll shedding in Cotton is
 1. Unfavourable Weather conditions: Reduced light conditions, Reduced light conditions, Excess or lack of moistures in the soils, Cloudiness and High relative humidity.
 2. Imbalanced nutrient supply
 3. Incidence of pest and disease
 4. Weeds alter the microclimate
 5. Physical injury - due to use of farm machinery
- This problem can be minimized by using certain hormones like **NAA**, since it increases the supply of auxin to bolls and buds, thus the senescence of them is reduced.
- Spraying of NAA – **Planofix @10 ppm at flower initiation (1 ml in 100 liter) 50 – 60 DAS & 15 days after 1st application** resulted in retention of more bolls.

HARVESTING

- Harvesting usually commences in the month of **Nov. and extends to March** depending upon sowing time and duration.
- Harvesting is done usually by manual labour i.e. **hand picking** the cotton from the open matured bolls.
- Since cotton is indeterminate type, flowering occurs in no. of flushes hence all the bolls do not mature at a time and bolls come to maturing stage at intervals of **2-4 weeks period**.
- Harvesting is done in **4 -5 pickings** as and when bolls are fully matured.
- Precautions must be taken to maintain the quality of fibre at the time of picking.
 1. Picking needs **good experience, care** is taken that all the cotton from all segments should be removed in one stroke. without leaving any fibre in the boll.
 2. Produce from **each picking should be dried separately and stored separately**. Cotton from all pickings should not be mixed since they vary in their quality. Cotton should be dried on clean floor in shade.

3. Kapas **should not be contaminated** with foreign materials like leaf bits, trash, soil particles etc., at the time of picking and shading.
4. While picking **weather conditions** must be taken into account. Usually pickings are done in the **early hours of the day**. As the day advances the fruit wall becomes brittle due to sun and while picking they easily collapse and contaminate. Picking must commence after cessation of dew fall.
5. Cotton of **early picking are of superior quality** and later pickings produce inferior quality fibre due to inadequate nutrient supply at later stages, high incidence of pest and inadequate moisture at later stages.
6. Boll affected with insect is common feature which not only reduce yield but produce yellow stained cotton which is considered inferior fibre.

Yields

Dryland crop	: 10 - 15 q/ha
Irrigated Crops	: 25 - 30 q/ha
Hybrids	: 35 - 40 q/ ha.
1 Bale = 170 kg.	

Yield attributes

1. Number of plants per unit area.
2. Number bolls for plant
3. Seeds per boll
4. Boll weight
5. Lint percentage

COTTON- QUALITY PARAMETERS

1. Colour of fibre

- Colour of the fibre of cotton is white with few exceptions like desi cotton which have reddish or yellowish tinge.
- **White coloured** cotton which are shiny are considered as superior cotton.
- Cotton obtained from first picking will be bright white in colour and the later produced will be dull or yellowish tinge in colour.
- The fibres may also be discoloured or stained by insect damage, fungal diseases mechanical harvesting and the sap of green plant parts.
- Colour of the cotton is decided by visual observation cotton marketed in India are classified on the basis of visual observation into **white , grey, brownish , greenish and light reddish**.
- In lab, colour grading is done by using **NICKERSON – HUNTER calorimeter**. Where a light is reflected from sample of cotton and the extent of yellowish tinge is calculated.

2. Length of fibre

- The length of fibre is mainly predetermined by heredity and is only slightly influenced by growing conditions. Fibre length is the mean length of lint hair expressed in mm. Longer the length superior will be the quality.
- Presence of excess moisture and poor nutrition will result in long fibre with poor strength. length is determined by various methods (at 65% RH & 21 °C temp.)
- By using **digital fibrograph** where in sum amount of light is transmitted through the fibre beared after combing along the fibre length and calculated. On the basis of fibre length, cotton is classified into six groups.
- Holo length : it is overall length of the lint without the fibre taken out of the seed

Groups	Length (mm)	Varieties
Short staple	< 19.5	Lohit , G - 27
Medium staple	20.0 – 21.5	Raichur 51 ,DB-3-12
Medium long Staple	22.0 – 24.0	MCV-7,G cot 12
Long staple	24.5- 26.5	Krishan, JKHY – 1
Superior long staple	27.0 – 29.5	MCU -5 , H4, Amaravathi
Extra long staple	32 & above	Suvin and sujatha

3. Fibre fineness

- It denotes the diameter of the fibre hair or thickness.
- **Lesser the diameter superior is the quality.**
- Thickness of the fibre ranges from **15-20 microns**.
- Fineness is measured by taking the **weight per unit length of fibre** which gives indirectly the fineness because measuring diameter of the fibre is very difficult as they are thin and minute.
- Fibre fineness is generally expressed as **microgram/inch** of the fibre which is also called micronaire value. It is measured by the
 1. Weight /unit length – specified number of fibre are taken with known length and weight is recorded using a sensitive balance. Lesser the weight, superior is the quality and finer the lint hair.
 2. By using instrument **MICRONAIRE**. In this cotton plugs are prepared by using known weight of cotton lint, i.e. 3-4 gm by pressing in a specially designed cylinder. Air is passed at high pressure through cotton plugs and fineness is determined indirectly by the flow of air through the plug. Finer cotton will allow more air to pass than coarse fibre . This is calculated on a scale and expressed as micronaire value.

- On basis of fineness, cotton are classified into five groups.

Groups	Fineness	Variety
Very fine	< 3.0 -	
Fine	3.0 – 3.9	MCU -5 , Varalaxmi ,H6
Average	4.0 – 4.9	H4
Coarse	5.0 -5.9	AKH -4 ,maljari
Very coarse	>6.0	

4. Fibre strength

- Fibre strength doesnot refer to a individual fibre but to a tuft of fibres of a given thickness.
- It is expressed as maximum load in terms of Kg that a fibre bundle can take when stretched in one direction before it breaks.
- Strength is determined by using STELOMETER.
- Generally the tuft of finer fibre will have greater strength.
- Fibre strength is measured in thousands of pounds/sq inch or kg/sq cm and grade is allotted, Based on strength cotton is classified into

Group	Grade
Very strong	>95
Strong	86 – 95
Average	76 – 85
Fair	66 -75
Weak	66- below

5. Spinnng count

- Spinnability of the fibre depends on length and thickness of the fibre.
- It is expressed in counts or hanks. A count is the number of hanks that a pound of cotton gives. **One count is equal to 840 yards**. Thus finer the thread the greater will be the count. Ordinarily Indian cottons have 22 counts. While the best quality cotton may have count ranging between 80 to 400.
- On the basis of spinnability cottons are divided into five groups.

Group	Counts	Vareties
Course Cotton	1 – 17	Maljari
Medium coarse	17-26	AKH4, Sanjay
Superior medium coarse	26 – 35	Nerma
Fine	35 -48	Bur 1007
Superior fine	40- 80	MCU5, H4, H6
	> 80	Varalaxmi, Suvin, DCH 12

6. Fibre maturity

- Fibre is matured when the cavity of the lint is completely filled with the cellulose.
- Extent of the filling indicate its maturity.
- According to cellulose content fibres are classified into
 - Mature fibres - Yellowish white fibre
 - Half mature fibres - Bluish or bluish green
 - Immature fibre - Deep blue or purple

Trash content or Foreign Matters:

- Foreign matter mainly consists of debris of leaves and broken stems of cotton and weeds that mix very easily with the lint during harvesting the amount of foreign matter remaining in the lint after ginning depends mainly on the efficiency of the drying and cleaning process in the ginning plant.
- Presence of foreign material will reduce the quality and yarn manufactured from such cotton will have poor strength and gives bad appearance presence of foreign material can be detected and measured quantitatively by instrument called **SHERLY ANALYSER**

7. Hygroscopicity

- The dry cotton absorbs moisture from the atmosphere. Presence of moisture in the lint affects the colour, elasticity, luster etc., and the fibres having moisture break very frequently.
- Thus the **fibres which absorbs less moisture are considered to be of superior quality** and vice-versa.

Ginning percentage:

- Recovery of lint from seed cotton is called Ginning percentage. A variety of cotton with high percentage of ginning is preferred as more lint per unit weight of seed cotton can be obtained from such varieties. This value ranges from **24 -43 %** in different cottons
 - Barbadense - 28-30%,
 - Hirsutum - 34-38% ,
 - desi cottons - 36-42%

$$GP = \frac{\text{Weight of lint}}{\text{Weight of seed cotton}} \times 100$$

8. Neppiness

- It refers to formation of small knots or specks in the yarn manufactured from cotton.
- Knots generally occur if fiber is not cleaned and ginning not done properly, lesser the neppiness, superior is the quality of fibre.
- Neps are tangled knots of fibre, caused by mechanical processing.

9. Lint Index

- It is the weight of lint from 100 seeds

$$\text{Lint Index} = \frac{\text{Weight of 100 seeds} \times GP}{100 - G.P}$$

10. Seed Index

- It is the test weight, which is weight of 100 seeds (g). Seed index of cotton varies from 4.8 to 11g.

11. Oil content

- It varies from 14.5 to 22.5% in desi cotton and ranges between 17.5 to 22.5 % in American cottons.

COLOURED COTTONS

- Natural coloured cottons are in existence in all shades from white to black.
- As per historical documents, blue, purple, pink, green, brown cottons were in cultivation and usage in coastal Peru.
- In Mexico wild trees of brown cotton are grown as perennial crops. The brown cotton are called coyoqui and yellow cotton is coyuchi. These are still spun by tribals in Mexico.
- In Indian brown cottons of *G. arborium* and *G. herbaceum* are grown in some remote areas of Kakinada in AP and Tripura.
- The natural colored cotton are environmental friendly and economically viable as they are sold at premium price.
- They do not fade on washing.
- The disadvantage of coloured cotton is as they yield less, fibres are shorter, low strength, low micronaire value and low maturity coefficient.





Thank You...