Multiplication & Distribution of seed varieties in Southern India – Best practices from SIMA CD & RA

The SIMA Cotton Development & Research Association

'Shanmukha Manram", 41 Race Course, Coimbatore 641 018

R & D Farm & Factory: 2/85 Tirupur Road, Ponneri 642 201

Branch Offices: Konganapuram, Kumbakonam, Rajapalayam, Theni, Udumalpet, Villupuram in Tamil Nadu; Guntur in Andrha Pradesh, Bijapur in Karnataka

SIMA

Established in the year 1933

- SIMA - The Southern India Mills‘ Association, Coimbatore
- Represents the Textile Industry in South India
- Covering over 600 major textile mills in South India

SIMA CD & RA

Established in 4th November, 1974

SIMA CD & RA - Cotton Development & Research Association

- Promoted by SIMA

- **Sponsored by Textile Mills in Tamil Nadu, Andhra Pradesh, Karnataka, Kerala and Pondicherry**
- **Registered as Non-Profit making & Service oriented Organization**
- **Recognized as Scientific Industrial Research Organisation (SIRO)**

Bridges the gap in the industry requirements and production of cotton in terms of quantity and quality

Objectives

- To promote the development of cotton farming for enhancing cotton productivity, production and quality, so that the raw cotton may be made available at reasonable cost to the textile mills.
- To supplement the efforts of the State and Central Governments and other agencies in increasing production and productivity.
- Production and distribution of Biofertilizer and Vermicompost.

Activities

- Production and Distribution of guaranteed Quality Cotton Seeds popularly known as SIMA Seeds
- Imparting Modern Technology to Cotton Farmers
- Cotton Research through Own Project & Sponsored Programmes
- Assures enhanced yield
- Co-operate with farming community
- Establish Farmer-Industry linkage
- Lives for National integrity
- Produced and distributed more than 600 m.t. of notified variety seeds of MCU-5, MCU-5 VT, Surabhi, Supriya, Suvin, LRA-5166, MCU-7 & Suraj.
- Maintenance of 600 germplasm Bank

Achievements

- **Produced, multiplied and distributed over 8710 M.t. of certified seeds**
  - ✓ **MCU-5, MCU-5 VT, Suvin, Supriya, Suraj, LRA-5166, MCU-7, SVPR-2 & SVPR-3 and hybrids like SIMA HB-3, GKS & TCHB-213 covering around 39,000 ha per year**
  - ✓ **This season (2019-20) we have produced and distributed more than 250 M.t of seeds.**
- **SIMA Seeds - Yield increases from 1.69 Qtl to 5.02 Qtl/acre due to better quality seeds and adoption of best practices**
- **Production and supply of Biofertilizers and Vermicompost**
- **Farmers were trained in best cultivation practices**
- **Designed & Developed SIMA Kapas plucker suitable for small holdings**

Multiplication & Distribution varieties characteristics

Characters	MCU-5	Suvin	MCU-5VT	Surabhi	Suraj	Supriya	GKS	LRA-5166	MCU-7
Yield/ha	24-26	20-22	22-25	24-26	24-26	24-26	27-29	18-20	17-19
Duration	165-170	170	165-170	165-170	150-160	155	135	155	135-140
G.Outturn	35	34	33	32-33	33	32-34	34	32-33	32-33
Length (mm)	**34.5**	**38-39**	**32-33**	**32.5**	**30-31**	**28-30**	**28-29**	**28**	**25**
Strength	24	27-29	23	23.5	25	22.8	23	23	21.5
MIC	3.5	3.5-3.6	3.7	3.8	3.9	3.8	3.8	3.7	3.5
Counts	70s	120s	60s	60s	50s	50s	37s	35s	35s

Bio-Fertilizer & Vermicompost Production

- ✓ **Established a full – fledged Biofertilizer Production Plant during 1992-93 with a production capacity of 150.M.T.**
- ✓ **Azospirillum and Phosphobacteria as 'Biorich' are being distributed as a value addition along with seeds to cut down expenditure on 'N' and 'P' bill.**
- ✓ **500 M.tonnes of 'Biorich' was produced and distributed.**
- ✓ **50 M.tonnes of vermicompost was produced and distributed.**

On going Research Projects

- Screening of germplasm (600 Germplasm were maintained)
- Development of intra *hirsutum* hybrids
- Maintenance of Breeding
- Improvement of Suvin
- Renovation of Suvin, MCU-5, MCU-7, Surabhi & LRA-5166
- Synthesis of New Hybrid combination
- Development of short duration, medium staple of culture and intra *barbadense* culture
- Development of high density planting with short duration suitable for machine picking varieties are SH-113, SCH-374, SCH-32, SH-102 and Shakthi Bt.
- Development of SHSJ-23 & SCH-32 long staple and sucking pest tolerance.
- Development ELS varieties
- Development of Bt varieties
- Development of ELS barbadense varieties
- Development of Colour Cotton varieties

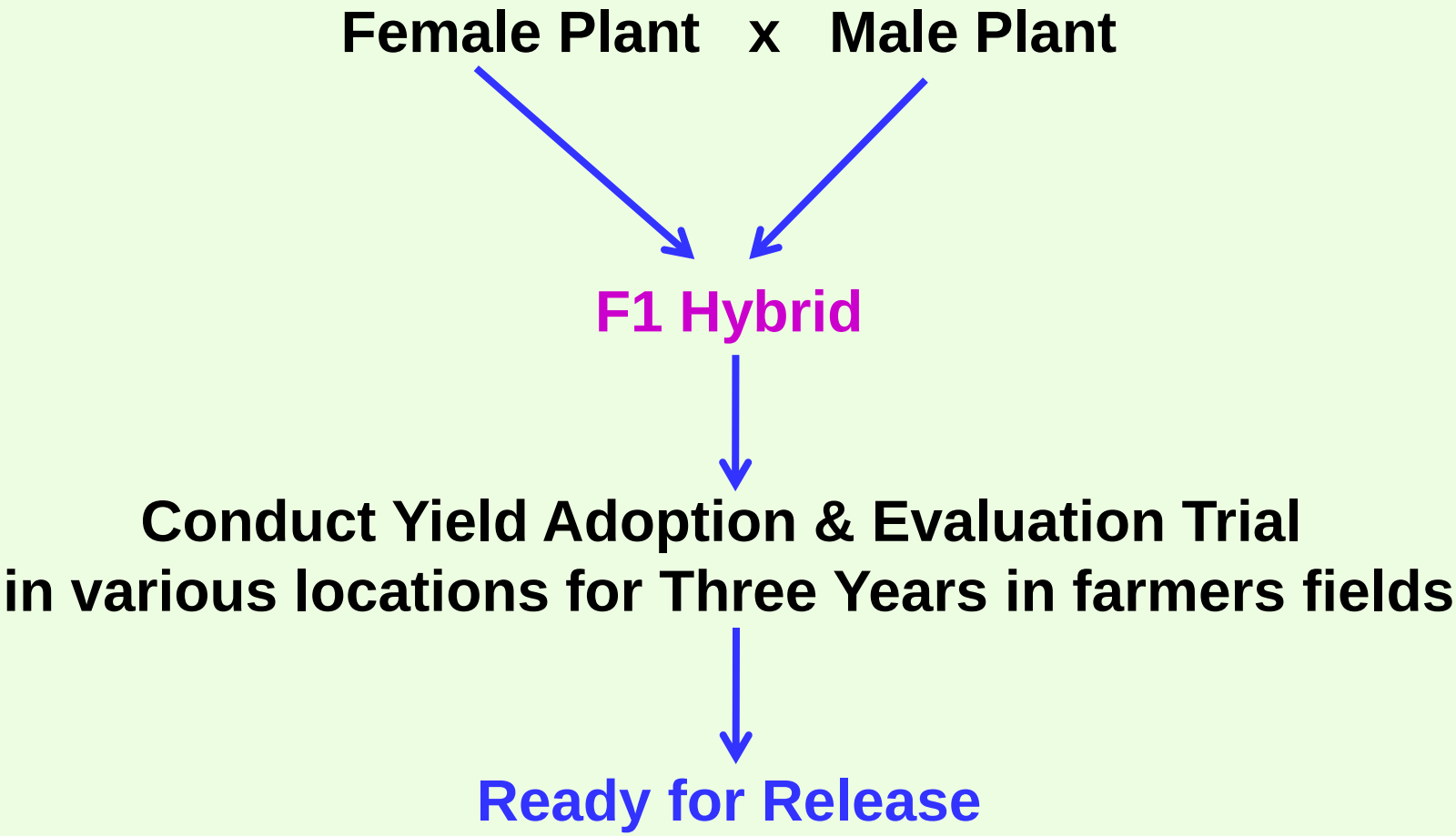
Cotton Quality Needs for Different Count Groups

Sl. No.	Count Groups (Ne)	2.5% Span Length (mm)	Short Fibre Content (SFC (n) tested using AFIS Instrument)	Tenacity (g/tex) – ICC mode in HVI Test system	Breaking Elongation (%)	Mic.Value (µg/Inch)
1	1 -10	21.0 –22.0	30	18.0 – 20.0	6.0 – 6.5	4.50 – 5.50
2	11 – 20	22.0 – 25.0	30	20.0 – 22.0	6.0 – 6.5	4.00 – 5.00
3	21 – 30	25.0 – 27.0	30	23.0 – 24.0	6.0 – 6.5	3.80 – 4.20
4	31 – 40	28.0 – 29.0	25	25.0 – 26.0	7.0 – 7.5	3.80 – 4.20
5	41 – 50	29.0 – 31.0	25	26.0 – 27.0	7.0 – 7.5	3.80 – 4.20
6	51 – 60	31.0 – 33.0	25	28.0 – 29.0	7.0 – 7.5	3.80 – 4.20
7	61 – 80	33.0 – 35.0	20	29.0 – 30.0	7.0 – 7.5	3.70 – 4.00
8	81 & Finer	35.0 – 38.0	20	30.0 – 32.0	7.0 – 7.5	3.50 – 3.80

Breeding Procedure for New Varieties

Year 1	Female Parent x Male Parent
	↓
	F1
Year 2	Female Parent x F1 (BC 1)
	↓
Year 3-5	BC 3 (F1-F6) Single Plant Section
	↓
Year 6	Single Plant Progeny Rows
	↓
Year 7	Primary Yield Trial (Replication & Evaluation Trial)
	↓
Year 8	Confirmation replicated and Evaluated for yield and fibre quality in bigger plot
	↓
Year 9	On Farm Trail → Ready for Release in the 10th Year

Breeding Procedure for Development of New Hybrids



Varieties developed by SIMA CD & RA

Extra Long Staple Varieties (32.5 mm & above)

SIMA Sivashakthi; SIMA-L1-3; SIMA-5 & SIMA Mahashakthi :
SIMA-G-1-5 (G.barbadnse)

Variety	Yield Ha/Kgs	GP %	2.5% Span Length (mm)	Strength (gms)	MIC	UR %
SIMA Sivashakthi	2560-2620	36-37	33.5-34.5	30.1-30.6	3.5-3.9	47
SIMA-L1-3	2130-2280	38-40	32.6-33.1	30.4-31.8	3.5-3.7	51
SIMA-5	2330-2460	35-36	34.1–34.3	31.2-32.3	3.2-3.5	49
SIMA Mahashakthi	2600-2950	35-36	33.5-34.5	31.3-32.6	3.8-4.2	48
SIMA-G-1-5	2200-2340	33-34	37.5-38.8	36.9-37.5	3.0-3.5	58

Varieties developed by SIMA CD & RA

Long Staple Varieties (28.5 – 32.4 mm)

SIMA-24; SIMA-102; SIMA-M-55; SIMA-J-23 and SIMA374

Variety	Yield Ha/Kgs	GP %	2.5% Span Length (mm)	Strength (gms)	MIC	UR %
SIMA-24	2400-2530	36-37	28.5-29.0	31.8-32.0	3.7-3.8	50
SIMA-102	2400-2600	36-37	28.0-29.0	28.8-29.5	3.7-3.8	50
SIMA M55	2140-2255	36-37	30.2–31.6	31.0-32.0	3.5-3.9	47
SIMA –J-23	2810-2990	35-36	29.5-30.2	29.4-30.2	3.6-3.8	49
SIMA 374	2870-2910	36-37	32.0-32.4	30.0-31.7	3.4-3.6	50

Varieties developed by SIMA CD & RA

Medium Staple Varieties (25.5 – 28.4 mm)

SIMA HITECH-1; SIMA-Compact 32; SIMA Shakthi & SIMA-113

Variety	Yield Ha/Kgs	GP %	2.5% Span Length (mm)	Strength (gms)	MIC	UR %
SIMA HITECH-1	2580-2770	35-36	27.5-28.0	28.2-30.1	3.5-3.8	47
SIMA-Compact 32	2600-2700	39-40	27.2-28.0	29.5-30.0	3.5-3.8	47
SIMA Shakthi	2690-2750	35-36	27.8-28.5	28.9-29.5	3.9-4.2	47
SIMA 113	2380-2500	35-36	28.0-29.0	29.4-30.4	3.8-4.0	49

Varieties developed by SIMA CD & RA

ELS Hybrid (35.0 – 37.0 mm)

SIMA HB-3

Variety	Yield Ha/Kgs	GP %	2.5% Span Length (mm)	Strength (gms)	MIC	UR %
SIMA HB-3	2490-2580	31-32	36.0-37.0	33.5-34.4	3.1-3.3	55

ELS Cotton varieties under going trials

G. Hirsutum — SIMA -5, M9, M40-1-2, and M 39-1

G. Barbadense — G-1-5, SBSG 1-5, SBSP 5-6 and SBSP 2-2

Variety	Yield Ha/Kgs	GP %	2.5% Span Length (mm)	Strength (gms)	MIC	UR %
SIMA-5	2330-2460	35 - 36	34.1–34.3	31.2-32.3	3.2-3.5	49
M9	2240-2360	33-35	33.1-34.7	30.2-32.1	3.7-38	50
M40-1-1	2250-2360	35-36	33.2-34.0	30.2-31.3	3.7-3.8	51
M39-1	2310-2470	33-34	33.7-34.3	30.8-32.1	3.7-3.8	50
G-1-5	2200-2340	33-34	37.5-38.8	36.9-37.5	3.0-3.5	58
SBSG 1-5	2200-2250	32-33	38.3-39.2	36.0-37.5	3.0-3.5	55
SBSP 5-6	2150-2210	32-33	36.8-37.9	35.0-36.5	3.4-3.6	52
SBSP 2-2	2150-2280	33-34	37.0-38.0	37.0-38.0	3.2-3.4	60

Varieties Released & Awaiting Approval

Shakthi Bt variety developed by SIMA CD &RA was released by Indian Council of Agricultural Research (ICAR) in 2018

Variety	Yield Ha/Kgs	GP %	2.5% Span Length (mm)	Strength (gms)	MIC	UR %
Shakthi Bt	2690-2750	35-36	27.8-28.5	28.9-29.5	3.9-4.2	47

SIMA Platinum

– Super Extra Long Staple G.barbadense variety
– 38 to 40 mm suitable for spinning upto 120s Ne
– to be released in 2020 in India

Variety	Yield Ha/Kgs	GP %	2.5% Span Length (mm)	Strength (gms)	MIC	UR %
SBSG 1-5	2200-2250	32-33	38.3-39.2	36.0-37.5	3.0-3.5	55

Achievements

Director of Seed Certification and Organic Certification approved SIMA CD & RA to distribute the following varieties/hybrid as Truthful Seeds

Extra Long Staple Varieties (32.5 mm & above)

SIMA Sivashakthi; SIMA-L1-3; SIMA-5 & SIMA Mahashakthi : SIMA-G-1-5 (G.barbadnse)

Long Staple Varieties (28.5 – 32.4 mm)

SIMA-24; SIMA-102; SIMA-M-55; SIMA-J-23 and SIMA374

Medium Staple Varieties (25.5 – 28.4 mm)

SIMA HITECH-1; SIMA-Compact 32; SIMA Shakthi & SIMA-113

ELS Hybrid (35.0 – 37.0 mm) - SIMA HB-3

Varieties awaiting approval - SIMA Platinum

Best Practices

Extension Activities

- ❖ **Supply of genetically pure good quality seeds**
- ❖ **Production and supply of Bio-fertilizers and Vemicompost**
- ❖ **Transfer of improved and low cost production technologies through**
- ➢ **Frontline Demonstrations**
  - ✓ **Farmers' Field Schools**
  - ✓ **Awareness Programmes**
  - ✓ **Open & Distance Education through TNAU**
  - ✓ **Display exhibits**

Enhancing Productivity & Ginning Outturn

- ✓ Choice of high yielding varieties and hybrid cotton seeds
- ✓ Improved agronomic practices
- ✓ Adoption of precision farming techniques
- ✓ Drip fertigation, where fertilizer is applied through an efficient irrigation system.
- ✓ Integrated Pest and Nutrient management.

Reducing cost of cultivation

- Practical farm mechanization like use of Power weeder and cotton picking machine.
- Cotton picking Machine-Reduce the cost of labour for harvesting of cotton.
- Increase farm income of cotton grower and prevent diversion to other crops.

Transfer of Technologies

Creating awareness on importance of

- Seed treatment and soil application of Bio-fertilizers to save N application
- Pre-emergence herbicide application to control the weeds
- Intercropping herbicide application to control the weeds
- Intercropping Greengram, Cowpeas or other legumes with cotton for IPM and getting addition income
    - ✓ Soil Test based N, P and K recommendation

Field Preparation

- ✓ Formation of ridges and furrows to economize irrigation water, easy weeding and reduce the cost of cultivation

Improving Seeds Quality

Preparation

- Importance of acid delinting of seeds
- Treating seeds with Trichoderma to prevent seed borne diseases
- Foiler application of Macro and Micro nutrients suggested for better development of seeds

Selection of Seeds

- Use of genetically pure and quality certified seeds suitable of soil condition, irrigation type, agro-climatic conditions, etc.

Controlled use of Organic / Inorganic / Micronutrients

- Seed treatment and soil application of Bio-fertilizers save N application
- Foiler application of magnesium sulphate @ 2% from squaring to boll development stages
- Foiler application of zinc suphate @ 0.5% flowering stage or soil application at 25 kg/ha or both
- Foiler application of borax @ 0.3% at boll development stage may correct the deficiency of magnesium, zinc and boron, respectively.

Weed Control

- Pre-emergence herbicide application to control the weeds
- Inter-cultivation method to control the weeds

Control Insects & Pests

- Border crop of castor/trap crop of cowpea used to control insect pests particularly Prodenia caterpillers
- Spraying of imidacloprid for controlling sucking pests upto 45 days at early crop stage

Insect	Threshold
Aphids	15-20% of infested plants
Thrips	15-20% infested plants
Jassid	> 2 adults per leaf
Whitefly	10 adults or 20 nymphs per leaf
Spotted Bollworm	More than 10% of attached fruiting bodies
American Bolloworm	5-10% infested fruiting bodies or one egg or larva/ plant
Pink Bollworm	More than 10% attached bolls or flowers

Diseases

- Bacterial Blight
- Root Rot
- Fusarium Wilt
- Alternaria Leaf Spot
- Myrothecium
- Leaf Sport
- Grey Mildew and
- Boll Rot

Control Methods

- Rotate cotton with non-host crops
- Spray carbendazim (250 g/ha)
- Spray dihiocarbanate (0.2%) or copper-oxychloride (0.2%) with the first appearance of leaf spots and spray subsequently, at 15-20 days interval, if needed
- Spray carbendazim along with the recommended insecticides for boll worm control
- Drain the fields well to avoid water logging
- Apply down compost at 25 tons/ha in wilt prone plots

Arresting terminal growth

- Nip the terminal portion of the main stem beyond the 15th node.
- NAA (Napthalene Acetic Acid 40 ppm) to arrest the shedding of squares. Flowers and young bolls.

Water Management

Water requirement of cotton crop depends mainly on variety or hybrid, duration of crop, soil type, agro-climate conditions and quality of water used for irrigation. An efficient irrigation system is needed to minimize the loss of water by percolation or run-off etc.

- Furrow Irrigation
- Drip Irrigation System

The water requirement of cotton at various growth stages

Early vegetative stage	10 to 12 cm
Flowering stage	26 to 28 cm
Boll formation to development stage	30 to 32 cm
Boll busting stage	4 to 6 cm
Total	70 to 78 cm

Adopting appropriate irrigation methods may regulate the water requirement of cotton crop in different growth phases such as

Germination	(1 – 15 days)
Vegetative	(16-44 days);
Flowering	(45-100 days)
Maturity phase	(beyond 100 days)

Kapas Picking

- Picking should commence when the cotton is fully mature.
- Several pickings may be necessary since bolls ripen over a period of two to three months.
- As days of harvest prolong even after complete boll opening, seed cotton weight and seed viability reduce gradually due to continued exposure to heat under field condition
- Start plucking from bottom of the plant

Sources of Contamination

Controlling contamination even after kapas plucking is necessary as it may get contaminated

- At farms
- During transportation to home
- During storage
- During transportation to market yards
- At market yards
- At ginning & pressing factories

Increase Farmers Income

Inter-cropping Greengram

- ✓ Cowpeas or other legumes with cotton for IPM and getting additional income

Adopting Hi-density planting

Mechanised Weeding

Mechanised Kapas Plucking

SIMA KAPAS PLUCKER

Battery Operated

Achievements

Design & Development of Battery operated SIMA Kapas Plucker

Reduces cotton plucking cost by more than 75%

Feed back received from farmers

“Kapas Plucker is a better alternative to manual harvesting for improving the quality of cotton as well as financial returns by improving the efficiency of harvesting”

Advantages of Machine picking and hand picking

Machine Picking (SIMA Kapas Plucker)	Hand Picking
Easy, safe and one time investment	Tedious, Laborious and Expensive
Quick process	Delayed process due to shortage of labour
High productivity - Minimum 80 to 100 Kg per day. Well trained farmer can pick 180 to 200 Kg of kapas/ day.	Low productivity-10-12 Kg/ day
Both men and women labourers can easily operate	Only women labourers are engaged
35 to 45 Kgs picked at last picking	3-5 Kgs at last picking
Picks only matured, fully opened bolls and good quality kapas	Picks immature and low quality kapas
Higher price realization for good quality kapas	Lesser price due to low quality kapas

Performance Certificates

- Performance Certificate given by the **Joint Director of Agriculture**, **Coimbatore** after working of the machine.
- Very good and **positive response** in all cotton cluster in **Tamil Nadu, Karnataka, Maharashtra, Gujarat, Rajasthan, etc.**
- One farmer in **Rajasthan picked 200 Kg kapas per 8 hour** during demonstration. Farmers are **awaiting for tax exemption and subsidy to switch over to machine picking.**
- Picking of **130 – 180 Kg of cleaned kapas without trash** experienced at Dharwad University, CICR and farmers at Nagpur.
- **Appreciation** about performance of the machine received from **African countries** for demo conducted at 74th Plenary of International Cotton Advisory Committee held during Dec. 6-11, 2015.
- **Hon'ble Union Minister of State for Textiles and the officials of Ministry of Textiles appreciated the machine performance**

THANKS