

Production Protocol for ELS Cotton



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The term 'Extra Long Staple' (ELS) cotton typically denotes a cotton fibre of extraordinary fibre length. As per the ICAR-CIRCOT, Mumbai classification, staple length of more than 32.5 mm is considered as ELS cotton in India.

Weather for ELS

- Maximum temperature ranging from 29.2 to 34.6°C
- Minimum temperature ranging from 22.7 to 24.3°C
- Relative humidity ranging from 70.3 to 85.2%
- Solar radiation ranging from 343.8 to 544.1 cal/cm²

Seasons:

- **Tamil Nadu:** August-September
- **Madhya Pradesh:** June-July

Genotypes

Tamil Nadu

- **Barbadense variety released:** Suvin, CICRB cotton 37, CICRB cotton 45, CICRB cotton 55, CO 18, DB1601, DB1602 & ARBB1502
- **Hirsutum varieties (more than 32.5 mm length):** MCU 5, Surabhi, Suraksha, Subhiksha, Sunantha,
- **Inters specific Hybrids (non Bt):** Varalaxmi, DCH 32, TCHB 213, Sruthi, RAHB -87, DHB- 915, DHB-1071, DHB-1071, DHB-105

- **Inters specific Hybrids (Bt):** DCH 32, RCHB 708 Bt, RCH 725, Ankur HB 1902, Ankur HB 1950, Ankur HB 1976, Ankur 2110, MRC 6918, MRC 7918, Kasinath, NFHB 109, KDCHB 407, KDCHB 786, Minarva 904, NCHB 940, NCHB 945, NCHB 990, NCHB 991, NCHB 992, VBCHB 1010, VBCHB 1203 and BIO SEEDPULIBG II

Madhya Pradesh

- **Inters specific Hybrids (Bt):** RCHB708 BG II, RCHB625 BG II, SP911 BG II, SP904 BG II, MRC 7918 BG II, MRC6918 XLB II & SWCH 5017 BG II

Land preparation

- Prepare the field to get a fine tilth. Chisel the soils having hard pan formation at shallow depths with chisel plough at 0.5 M interval, first in one direction and then in the direction perpendicular to the previous one, once in three years.
- FYM or Compost @ 4 t/acre apply 2-3 weeks before sowing.
- Apply biofertilizers viz., *Azospirillum*, Phosphobacteria (or) *Azophos* each @ 1 kg/ac (or) 200ml/ac along with 1 kg of Silicate Solubilizing Bacteria (SSB) mixed with 10 kg of FYM and 10 kg of sand, before forming ridges and furrows.
- Mono-cropping Breaking: Growing ragi @ 20 kg/ac. in the off season and incorporation at 45 days old crop with *Trichoderma viridi* before the cotton crop.

Seed treatment

- **Micronutrients:** Zinc Sulphate, Ferrous sulphate and Manganese sulphate @ 0.4 g per kg of seeds with polymer @ 8 ml/kg of seed
- **Sucking pest & soil borne diseases:** *Beauveria bassiana*, *Bacillus subtilis* and *Trichoderma asperellum* each @ 10 g/kg of seed
- **Biofertilizer:** *Azospirillum*, Phosphobacteria (OR) Azophos and Silicate Solubilizing Bacteria (SSB) each @ 400 g or 50 ml of liquid formulation using rice gruel for 30 minutes before sowing

Spacing, plant population and seed rate

Varieties / Hybrids	Spacing (cm)	Plant Population / acre	Seed rate (kg / acre)	Soil Fertility Status
Barbadense varieties	90 x 45	9800	2.4	-
HXB Hybrids	90 x 60	7400	1	Normal soil
HxB Hybrids	120x 60	5500	0.75	High fertile soil

Weeding

- Manual weeding: 20 and 45th day (or)
- Pre-emergence-Pendimethalin @0.5kg/ac. with one hand/mechanical weeding on 45th day after sowing (or)
- Pre-emergence-Pendimethalin @0.5/ac. with post emergence application of herbicide tank mixture of quizalofop-ethyl @ 20 g ai/ac. + pyriithiobac sodium @ 40g ai /ac. at 30 DAS at 2 to 4 leaf stage of the weeds.



Thinning:

At 20th day of sowing.

Irrigation Scheduling:

- First irrigation: After sowing
- Life irrigation: 5th days after sowing
- Two irrigations during vegetative phase (16-44 days)
- Five times during the flowering phase (45-100 days)
- Five times during the boll development & maturity phase (101-160 days)

Fertilizer levels

Varieties and Hybrids	Recommended dose per Acre (kg)
Barbadense Varieties	32:16:16 kg N, P ₂ O ₅ & K ₂ O
Interspecific hybrid	
Tamil Nadu	48:24:24 kg N, P ₂ O ₅ & K ₂ O
Madhya Pradesh	40:20:20 kg N, P ₂ O ₅ & K ₂ O

Fertilizer schedule	% of recommended dose per Acre
Basal	1/3 of N, 100 % P and 50 % K + 5 kg of MN mixture
Squaring stage	1/3 of N + 50 % of K
Flowering stage	1/3 of N

Drip Fertigation Schedule:

Recommended dose per Acre (kg/Acre)	Fertilizer schedule
24 kg of P ₂ O ₅	Basal - 100 % as soil application
40 kg of N and 24 kg of K	100 % of N & K fertigation through drip in six equal splits during 30 DAS to 105 DAS at 15 days interval





Foliar application for better growth and yield

Foliar nutrition schedule	Recommended dose per Acre
Flowering and Boll development stage	1.5 % DAP + 0.5% KCl
Flowering and Boll development stage	Cotton plus @ 2.5 kg/ac. mixed in 200 litres of water
Drought management	PPFM (Pink Pigmented Facultative Methyloph) @ 200 ml/ac. mixed in 200 litres of water

Square shedding

- Foliar spray of Planofix @ 4.0ml/10lit of water during pre-flowering and peak flowering stages

Reddening

- Foliar spray of 0.5% MgSO₄ + 1.0% urea + 0.1% ZnSO₄ on 50 and 80th day

Canopy management

- Mepiquat Chloride @ 60 ppm when height node ratio (HNR) reached 1.5 followed by 30 ppm twice at 15 days interval after the first spray. Topping: Nipping on 20th node (85-90 DAS).

Polymulch technology

- Polyethylene mulch film of 30/40 micron thickness, preferably dual colour, the top layer silver for reflective action with bottom layer black colour is ideal for cotton.

Water logging

- Drainage practice by adopting ridges and furrows land configuration followed by foliar application of Salicylic acid @ 6.9 g dissolved in 300 ml of ethyl alcohol and then add into 100 litre of water for spraying of one acre or 2 kg of KNO₃ dissolved in 100 litre of water three days after drainage of waterlogged field



Plant Protection

Window based strategy for management of Insects

Crop growth stage 0-60 days after sowing (DAS)

Insect	Recommended management tactics
Stem weevil	Basal application of neem cake @ 100 kg/acre and earthing up @ 45 DAS for stem weevil (or)
Sucking Pests	Spraying of NSKE 5% or Neem oil 3% or neem oil-based formulation 5 ml /litre (300 or 1500 ppm) + 1.0gm detergent emulsion. Installation of yellow sticky traps @ 40/acre on 30 DAS
Bollworms	Installation of pheromone traps @ 8 per acre

Crop growth stage 60-90 days after sowing (DAS)

Sucking Pests	Release of Chrysoperla @ 4,000/acre ETL based application of Flonicamid 50WG @ 60g/acre or Dinotefuran 20SG @ 60 g/acre or Imidacloprid 17.8 SL @ 50 ml/acre.
Bollworms	NSKE 5% + Neem oil 3% or neem oil-based formulation 5 ml /litre (300 or 1500 ppm) + 1.0 gm detergent emulsion ETL crossed i.e. >10% damaged flowers (Rosette flowers) or 10% damaged green bolls spray Profenofos 50 EC @ 600 ml/acre or Emamectin benzoate 5SG @ 90 g/acre Chlorantraniliprole 18.50 % SC @ 60 ml/acre

Crop growth stage 90-120 days after sowing (DAS)

Sucking Pests	ETL based application of Thiamethoxam 25WG @ 40g/acre or Diafenthiuron 50%SC @ 400 g /acre Spinetoram 11.7 SC @ 170 ml/acre for sucking pests (Thrips)
Bollworms	Release of parasitoid <i>Trichogramma bactrae</i> @ 60000 per acre ETL crossed i.e. >10% spraying of Profenofos 50EC @ 600ml/acre or Emamectin benzoate 5SG @ 100 g/acre Or Indoxacarb 14.5 SC @ 200ml/acre).

Crop growth stage > 120 days after sowing (DAS)

Bollworms	Spray Cypermethrin 10% EC @ 220-300 ml/acre or Lambda cyhalothrin 5%EC @ 200 ml/acre or Fenpropathrin 10% EC 250-400 ml/acre for PBW
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Crop growth stage > 120 days after sowing (DAS)

Bollworms	Spray Cypermethrin 10% EC @ 220-300 ml/acre or Lambda cyhalothrin 5%EC @ 200 ml/acre or Fenpropathrin 10% EC 300-400 ml/acre for PBW
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Window based strategy for management of Disease

Crop growth stage 0-60 days after sowing (DAS)

Disease	Recommended management tactics
Root rot	Seed treatment with <i>Trichoderma</i> @4g per kg seeds (or) <i>Pseudomonas fluorescens</i> WP @10 g per kg seeds Seed treatment with Carboxin 37.5% + Thiram 37.5% DS @3.5 g per kg of seeds Soil drenching with <i>Trichoderma</i> @ 4 kg per acre with 80 kg moist FYM. Spot drenching with Carbendazim 50 % WP 2g per litre water at the base of root rot affected plants as well as surrounding healthy plants.
BLB disease	Seed treatment with Carboxin 75 % WP 1.5 g per kg seeds (or) Carboxin 37.5% + Thiram 37.5% DS @3.5 g per kg of seeds Foliar spray with streptomycine 1g + copper oxychloride 25 g per 10litre water.
Seedling disease	Fluxapyroxad (333 g/L FS) @1.5 ml per kg seed

Seed-borne disease	Tetraconazole 11.6% W/W (12.5% w/v) SL @1.5 ml per kg of seeds Drenching early symptomatic plants and surrounding plants with <i>Trichoderma (harzianum or viride)</i> 1% WP @ 50 g or Carbendazim 50 WP @ 20 g per 10 liters of water.
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Crop growth stage 60-120 days after sowing (DAS)

Target leaf spot, Alternaria leaf spot, Myrothecium leaf spot,	Prophylactic spray Propineb 70 WP@ 25-30 g (or) azoxystrobin 18.2%w/w + difenoconazole 11.4% w/w SC@ 10 ml (or) fluxapyroxad 167 g/l + Pyraclostrobin 333 g/l SC@ 6 g (or) Carbendazim 50 WP@2gm or Propiconazole 25 EC @10 ml (or) Pyraclostrobin 5%+ Metiram 55% WG @20g (or) per 10liters water
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External fungal boll rot Spray	Carbendazim 50 % WP 2g per litre of water.
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Inner boll rot	Prophylactic sprays of Copper Oxychloride 50 WP @ 25 g Spray streptomycin 2.5 g + Copper Oxychloride 25 g per 10 litre water
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Crop growth stage 45-90 days after sowing (DAS)

Tobacco streak virus	Spraying of insecticides (Flonicamid 50 WG @ 4 g or Dinotefuran 20 SG @ 3g or Diafenthiuron 50 WP @ 12 g per 10liters of water)
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Crop growth stage 90-140 days after sowing (DAS)

Grey mildew	Spray with Kresoxim-methyl 44.3% SC @1ml (or) azoxystrobin 18.2%w/w + difenoconazole 11.4% w/w SC@ 10 ml (or) Propineb 70 WP @ 25-30 g or Carbendazim 50 WP@20gm or Propiconazole 25 EC @10 ml (or) Pyraclostrobin 5% + Metiram 55% WG fungicide @20 g (or) fluxapyroxad 167 g/l + Pyraclostrobin 333 g/l SC@ 6g per 10liters water
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Harvesting: First harvest of kapas after 50 % of boll opening and subsequent picking at an interval of 5-7days. Immediately after harvesting, shade dry the kapas to avoid discoloration.

Citation: Sankaranarayanan K, Nalayini P, Raja R, Manickam S, A. Manivannan, Prakash AH, and Prasad YG (2023) **Production Protocol for ELS Cotton. CICR-Folder/2023/8 (English)**

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