

A close-up photograph of cotton bolls on a branch, with a semi-transparent white box overlaid in the center containing the title. The background shows a vast field of cotton plants under a clear blue sky.

Cotton Manual

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Section 1: Introduction:

- Cotton is an important world's fiber crop

- The oil of cotton is used as raw material for production of edible ghee
- Pakistan is at 5th number in production of cotton in whole world and 70% cultivation is produced in Punjab

Previous 6 years data of cotton, Total area, yield and Average yield:

Year	Area in thousand hectares	Area in thousand acres	Total yield in thousand patches	Average yield in kg /hectare	Average yield per mond in acre
2015-16	2242.72	5542	6343	1358	14.72
2016-17	1815.34	4486	6978	1845	20.00
2017-18	2052.93	5073	8077	1889	20.48
2018-19	1888.00	4665	6826	1736	18.82
2019-20	1879.73	4645	6306	1610	17.46
2020-21	1546.27	3821	4964	1541	16.71

Classification of cotton grown areas in Punjab:

Core area:

Multan, Khanewal, Vehari, Lodhran and Bahawalnagar
Bahawalpur and Rahim yar khan
DG khan, Rajan pur, Muzaffargarh and Layyah

Non-core area:

Sahiwal, Okara and Pakpattan
Faisalabad, Toba Tek singh, Bhakkar and Mianwali
Qasoor

Production technology of cotton:

Section 2: Preparation of land:

- For better cultivation of cotton crop fertile soils are preferable which after preparation looks like beads. It has better organic matter percentage and it has capacity to store more water. It did not have hard pan in sub soil so that the roots can easily penetrate
- Deep ploughing is done. It allows the root to go deeper as well as it allows the soil to store more water
- For better germination of seed and for better utilization of water land must be levelled with laser leveler
- Previous crop residues to be incorporated into the soil

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- For this purpose, rotavator, disc harrow sub soil should be used
- Green manure crops should be incorporate in to the soil before 30 days at field capacity and irrigate the field within 10 days so that they can be decomposed
- Half bag of urea should be added for fast decomposition

List of varieties of cotton for 2020 and 2021:

IUB 13	MNH 1016
IUB 222	MNH 1020
BS 15	MNH 1026
CIM 600	MNH 1035
CIM 602	FH-Super
CYTO 179	FH-490
CIM 598	BS 20
FH 114	CIM 663
FH 142	CIM 343
FH Lalazar	NIAB 1011
RH 668	HATAF 3
MNH 886	CEMB Clean Cotton 3
NIAB 545	ICI 2424
NIAB 878	NIAB 545

Attention:

- It is also important to cultivate non-Bt as well so that pests cannot develop resistant again certain insects
- If pests attacked increased from economic thresh hold level accordingly chemicals should be used

Seed quantity:

- For cultivation of cotton recommended seed, free from diseases and healthy seed should be used.
- Approved cotton seed must be purchased from offices of Pakistan Seed Corporation and registered private companies

Seed rate according to germination %:

Seed germination %	For Drill seed quantity per acre in kg



	Without lint	With lint
75 % or more	6	8
60 %	8	10

- For sowing on ridges 6-8 kg per acre seed is used
- For better yield production proper plant concentration should be present.

Sowing time according to method of sowing:

No	Sowing time	P-P distance	R-R Distance	Per acre plants population
1	1 st April - 30 th April	12 inches	2 ft-6 inches	17500
2	1 st May - 31 st may	6-9 inch	2 ft - 6 inch	23000 - 35000

- Place 400 cottonseed on two layers of pre-soaked towel or gunny bag and placed in shade to determine the germination rate. Keep the towel moist by using sprinkler, that will facilitate the germination of seed. Open the layers of towel/gunny bag and count the number of germinated and non-germinated seeds for calculation of germination percentage of a specific variety

Treatment of seed:

- Cottonseed must be treated with chemical before sowing to protect the plant from sucking insects (White fly)

Section 3: Methods of sowing:

Cultivation through drill:

- Sowing of cotton with seed drill in rows at distance of 2.5 feet and at depth of 2 to 2.5 inch

It has many benefits:

- It saves water up to 20 to 30 %
- Weed control is easy
- Fertilizer application may be more effective
- Better drainage of water if there is heavy rain falls
- It prevents shedding of bolls
- It gives higher yield



Sowing on bed and furrow:

- Land must be leveled for machinery sowing
- It should be on dry ridges
- For early sowing irrigate the field in 5-6 days of sowing for better seed germination, but this method is not commonly used now

Hand sowing:

- For hand sowing first water is irrigated to 6-7 inch deep
- After irrigation immediately at above 1 inch sow the seed with hand
- Gaps may be filled after 2nd irrigation is applied

To minimize the side effects of rain:

Following are the measures to minimize

- Hoeing should must be carried out at field capacity
- Small ponds should be made in middle of field for drainage of extra water
- In case of heavy rain, then power sprayers should use for chemical sprays

Thinning:

- For better production of crop, it is necessary to keep a proper distance of plants between rows
- Thinning should be completed 20-25 days after sowing or before first irrigation, or after hoeing in one time
- The areas where attack of virus is high followed there thinning after first irrigation and affected plants musty be eradicated

Section 4: Weed:

- It is seen that loss of cotton from pests and virus starts from weeds present at the edges of the field
- So, weeds at corners must be eliminate before sowing
- Weeds of cotton are itsit, madhana grass , jungli cholai , lehli , qulfa , tandla, hazardani, khabbal, and deela

Itsit:
Trianthema portulacastrum

Madhana grass
Dactyloctenium aegyptium



Tandla:
Digera arvensis

Qulfa:
Portula oleracea



Deela:
Cyperus rotundus

Lehli:
Convolvulus arvensis



Losses of weeds:

- It decreases yield to maximum level
- It gives shelter to pests of crop
- It can compete with crop for nutrients
- It spreads leaf curling virus and mealy bug pest
- Roots of weeds release chemical material which can cause losses

Eradication of weeds:

Through hoeing:

- It has many other benefits as well such as to store moisture
- It offers soil aeration
- Hoeing at a depth of 2-2.3 inch is enough
- If eliminated the weeds once, it is sufficient

Chemicals for eradication of weeds:

Pre emergence herbicides:

Pendimethylin 33 EC	1000 to 1250 ml
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Post emergence herbicides:

<u>Herbicide</u>	<u>Weed type</u>	<u>Quantity per acre</u>
Glyphosate	for all weeds	1200 ml

Section 4: Irrigation:

- It should be according to type of soil, weather and condition of crop
- Water shortage symptoms appears at the upper part of plants

Method of sowing	Irrigation
For sowing in lines	First irrigation after sowing from 30-35 days and remaining 12-15 days.
For sowing on bed and furrow	After 3-4 days sowing, 2 nd 3 rd and 4 th delay of 6-9 days, and remaining after 15 days of interval

Recommended fertilizers for Bt varieties:

Soil health	Nitrogen kg / acre	Phosphorus kg/ acre	Potash kg / acre
Weak	100	40	38
Medium	90	35	38
Fertile	38	30	80

For non-core areas:

Soil health	Nitrogen kg / acre	Phosphorus kg / acre	Potash kg / acre
Weak	90	40	30
Medium	80	35	30

Fertile	70	30	30
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Fertilizer recommendation for non Bt varieties:

For core areas N, P,K should be 69,35,25 and for non-core areas it should be 58 , 35 and 25
In case of zinc deficiency use of zinc sulphate of 33-% 5 kg or 21% 10 kg and boric acid 17% 2.5 kg
or Borax 11 % 3.5 kg

Section 5: Diseases of cotton:

1. Bacterial leaf blight:



- This disease is also known as angular leaf spot, symptoms include black arm brown spot on leaves that turn into black in case of severe attack
- Seed borne and bacterial disease

2. Boll rot:



- Causal organism ***Pageant agglomerate***
- Bacterial disease
- Boll turned into black color
- Leaves color turned into yellow

3. **Cotton Leaf Curl Disease (CLCV):**



- White fly is a vector of CLCV
- Upward and downward turning of leaf
- Leaf, vein clearing, leaf enation (small leaflet) in case of severe infection

4. **Cotton wilt:**



- Two causal agents ***Samarium scriptorium*, *Diverticulitis dahlia***
- It's a fungal disease
- Plants remains short

5. Root rot of cotton:



- Fungal and bacterial disease
- It harms roots

Insects pest of cotton:

1. Jassid:



- It causes yellow spots on leaves and sides turned into red
- Leaves turned downward cup shaped
- The ETL is 1 per leaf
- Rain and humidity increases the pest

2. White fly:



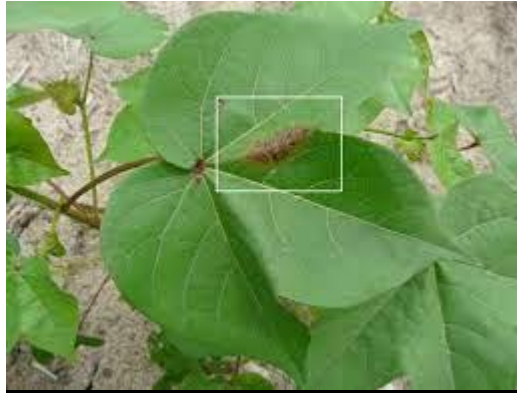
- It sucks sap (Adult and nymph are active)
- It grows black mold
- It spreads CLCV
- The ETL is 5 per leaf

3. Thrips:



- Lower side of leaf turned into white color
- Collapse of leaf
- In severe attack, fallen of leaf occur
- The ETL is 8-10 per leaf

4. Cotton mites:



- Adult and nymph both suck the sap
- Attack in patches
- Leaves turned yellow, red dry and fall
- Make web on lower side of leaf
- The ETL is 10 -15 per leaf
- Found on lower side of leaf

5. Cotton Steiner's:

Red cotton bug:



- Rotting of cotton bowl
- Stain the cotton into red

Dusky cotton bug:



- It reduces weight, germination, oil quality and lint of seed

6. **Mealy bug:**



- Suck the sap and cause weakness in the shoots
- Shoots turn into dry
- Secrete honey dew
- Grow black fungus
- Effect photosynthesis

7. **Spotted boll worm:**



- Make holes in twigs, shoots and later in bolls
- ETL is 3 larvae per plant

8. American boll worm:



- Feed on twigs, shoots, flowers and boll
- ETL is 3 larvae per plant

9. Pink boll worm:



- Its scientific name is ***Pectinophora gossypiella***
- *Family: Gelechiidae*
- Larvae attack on twigs flowers and bolls
- Rosette flowers
- Larvae entered and feed on seeds in bolls
- Destroy the ginning factories till 31st Jan
- ETL 5 larvae per seed boll
- Attack only on cotton
- ETL is 3 larvae per plant

10. Army boll worm:



- Larvae feed on leaves and bolls
- Gregarious in nature
- Leaves look like sieve after attack
- ETL on observation

Picking of seed cotton:

- Picking should be done when 40 - 50 % bolls are opened
- Right time: 10: 00 AM to 4: 00 PM
- Start picking when night dew is evaporated
- Picking of cotton after (15-20) days interval
- Daisy cotton 8 days interval
- Don't mix yellow spotted cotton with white cotton
- Avoid plastic material, dry leaves, use gunny bags

Storage of cotton seed:

- Moisture of cotton seed should be 8 to 10 %
- During storage place 30 tablets of Aluminum phosphate in store for prevention of pink boll worm larvae in seeds

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