Long Staple Cotton Production in Tamil Nadu

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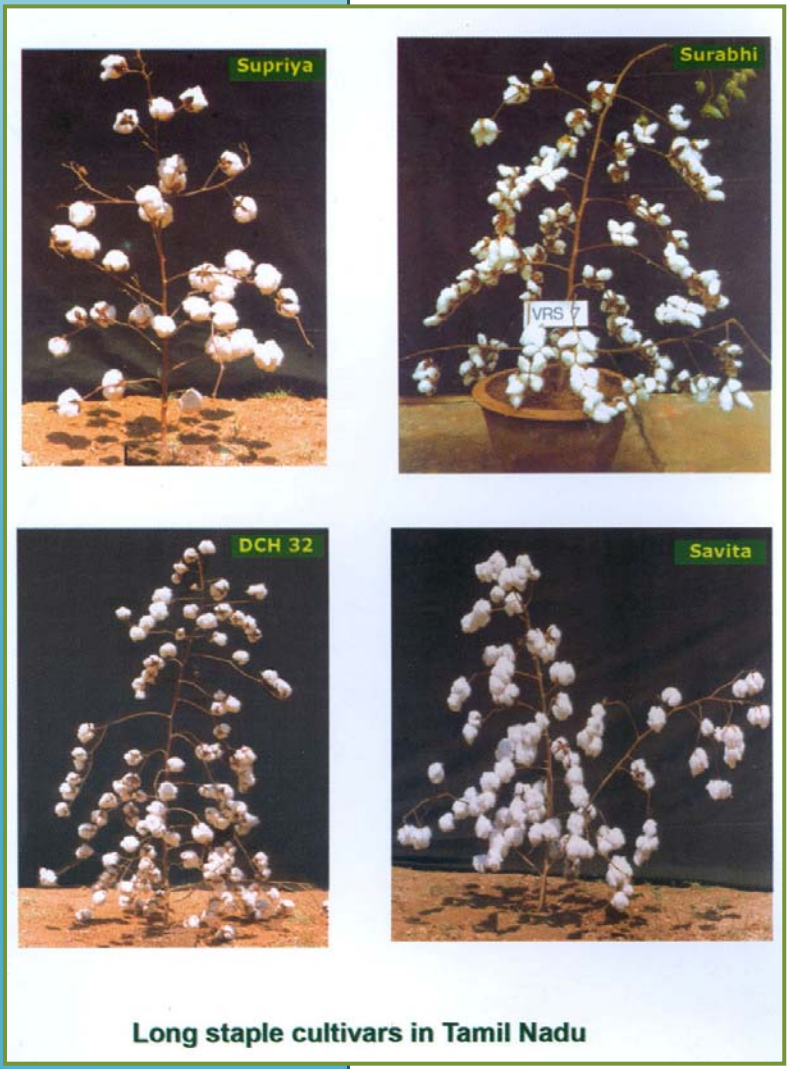
Cotton is an important commercial crop of India. The city of Coimbatore is known as the Manchester of South India. Of the two thousand five hundred textile Mills in India, eight hundred textile mills exist in Tamil Nadu of which 300 are in Coimbatore District itself. The Spindle capacity of this organized sector is about 12.6 million. Apart from this, there are more than 700 small scale sector units which contribute not less than 2.0 million spindles. These sectors on an average consume around 7 million bales of cotton. The long and extra long staple cotton requirement of these mills is around 0.8 million bales per annum.

Tamil Nadu traditionally grows cotton in an area of about 0.2m hectares and produces about 0.6 million bales of cotton and because of its climate and soil, the State is ideally suited for producing long and extra long staple cottons.

The current production of extra long staple cotton in the country is only around 0.5 million bales. The balance is being met through imports. However, there is a growing apprehension that with the world trade liberalization, removal of quota system and abolition of subsidy on cotton export, the foreign cottons will become costlier and beyond the reach of Indian textile Industry. Further, the Cotton Advisory Committee has projected higher level of consumption of cotton than production during 2005-06. Similarly, the consumption pattern in India is also expected to increase with the expansion of spinning capacity of Indian Textile Mills. With the international prices also firming up, substantial opportunity exists for the export of Indian Cotton to other countries. All these things call for urgent steps to augment our long and extra long staple cotton production in the country.

Tamil Nadu is a pioneering State in the development and cultivation of long and extra long staple cotton in the country. Release of first extra long staple *G. hirsutum* variety MCU 5 in 1969 is a distinct milestone. The stability and adaptability of this variety spanning across four states and four decades is due to its diverse pedigree involving genotypes from different countries and different species. India is perhaps the only country to harness G. *hirsutum* for spinning good 60s count yam. The release of a verticillium wilt tolerant selection MCU5 VT, in 1984 gave a further lease of life to this variety. Further improvements in verticillium wilt resistance, seed cotton yield and quality were done by hybridization with the wild species *G.mexicanum var. nervosum* Leningrad strain. This was released as Surabhi in 1997. The varieties MCU 5 and Surabhi, mainly grown in both winter and summer seasons under irrigation meet the 60s cotton requirement of the country.



Long staple cultivars in Tamil Nadu

The requirement of textile Industry for extra long staple cotton of G. *barbadense* origin and capable of spinning 120s count yarn was initially met from import of Giza varieties from Egypt, Sea Island types from West Indies and Pima from USA. However, pioneering research done at the Central Institute for Cotton Research, Regional Station, Coimbatore resulted in the development and release of first G. *barbadense* variety Sujata in 1969. However, this variety was capable of spinning only up to 100s count and also suffered from tall plant habit which made plant protection very difficult. By hybridization with the variety St Vincent from West Indies, the second barbadense cotton 'Suvin' capable of spinning up to 120s count was released for cultivation in 1976. Large scale cultivation of Suvin, which at one time touched 30,000 hectares in the Southern states helped the country to attain self sufficiency in Extra long staple production. However, due to increased cost of cultivation, competition from other high yielding hybrids and price fluctuations at the time of harvest, the area under Suvin has been drastically reduced. However, under contract farming and through improved management practices, the area under Suvin is on the increase.

Role of Heterosis or Hybrid Vigor in attaining quantumjumps in production and productivity in cotton is known for decades. India is the only country to have successfully used this phenomenon by growing hybrids commercially on a large scale. India can feel proud of the fact than today both intra hirsutum and interspecific (*G. hirsutum x G.barbadense*) hybrids are under large scale cultivation in the south and central parts of the country. Ever since the release of Hybrid-4 in 1971, as many as 40 hybrids have been released for commercial cultivation for various *agro niches*. Today, Cotton hybrids occupy about 45 per cent of the total cotton area and account for 55 per cent of production. Most of the intra hirsutum hybrids released in the country belong to long staple category. We are not only self sufficient in this category but are also in a position to export a sizable quantity. With the introduction of Bt cotton hybrids for all the three zones, the area under long staple hybrid cotton is likely to increase further.

Long staple cultivars in Tamil Nadu

The first extra long staple intra hirsutum hybrid Savita capable of spinning 60' s count yam was released in 1987 from the Central Institute for Cotton Research, Regional Station, Coimbatore and this was followed by TM 1312 in 1995. Later, Private sector hybrids like RCH 2, Bunny and Mallika were released. These hybrids meet the long staple requirement of the Tamil Nadu textile mills.

The long staple variety Supriya with big bolls, earliness and high ginning out turn is popularly grown in Theni and Madurai districts. Similarly, the variety MCU 13 released from Tamil Nadu Agricultural University, Coimbatore can be grown in the winter irrigated tracts. These varieties are also capable of spinning up to 50's count yam.

The first interspecific (*G. hirsutum x G. barbadense*) hybrid, Varalaxmi was released from UAS, Dharwad. This was followed by DCH 32 in 1974. Even after three decades, these interspecific hybrids are popular in south zone states of Tarnil Nadu and Karnataka apart from certain pockets in Uttar Pradesh. The interspecific hybrids are capable of spinning up to 80's count yarn. Due to poor adaptability of these two hybrids in Tamil Nadu, a new hybrid TCHB 213 was released from Tamil Nadu Agricultural University in 1991 and this has replaced DCH 32 in most parts of the state. These hybrids meet the textile industry's need for spinning 80's count yarn.

VARIETY	MCU 5 VT	SURABHI	SUPRIYA	MCU 13	SUVIN
Notificafion No.	596 E Dt.13.8.84	E 360 Dt.1.5.97	E 295 Dt. 9-4-85		SU 1004 Dt.23.3.76
Kind	*G.hirsutum*	*G.hirsutum*	*G.hirsutum*	*G.hirsutum*	*G.barbadense*
Yield(Q/ha)	25 to 30	25 to 30	20 to 25	25 to 30	20 to 30
Ginning out turn (%)	32	33	38	34	28
Duration (days)	175	170	155	165	190
Boll Weight (g)	4.0	4.0	5.5	4.0	3.0
Lint Index (g)	5.5	5.0	6.0	5.6	4.0

Seed Index (g)	10.5	8.5	10.0	10.5	9.5
2.5% span length(mm)	32.1	33.0	30.6	30.3	40.0
Uniformity Ratio (%)	44	47	46	44	42
Fibre fineness{Micronaire)	3.4	3.6	4.0	4.5	3.5
Maturity Coefficient	66	70	73	77	80
Bundle Strength (g/tex)	24.1	23.9	23.3	22.6	32.3
Area of adaptation	TN,.KAR,AP	TN, .KAR,AP	TN	TN	TN, KAR,AP
Special feature	Verticillium Wilt tolerant	Verticillium Wilt resistance	Early, White Fly resistance	-	
Released by	CICR, Coimbatore	CICR, Coimbatore	CICR, Coimbatore	TNAU, Coimbatore	CICR, Coimbatore

The detailed agronomic and fibre quality attributes of the long and extra long staple varieties are furnished below.

Agronomic and Quality Attributes of long staple Varieties and Hybrids:

Hybrids	Savita	TM 1312	RCH2	Bunny	DCH 32	TCHB 213
Notification No.	SU 743 Dt.23.3.76	408 E Dt.4.5.95	340 E Dt.3.4.2000	1134E Dt.15.11.01	E2 Dt.3.1.83	E.793 Dt.22.11.91
Kind	Intra hirsutum hybrid	Intra hirsutum hybrid	Intra hirsutum hybrid	Intra hirsutum hybrid	Inter specific hybrid	Inter specific hybrid
Yield (Q/ha)	30 to 35	30 to 35	30 to 35	30 to 35	30 to 40	30 to 40
Ginning out turn (%)	34	36	35	36	34	30
Duration (days)	165	165	165	165	185	200
Boll Weight (g)	4.5	5.5	5.0	4.5	4.3	3.0
Lint Index (g)	5.0	5.5	5.8	4.8	5.7	5.0
Seed Index (g)	9.5	10.0	10.8	9.4	10.3	11.4
2.5% span length(mm)	31.9	31.3	30.2	32.0	33.9	34.8
Uniformity Ratio (%)	49	47	50	48	45	47
Fibre fineness (Micronaire)	3.4	3.5	4.2	3.8	3.0	3.3
Maturity Coefficient	68	76	75	70	73	75
Bundle Strength (g/tex)	22.8	21.6	24.3	22.3	23.9	24.3
Area of adaptation	TN, AP, Orissa	TN,AP	TN,AP	TN, AP, Kar	Kar, TN	TN,
Released by	CICR, Coimbatore	CICR Coimbatore	Rasi Seeds, Attur	Nuziveedu Seeds, Hyderabad	UAS, Dharwad	TNAU, Coimbatore

Practices for increasing long staple cotton production in Tamil Nadu

Season & Sowing time: As an irrigated crop, cotton is sown in both winter & summer seasons in Tamil Nadu. *G.hirsutum* varieties and intra hirsutum hybrids can be sown in both the seasons. Considering their long duration. *G. barbadense* and inter specific (*G. hirsutum X G. barbardense*) hybrids are grown during winter season only. Cotton is sown during August and harvested in January-February in winter irrigated tracts. As a summer crop, it is sown in February and harvested in June-July.

Soil Requirement: Cotton can be grown in black, red or mixed soils. Well drained soils are preferred as cotton is sensitive to water logging.

Cropping System: Cotton is cultivated either as monocrop or in rotation with Rice. Jowar or Pulses. Intercropping with Onion, Groundnut or Blackgram is also prevalent.

Land Preparation: Land may be prepared well and brought to good tilth. Farm yard manure or Compost should be applied @ 5 to 10 tonnes per hectare during last ploughing. Neem cake may be applied at the rate of 200 kg per hectare.

Selection of Varieties: Since several long and extra long staple varieties and hybrids are available from State Agricultural Universities, Central Institute for Cotton Research and Private R & D centres, proper selection of variety is every important. Choose a variety best suited to your region. As far as possible varieties of similar duration and quality group may be chosen for a particular region to avoid varietal admixture. It is essential to procure seeds for sowing well in advance from authorized agencies. In case of public hybrids, use only certified seeds.

Seed Rate: Seed rate depends upon spacing adopted. Normally 8 kg of seeds/hectare may be required for varieties. It is advisable to sow 3 to 4 seeds per dibble and thin it down to two per dibble on 15th day to ensure uniform stand. In the case of hybrids, 1 to 3 kg seeds / hectare may be required. Wherever wide spacing and single seeds / dibble are adopted, especially for hybrids, it is necessary to raise seedlings in polythene bags and transplant it on 15th day wherever gap exists in the field. Use only acid delinted seeds.

Method of Sowing: Hand dibbling of seeds is prevalent in Tamil Nadu. However, cotton can be sown using tractor or bullock drawn seed drills. Higher seed rate may be required for varieties while using seed drills. Before sowing, seeds may be treated with imidaclroprid @ 5 g/kg of seeds to prevent sucking pest damage till 40 DAS. Carbendazim 50 W.P. @ 2g/kg or talc formulation of *Trichoderma viride* @ 10g/ kg may be used for preventing root rot or seedling diseases.

Spacing: The plant population and geometry varies with the plant architecture, soil type, soil fertility status, soil moisture holding capacity and genotype. For long staple varieties like MCU 5 and Surabhi, normally followed spacings are 90 x 60 cm with two plants/hill. For Supriya, 90 x 45 cms may be sufficient. For intra hirsutum hybrids 90 x 60 cm with single plant / hill is adopted. For RCH 2 and Bunny hybrids, 90 x 90 cm is recommended. For interspecific hybrids (*G. hirsutum x G. barbadense*), it is essential to adopt a spacing of 120 cm x 60cm.

Wherever Bt Cotton hybrids are grown, it is absolutely essential to grow non Bt (Refugia) hybrids also along with Bt Cotton hybrids. This will help prevent the Bollworms from developing resistance to Bt gene, and will enable farmers to grow Bt cotton successfully for several years.

Nutrient Management: Climatic factors like rainfall and temperature, soil factors like soil type, depth, pH, EC and organic matter, crop factors like sequence and plant factors like genotype and duration determine the nutrient requirement of cotton.

Cultivation of green manure crops like *Sunhemp* and *Daincha* and *in situ* ploughing before cotton enhances soil fertility and soil health. Integrated nutrient management schedules with a part of chemical fertilizers supplemented by farm waste (FYM), crop residues and bio fertilizers are strongly recommended.

1) Farm Yard Manure @ 5 t/ha may be added before preparatory tillage. FYM should be well decomposed and preferably treated with composting organisms such as *Trichoderma viride*.
2) In situ green manuring with fodder cowpea or sunhemp and ploughing at 40 DAS will ensure steady supply of N during grand growth phase. Additional benefits include smothering of weeds.
3) Vermicompost @ 1-2 t/ha can supplement FYM.
4) Seed incoculation (20 g/kg of seeds) or Basal application of (2.5 kg/ha) microorgaisms like Azotobactor or Azospirrilum can reduce the inorganic fertilizer requirement.

Recommended fertilizer dose

1) For varieties, NPK at 60:30:30 kg/ha may be applied as a basal dose. Nitrogen may be applied in splits. 30kg N is applied basally and the balance in two splits on 8th and 10th week after sowing. A higher dose of 100:50:50 kg/ha is recommended for intra hirsutum hybrids and 150:60:60 kg/ha for inter specific hybrids. N may be applied in 4 splits to interspecific hybrids.
2) In micronutrient deficient soils, basal application of micronutrients@ 15kg/ ha is recommended.
3) Urea may be mixed with Neem cake and applied.

4) Foliar applications of Nutrients during peak bolling phase is recommended to prevent leaf reddening and late stage nutrient deficiency. Foliar application of 2% D.A.P. or 1.5 % D.A.P. + 0.5% Potash may be done from 110 DAS at fortnightly intervals. Optimum soil moisture must be maintained during foliar application of nutrients.
5) Micornutrients can also be sprayed to rectify micronutrient deficiency.

Inter cultivation and Weed Management: Weeds compete with cotton crop for nutrients, light and moisture. Cotton is susceptible to weed competition from sowing to about 60 days or till the canopy covers the inter spaces. Fluchloralin or Pendimethalin @ 2 to 2.5 1/ha as pre emergent weedicide can effectively control weeds till first inter cultivation operations on 60th day. However, it is best to remove deep rooted perennial monocot weeds by summer ploughing.

Use of plastic sheets of 30-100 micron thickness as poly mulch effectively controls weeds, saves on irrigation water up to 40 per cent and increases seed cotton yield by more than 50 per cent. Thicker sheets could be used for the subsequent Maize or sorghum crop also.

Regular inter cultivation not only checks the growth of weeds but also leads to better soil aeration and soil moisture conservation. Inter cultivation is normally done with a blade harrow, three tined hoe or a country plough.

Thinning of the cotton crop sown in ridges in the Southern India is a special feature of the irrigated crop. This enables maintenance of optimum population and is best done on 15 DAS. During thinning, retain vigorous seedlings and remove weak seedlings.

Water Management: Cotton generally withstands mild moisture stress and is very sensitive to water logging. Hence, it is essential to judiciously use the available water. The following methods are recommended to economize water usage and extend irrigated areas under cotton.

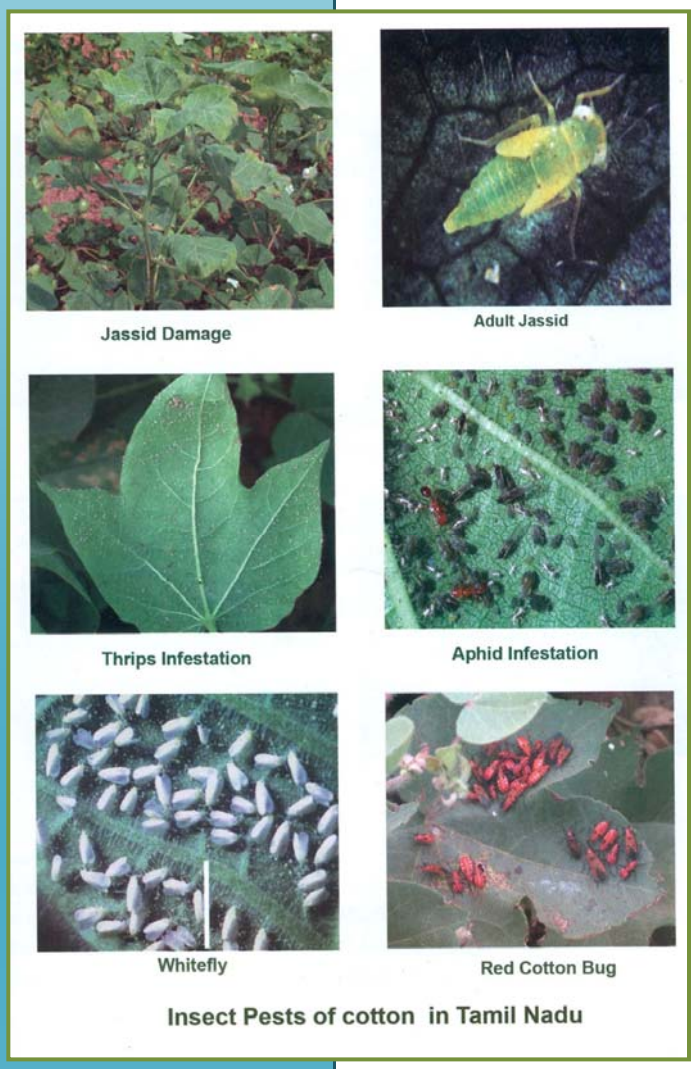
1) Ridges and furrows: Ridge sowing and furrow irrigation is found better than flood irrigation in saving irrigation water from 20 to 30 percent.
2) Alternate furrow irrigation: After first two irrigations, alternate furrow irrigation economizes water by over 30 per cent. Irrigation furrows are alternated in every irrigation.
3) Paired row planting: In this method, the distance between ridges is doubled and cotton is sown on both of alternate furrows and irrigated. This results in 50% water saving.

4. 2: 1 skip row planting: In this method, every third ridges is skipped. It is necessary to increase interrow spacing to maintain optimum population. Sixty to seventy percent saving of irrigation water can be achieved without any reduction in yield.

Growth Regulator: During cloudy weather and during sudden climatic changes, healthy squares and flowers drop. Spraying of growth regulators like Planofix @ 5ml/ 10 litre of water prevents shedding.

Detopping: In fertile soils cotton plants tend to grow very tall. The top sympodia develop only one or two bolls. Detopping is recommended to prevent excessive growth and allow the top sympodia to grow longer and bear several bolls with improved boll size. Bursting of bolls also improves and cotton plants tend to become determinate. Detopping is recommended after 90 DAS, when plants have 15 to 20 sympodia with 4 to 5 bolls / sympodia.

Intercrop: In wide spaced cotton crop, the inter row spaces can be profitably utilized by intercropping with short duration pulses like black gram, green gram or soyabean or vegetables like onion, beetroot or radish. Use of cowpea as an intercrop reduces the sucking pest damage in cotton. After harvest, the remaining bio mass can be used as a mulch.



Pest Management: If cotton pests are not controlled scientifically, damage due to insect pests in cotton can lead to 50 - 70% loss in yield. Repeated use of broad spectrum insecticides either in excess or in sub lethal doses and the use of incompatible insecticides in different combinations have led to several undesirable effects on the cotton eco system. Insects, especially bollworms, have developed very high degree of resistance to most of the insecticides used in cotton.

Increased cost of cultivation and reduced yield levels has made cotton cultivation uneconomical. Integrated pest management aims to reverse the situation by resorting to alternate methods of pest control.

The principal components of integrated pest management are:

1. Avoid growing summer cotton in winter irrigated areas
2. Plant cotton in the proper season
3. Follow crop rotation
4. As far as possible grow cotton of similar duration in a village.
5. Identify alternate hosts and destroy them.
6. Do not store cotton stalks in the vicinity of cotton field.
7. Use correct insecticide in correct dosage and at the correct time.
8. Adopt mechanical removal of affected parts and boll worm larvae.
9. Use bio control agents to reduce dependence or chemical pesticides.
10. Use pheromone traps (15 to 20/ha) to monitor pests.
11. Do not apply excess fertilizer.
12. Maintain optimum moisture with proper irrigation.

Cotton Harvesting and Post Harvest Management: One of the common complaints about Indian Cotton is its high levels of contamination. The Indian Cotton is hand picked and is one of the purest cotton at harvest. But when it

reaches the mills, it becomes most contaminated. Hence, urgent measures are required to maintain the purity of Indian Cotton.

Collect fully burst cotton and the stained cotton separately. To avoid leaf trash and floral part debris, collect cotton only during morning and late afternoon hours. Always shade dry cotton in a well ventilated place. Do not store cotton on cement floor. Use only cloth bags for storing seed cotton. Do not use jute materials either for storage or for transport. It is always preferable to sell the produce after grading in a regulated cotton market.

American Bollworm Moth

American Bollworm
Larval Damage

Pink Bollworm Larva

Rosette Flower
Symptom of PBW Incidence

Pink Bollworm Damage

Stem Weevil Damage

Insect Pests of cotton in Tamil Nadu

Pest and Disease Management

Pests:	
Symptoms	Control measure
1.Aphid Yellowish green in colour. Seen on the ventral side of the leaves and on tender shoots in groups. Due to the sucking of the plant sap from the leaves the leaves curl downwards. Subsequently, the plant growth is affected. Honey dew excreted by the insects affects the photosynthesis and leads to the development of black sooty mould on the upper surface of lower leaves.	Spray any one of the systemic insecticides (Methyl demeton 500ml (or) imidacloprid 100ml/ha) Dorsal and ventral surfaces of the leaves should be drenched throughly. Use hand sprayer during the early stage of the crop. If aphids are observed 80DAS apply Acephate 625gms/ha (or) Monocrotophos 1250ml/ha.
2.Thrips Thrips are yellowish green coloured insects observed in between the veins on the under surface of the leaves. Early symptoms are the appearance of white, silvery spots on the ventral side. Under severe conditions leaves thicken, develop blisters and become bronzed.	-do-
3.Jassids Nymphs & adults remain on the under surface of leaves. Jassids are green in colour; adults are winged and nymphs are wingless and move sideways. The adults and nymphs suck the plant sap due to which edges of the leaves turn yellow, pinkish brown and curl downward like a cup. In severe cases leaves show 'hopper burn' symptoms.	-do-
4.White fly Nymphs and adults are observed on the ventral surface of the leaf and they suck the plant sap. Due to the feeding the leaves turn yellowish red colour and fall down. Squares, flowers and young bolls are also shed and the boll bursting is affected. Ultimately the growth of the plant is affected. The honey dew excerted by the insects leads to the development of sooty mould due to which the quality of the lint is affected.	Remove the alternate hosts such as Abutilon sp. Avoid excess fertilizer and irrigation. Application of Pyrethroids during the early crop growth should be avoided. Yellow sticky traps can be used for attracting and killing the adult whitefly. Apply Neem based insecticides at 2.5lit/ha (or) Triazophos 1875 ml/ ha
5.Red spider mite The insects are red in colour. Due to the sucking of plant sap, the growth of the plant is affected.	Apply wettable Sulphur 1250 gm/ha (or) Kelthane 625 ml/ha
6.Cotton stem weevil The adults weevils feed on the bark of the plant	i. Use high seed rate; remove and

and lay the eggs on the cotyledon nodal region. The grub feed inside the stem by causing spiral galleries and damages the vascular tissue. If infestation is early, the plants dry completely. Grown up plants survive the attack by developing a woody gall at the collar region. The galls are the weak points where the stem breaks if there are strong winds or other disturbances. More than one grab is observed/gall.	destroy affected plants. ii. Earth up on 20 DAS and apply Neemcake (150 kg/ha) + carbofuran 35 kg/ha. Follow it up with stem drenching with NSK @ 5% or chlorpyriphos (4 ml/litre), four times at weekly intervals.
7.American bollworm The larvae damage the squares, flowers and bolls. At the time of feeding the larva inserts the head portion inside the boll and leaving the posterior part of the larvae outside. In the absence of squares and flowers the larvae feed on the leaves also.	Fix pheromone traps for monitoring the adults. Apply Neem seed kernel extract at the squaring stage. Apply anyone of the following insecticides during the early crop growth stage Endosulfan or Quinalphos or Chlorpyriphos - 1500 - 1875 ml/ha If incidence is severe apply Tracer - 175ml/ha (or) Proclaim - 250 gms/ha
8.Spotted bollworm The pest attacks the shoots during the early stage of the crop due to which the drying of the shoots are noticed. Larval feeding on squares can be noticed. Causes flaring up of squares. Boll opening is affected because of the larvel feeding and subsequent boll rot.	Spray Endosulfan - 1500 - 1875 ml/ha depending upon the crop growth stage Hand picking and destroying the affected squares, bolls and grown up larvae will help in reducing the pest incidence Repeated application of the same insecticide should be avoided. Apply Neem seed extract 13-19 Kgs/ha during the early crop stage.
9.Pink bollworm The larvae are white in colour at the early stage and turn into pink colour later. Early stage larvae feed on the pollen of the flower and spin the petals together which makes the flower a unopened 'rossette'. The larvae enter inside the bolls, feed the seeds and the boll bursting is affecting severely.	Collect the larvae from unopened flowers and destroy. Fix pheromone traps for monitoring the adults. Apply any one of the pyrethroids.
Diseases:	
Symptoms	Management
1. Bacterial blight Dark green water soaked angular lesions appear across the leaves and bracts or along the veins. More prevalent on lower leaves. Leaves may shed prematurely. Black lesions on the stem	Spray antibiotic Streptocycline (25 g/ ha) along with copper oxychloride (1.25 kg/ha).

may appear as black arm. In severe cases, lesions appear on the bolls and prevent good boll opening.	
2.Alternaria leaf spot Brown or grayish brown lesions appear on lower leaves. Sometimes with dark purple margins and with concentric zones. In severe cases lesions may be seen on the bolls also. Defoliation may occur frequently due to favourable climate.	Spray Copper oxychloride (1.25 kg/ ha) or Propioconazole 0.1 % or Hexaconazole 0.1 % immediately after the disease appearance and repeat the spray at 15 day interval.
3.Grey mildew Angular, pale translucent spots appear normally on older leaves. In the late stage, leaf tissues turn yellow brown, whitish frosty growth appear on the under surface. Lesion appears on the bract also. Lesions turn reddish brown leading to defoliation and bad boll opening.	Spray Carbendazim 50% WP (250 g/ ha) or Propiconazole 0.1 % immediately after the disease appearance and repeat the spray at 15 day interval.

Bacterial Leaf Blight

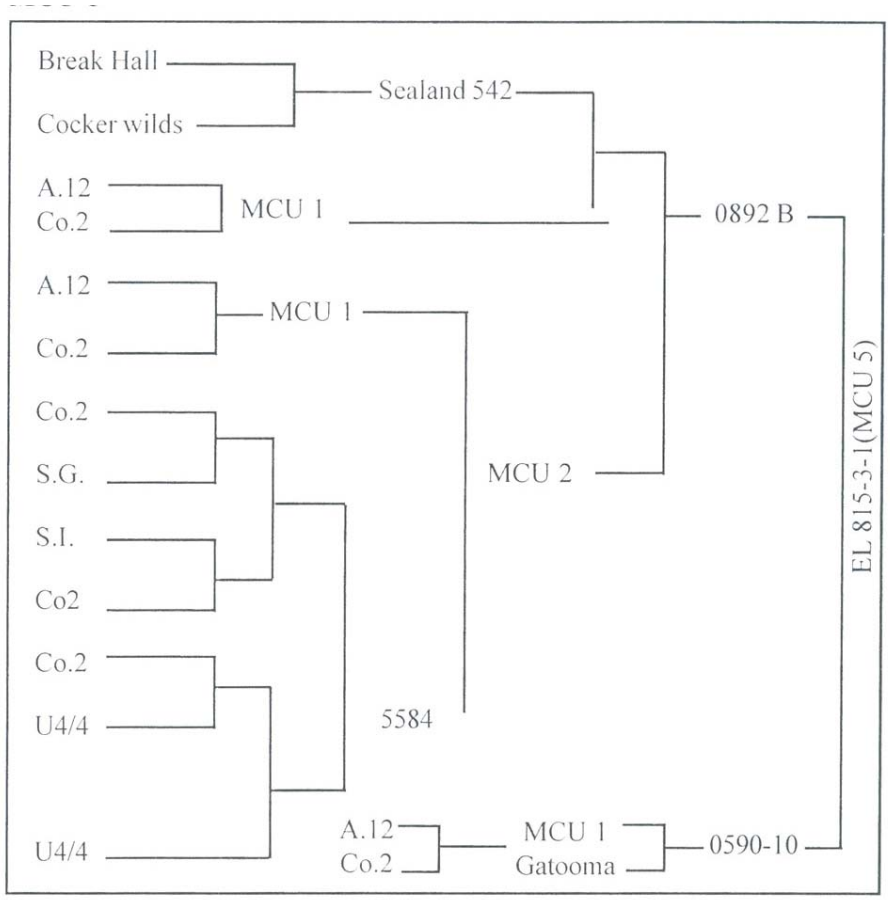

Grey mildew

Alternaria leaf spot

Foliar Diseases of Cotton

Parentage of Long Staple Varieties

MCU 5



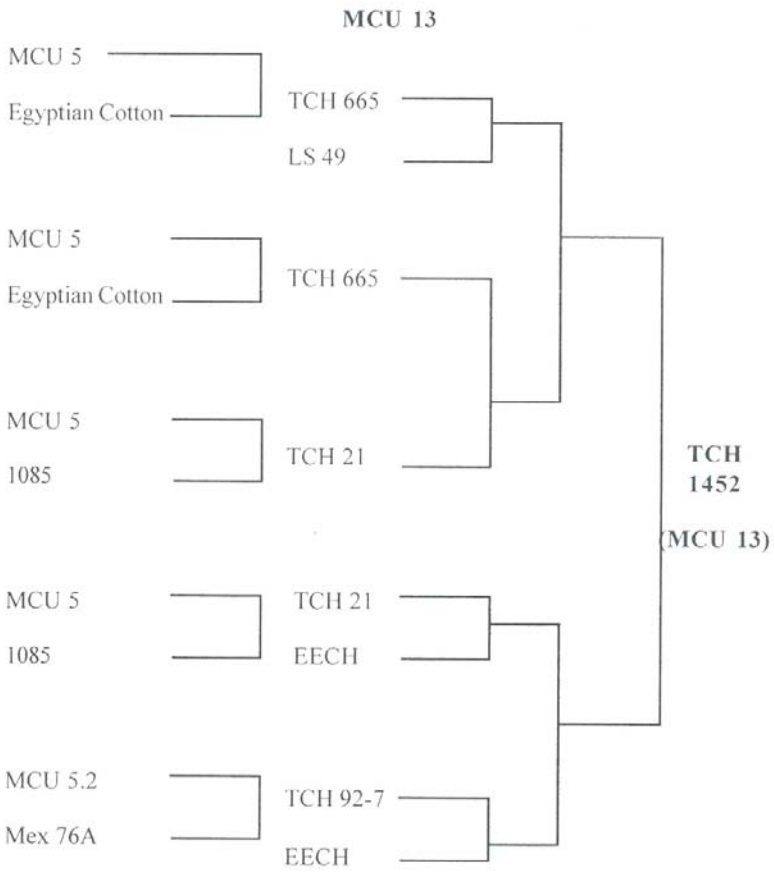
MCU 5 VT: Reselection from MCU5

Surabhi: MCU5 VT (MCU5 X *G.mexicanum* var nervosum Leningrad strain)

Supriya: MCU 5 x C1998

Suvin: Sujata x St. Vincent (SIV 135)

MCU 13



Parentage of Hybrids

Savita	:	T7 x M12
TM1312	:	HLS 329 x M12
RCH2	:	RC 91xRC 86 R
Bunny	:	NC 71 x NC 99
DCH 32	:	DS 28 x SB 425 (YF)
TCHB 213	:	TCH 1218 x TCB 209