Lesson 13
COTTON
Gossipium sp

Cotton

- It is white gold
- Backbone of textile industry
- Contributes 7% of GDP
- Providing employment to 60 million people in India
- 45% world's fibre need is met from
- 10% of world's edible oil

Importance of cotton

- It is cultivated primarily for lint
- Raw cotton is also used for medical and surgical purpose
- Linters are used cushions, pillows etc
- Also used for high grade paper, rayon, films, explosives
- Stalk is a fuel
- Seed crushed for edible oil
- Cakes and meals are excellent cattle feed

Cotton – World production Scenario (1996-97)

Country	Area -M ha	Lint -M tonnes	kg lint /ha
India	9.2	3.0	327
USA	5.2	4.1	792
China	4.7	4.2	890
Pak	3.2	1.6	497
Uzbekistan	1.5	1.0	689
World	33.8	19.4	574

+ Argentine, Turkey, Brazil, Turkmenistan, Greece, Australia, Egypt

Cotton – Indian Scenario (1996-97)

State	Area -M ha	Lint -M tonnes	kg lint /ha
Maharastra	3.10	Lint is 30% of Kapas0.56	182
Gujarat	1.52	0.43	282
AP	1.01	0.48	477
Punjab	0.74	0.27	367
Karnataka	0.67	0.15	229
Haryana	0.65	0.23	354
Rajasthan	0.65	0.24	364
MP	0.53	0.32	605
TN	0.26	0.09	360
India	9.17	2.97	327

Note: Lint is around 30% of kapas

- Cotton is cultivated in 9 states in India

- Area is classified as:
- Northern – Punjab, Haryana, NW Rajasthan & W. UP (hirsutum-arboreum)
- Central – Maharastra, MP, Gujarat & S. rajasthan (herbaceum – arboreum-hirsutum)
- Southern – Karnatak, AP & TN – (hirsutum- arboreum- herbaceum)

Origin

- Old world cotton with 'A' genome may be from Southern Ethiopia
- *G. arboreum* and *G. harbaceum*
- Called as 'desi' cotton
- New world cotton 'D' genome
- *G. barbadense,(Egyptian) G hirsutm* (American) are New world cotton

Cultivars and hybrids

- Lot of work on varietal improvement as early as 1900
- Hybrids are available at plenty
    - Hirsutum varieties are famous
        - MCU series
            - MCU 5, 7, 9, 10, 11, 12
        - LRA 5166
    - Arboreum
        - K 9, 10, 11
    - Barbedense
        - Suvin (Anjali), Surabi
    - Hybrids
        - Jayalakshmi, TCHB 213, HB 224,

The plant

- Root
    - Tap root system
    - Grows more than 1.6 m
- Shoot and branches
    - Monopodium and sympodia
    - It is similar in all except arboreum
        - In arboreum growth continues in monopodium
- Leaf
    - Spirally arranged on the main stem
- Fruiting structure
    - Begins as flower bud or square
    - After flowering t becomes a fruit called boll

Growth stages

- Germination phase -4-7 days
- Early vegetative phase
- Squaring- it may be from 35-70DAS depending upon
    - The variety
    - Location and
    - Management
- Flowering
    - 20-35 days after first square formation

    - It continues for 60-80 days
    - However peak flowering is 70-100 DAS
- Boll development
    - Within 15-18 days boll attains 90% size
    - Mature size is attained within 25 days
    - Cotton fibre develops from the outermost cells of the seed-coat
    - Fibre elongation is complete by day 21-24
    - Secondary wall thickening strengthens the fibre and continues up to 30-40 days after anthesis

Climate

- A mean average temp of <15°C for crop growth
- Optimum temp for vegetative growth is 21°C
- For fruiting a day temp of 27-30°C with large diurnal variation
- Frostless period of 180-200 days
- Well distributed seasonal rainfall
- Open sunny weather

Soils

- A soil to a depth of not less than 60cm
- Sandy, sandy loam, black soils
    - When the rainfall is heavy - a coarse textured soil
    - When moisture is problem then clay soil

Season

- North Zone
    - 1st week of May
    - For the new varieties 3rd week to 1st week of June
- Central zone
    - 3rd week of June to 1st week of July
    - Irrigated may start from March
- Southern zone
    - June in Karnataka
    - Jun / July in red soil of AP
    - August in TN

Field preparation

- Fine tilth is not a pre-requisite
- Application of FYM / compost
- Chiseling may be to break hard pan
- Forming ridges and furrows is ideal

Spacing and seed rate

Variety / Hybrid	Spacing	Seed - Fuzz	Seed- Delinted	Seed Naked
MCU5, 9, 11, SVPR 2, LRA 5166	75 x 30	15	7.5	-
KC 2	45 x 15	20	15	-
SUVIN	90 x 45	-	-	6
Jayalakshmi, HB 224, TCHB 213	120 x 60	3.75	2.5	-
MUC 7, SVPR 1, ADT 1	60 x 30	15	7.5	-

Sowing

- Dibble the seeds at 3cm depth
- No of seeds
    - Fuzzy seeds
        - Hybrids - 2
        - Varieties -3
    - Delinted seeds
        - Hybrids – 1
    - Varieties - 2

In organic fertilizer – kg /ha

Variety / Hybrid	**N**	**P_2O_5**	**K_2O**
MCU5, 9, 11, SVPR 2, LRA 5166	80	40	40
MUC 7, SVPR 1, ADT 1	60	30	30
SUVIN, Jayalakshmi, HB 224, TCHB 213	120	60	60

- P & K as per soil test
- Time of application for Group I & II
    - ½ N + P+K basal
    - ½ at 40-45 DAS
- For Group III
    - N as three equal splits as basal, 40-45 and 60-65 DAS
- If the previous crop if heavily fertilized (for crop like ragi) reduce N level by 25%
- If basal not applied fertilizer may be applied at 25th DAS
- Application of 'azospirillum' saves 25% N requirement

Weed management

- Herbicide application
    - Pre-emergence application of
        - Fluchloralin 1.0 kg
        - Pendimethalin 1.0 kg
    - Hand weeding at 30-45 DAS

Irrigation

- Cotton can be irrigated at
    - 75% depletion available soil moisture in clay
    - 50% ASM at sandy loam soils
- Early irrigation is important to have proper plant growth
- An mild stress before flowering is advantageous
- After flowering very crucial
    - Deficit results in fruit abscission
    - Excess leads to excess vegetative growth
- Methods of irrigation
    - Flooding through furrows
    - Surge may be followed
    - Drip fetigation is also possible

After cultivation

Thinning and gap filling

- Gap filling on 10th day

- Seedlings raised from by polyethylene bag may be useful
- Thin the seedlings to single plant on 15th day

Earthing up

- Digging and earthing up is essential for soil aeration

Nipping

- If monopodia continues more than 15 nodes

Harvesting

- Hand picking is usual practice
- Strippers – spindle or brush type is used in developed countries
  - Periodical
  - Early morning
  - Without bracts or with minimum
- May be machinery
  - Method of sowing needs change
  - Varietals preference
  - One time harvest
  - Weather at maturity (RF) plays vital role
- Seed cotton should be collected from fully opened bolls
- After harvesting should be dried in clean threshing floor
- Should not be mixed with other varieties
- Hand picking and cleaving the pest infected kapas will enhance the quality

Quality parameters

- Ginning percentage
- Color
- Trash
- Fibre quality
- Fibre length
- Fibre fineness
- Fibre sterngth
- Spinning performance
- Oil content (14-26%) of the seed etc.
  - Absence of gossypol, gossy purprin, gossy pulvin

Very Important management

- Pests and disease control

Cropping system

- Rainfed areas
  - Mono cropped
  - Mono with mixed crops
    - Pulses, millets, groundnut
- Irrigated
  - Cotton – wheat
  - Cotton – pulse – millets
  - Rice - cotton

Rice fallow cotton

- It is cotton cultivated in rice fields immediately after the harvest of rice when the field is in waxy condition when the season is optimum.
- No field preparation is needed to sow the crop.
- It may also be called minimum tillage crop.
- Management of previous rice crop including land leveling, P & K management, weed management, water management, and height of harvest of rice stubbles etc decides the efficiency and growth characters of cotton crop.
- Season
    - Jan 15th –Feb 15th
- Field
    - Immediately after the harvest of rice
    - Sowing at waxy soil condition
- Season
    - Jan 15th –Feb 15th
- Field
    - Immediately after the harvest of rice
    - Sowing at waxy soil condition
- Varieties
    - MCU 7, SVPR 1, ADT 1 LRA 5166
- Spacing
    - 60 x 30 and (75 X 30 for LRA)
- Fertilizers
    - 60:30:30
- Gap filling and thinning
    - Gap filling from 7th day onwards
    - Thinning on 15th day
    - Hand weeding around the plant
        - From 15th day
- Digging the rows and earthing up
    - From 21st day
- Irrigation
    - After drying of the soil dug between the rows
- Fertilizer application
    - Around 35th day
    - Followed by 1st irrigation
- Earthing up
    - Around 40th day after the moisture dried and soil loosened for second time
- 2nd irrigation may be around 50-60 DAS
- Plant protection
    - As per the need