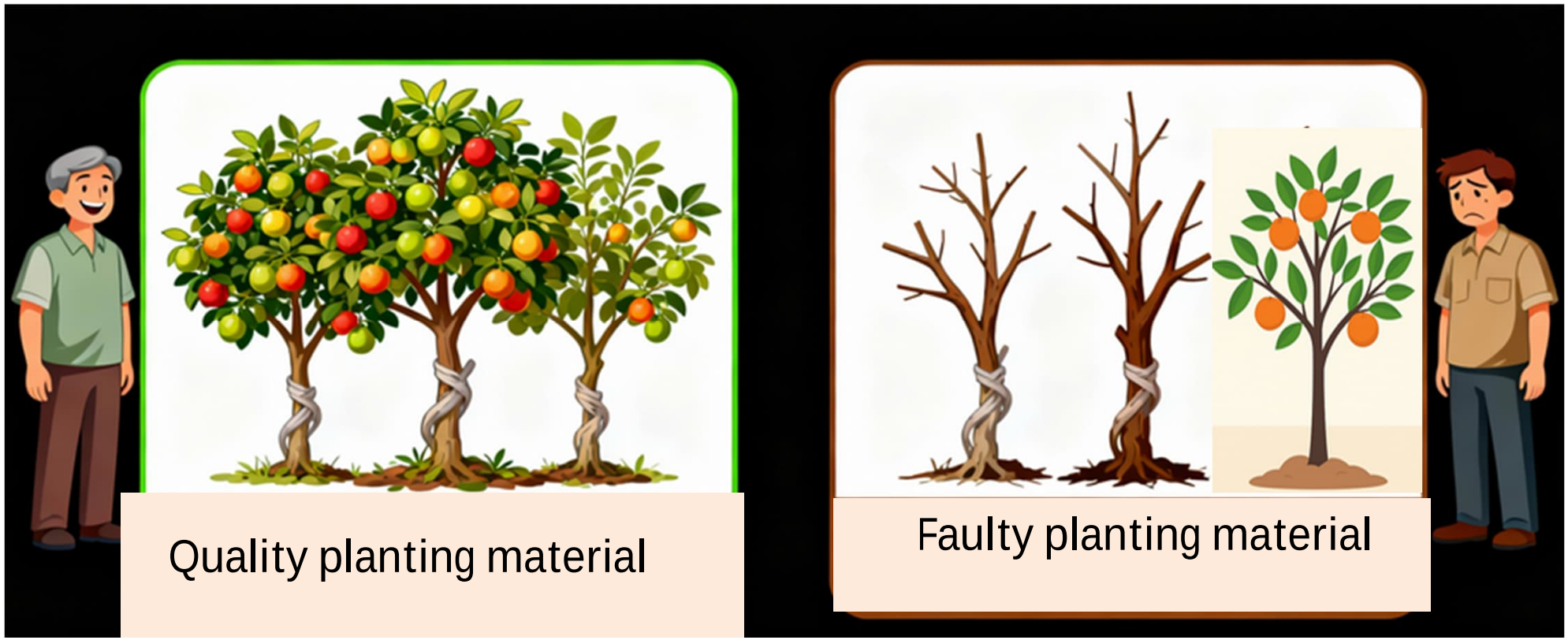
Strengthening the Supply Chain of Quality Planting Material for Sustainable Fruit Cultivation

Focus: Limited Land & Landless Farmers in India

Shailendra Rajan
Ex-Director
Central Institute for Subtropical Horticulture, Lucknow

Why Planting Material Supply Chain Matters

- Quality planting material is the seed of sustainability
- Directly Linked to SDG 1 (poverty reduction), SDG 2 (zero hunger), SDG 12 (responsible consumption).
- Faulty planting material affects 10–15 years of fruit production



Understanding the Target Group

Limited Land and Landless Growers

- Backyard orchardists, rooftop growers, peri-urban growers.
- SHGs and FPOs working on micro and community orchards.
- Lease-based fruit farming (e.g., banana, papaya, guava).
- Vertical fruit growing in limited land

Current Bottlenecks in the Planting Material Supply Chain

- Genetic purity compromised by unverified nurseries.
- Transport shock and loss during long-distance movement.
- Poor traceability—no one knows “which mother plant it came from”.
- Seasonal bottlenecks → All buy during 8–10 weeks, demand peaks.
- Lack of planting material for high-density orchards.

Demand for Miyazaki mango surges in city

SHARMILA KRISHNA
LUCKNOW

mangoes, has become a hotbed for enthusiasts seeking

flavours associated with Miyazaki. The nurserymen

the cost of the Miyazaki mango, he pointed out.

dogs. The news of this luxurious fruit captured the imagi-

Most deadly disease of mango, guava and banana through nursery plants

Estimated losses

About > 300 crore in affected orchards

Estimated losses

About 124 crore in affected orchards

Estimated losses

33 crore in UP and 16 crore in Bihar

Clean Plant Programme

- A scientific initiative to provide disease-free planting material
- Focus on certification of mother plants and nurseries
- Involves virus indexing, tissue culture, and pathogen testing
- Ensures healthy plants for improved yield and quality

Home / Budget / News / Govt to launch Atmanirbhar Clean Plant Programme with outlay of Rs 2,200 cr

Govt to launch Atmanirbhar Clean Plant Programme with outlay of Rs 2,200 cr

What is the Atmanirbhar Clean Plant Program?

- Program Overview
  - Aims to boost availability of disease-free, quality planting material for high-value horticultural crops
  - Launched with an outlay of 2,200 crores till 2030
- Objectives
  - Enhance quality production of horticulture crops
  - Disseminate and adopt climate-resilient varieties
  - Protect the ecosystem through proactive virus and disease control measures
- Implementation
  - Ministry of Agriculture and Farmers Welfare through the National Horticulture Board and the Indian Council of Agricultural Research.
  - Centers to ensure global competitiveness of the Indian horticulture sector
- Stakeholder Engagement
  - Centers collaborate with stakeholders to promote the adoption of clean plant and nurseries

Role of Different Types of Nurseries

Research/Institutional Nurseries

- Source of elite mother blocks
- Certification, virus indexing
- Foundation material supply

Stakeholder	Plants	Mother Block
Farmer	267062	64
ICAR Inst	28737	31
KVK	15467	70
NEH	22420	2
State Govt.	114512	204
TSP	10810	3
SAU	8447	62
Total	467455	538

Private Commercial Nurseries

- Mass-scale multiplication
- Potential for standardisation and licensing
- Key link between science and farmers

*** **R.S-** Rootstock**, G.P-** Grafted Plant**, P.H-** Poly House

Courtesy: VNR Nursery

Community/Cluster Nurseries

- SHG- or FPO-run
- Employment for landless women/youth
- Localised demand fulfilment, reduces transport loss


KESAR
MANGOES
Kesar


પવનપુત્ર

High-Tech Nurseries (Protected + Automation)

- Mist chambers, tissue culture units
- Ensures consistent year-round supply
- Ideal for banana, citrus, guava, pomegranate

Jain™
Tissue-Culture
Better Yield - Greater Profits.

Vision: A Three-Tier Supply Chain Architecture

Tier 1: Elite Germplasm & Mother Blocks

- ICAR institutes, SAUs, and clean plant centres supply pre-basic material.

Tier 2: Licensed Multiplication Nurseries

- Private sector + State horticulture departments produce “basic” and “certified” plants.

Tier 3: Community Nurseries

- Last-mile distribution; organise quantity into small lots for micro-farmers.

From Nursery to Farm:
The Fruit Journey

Strengthening the Supply Chain

Geo-Tagged Mother Plants

- Every mother tree has a QR code with peformance details.
- Farmers can check *lineage* like checking pedigree.

Regional “Planting Material Banks”

- Like seed banks but for grafted plants.
- Holds surplus stock, redistributes during peak demand.

Mobile Nursery Vans

- For landless/urban/peri-urban horticulture.
- Deliver saplings + potting mixture + advisory door-to-door.

Nano-Orchard Kits

- Pre-packed kits: 3–5 dwarf plants, potting mixture, nutrition starter pack.
- Ideal for rooftop/backyard growers.

Strengthening the Supply Chain (contd.)

Traceability

- Track movement from mother block → nursery → farmer.
- Prevents mixing of inferior or uncertified germplasm.

‘Adopt a Mother Tree’ Program

- SHGs maintain elite mother plants with income-sharing model.

24×7 Climate-Smart Mini Nurseries

- Solar-powered propagation structures in remote villages.

Ensuring Quality Standards

Certification Ideas

- Colour-coded seedling tags (red = core, blue = certified, green = commercial).
- Thermal printing of nursery identity on tags to prevent falsification.
- Aadhaar-verified nursery licensing for authenticity.

Testing

- Rapid disease /virus detection kits for field nurseries.

Strengthening Logistics for Micro-Farmers

Innovative Packaging

- Use biodegradable “root cushions” for long-distance transport.
- Moisture-retaining gels for 5–7 days transit survival.

Decentralised Distribution Hubs

- Suggestions for “plant ATMs” at block headquarters.
- Use Common Service Centres (CSCs) as pickup points.

Innovations in nursery industry

Empowering Limited Land & Landless Farmers

Opportunity Models

- Micro-orchards (1–10 plants).
- Vertical fruit gardens (economy models).
- Shared orchard models (e.g., cooperative clusters).
- Rooftop grape, kinnow, sappota, guava, lemon

Income Streams

- Sale of grafts/saplings from community nursery.
- Rental of community pollination services (beekeeping + fruit trees).
- Fruiting wall models for peri-urban areas

Mango, jackfruit, jamun, banana and many fruits were common in urban landscape

Gulab Park: A unique example

- Resident Association and the ICAR-CISH transformed park into a "collection garden" of over 33 different mango varieties.
- Not only Arunika and Ambika are doing well, but so are older varieties such as Langra, Dashehari, Husneara, Amrapali, Mallika, Chausa etc.
- Top worked several varieties on a single tree
- Varieties of jamun, bael, grapes, phalsa, ber, karonda, jackfruit, rose apple and many fruit plants.
- Insecticide and carbide free mangoes for residents.
- Mango party on Sundays

Variability in lime and lemons can be exploited for domestic use

Kinnow, lime and lemons can be grown successfully in cotainers

New varieties and grafting in jackfruit: A hardy crop has accommodated it in small space

Himachal Pradesh
Uttarakhand
Saharanpur
Haryana
Shamli
Muzaffarnagar
Bagpat
Meerut
Rudrapur
Pantnagar
Amroha
Delhi
Bulandshahr
Aligarh
Kasganj
Sahjahanpur
Lakhimpur Kheri
Shravasti
Sitapur
Balrampur
Farrukhabad
Hardoi
Siddarthnagar
Kannauj
Barabanki
Gonda
Lucknow
Sant Kabir Nagar
Basti
Faizabad
Raebareli
Amethi
Mau
Murshidabad
Jaunpur
Varanasi
Bihar
Rajasthan
Madhya Pradesh
Bhopal
South India
Hyderabad
Chhattisgarh
Jharkhand

Training grape vine to the rooftop with roots in the ground







Dragon fruit can be cultivated with limited land or pots

Demand for Planting Material of Exotic fruits

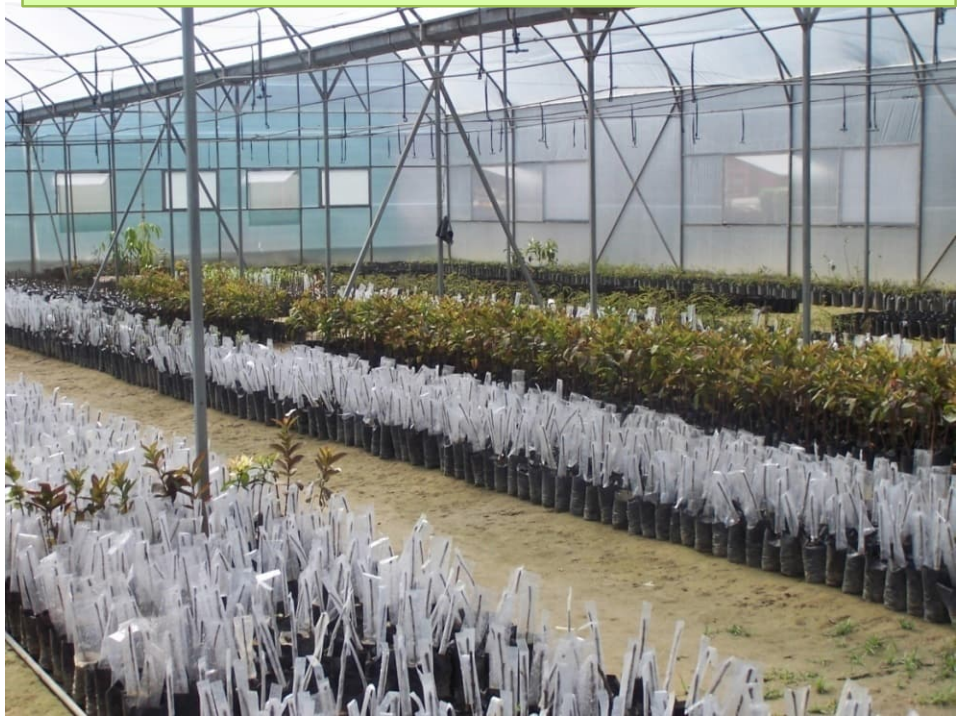
Avocado, Rambutan, Blueberry, Fig, Raspberry, Macadamia nut are many fruits in demand and are being imported

Wedge grafting now a widely adopted method in mango

Allows different rootstock girth, age and season

GUAVA WEDGE GARFTING

- Grafting success rate is higher when compared to other methods.
- Newly developed varieties could spread quickly.
- Low multiplication cost and subtropical adaptation.



A Call to Action

- “Healthy Orchards Begin with Healthy Roots.”
- “Certified Plants = Sustainable Livelihoods and fruit production.”
- “Quality Planting Material is the First Step to Doubling Farmer Income.”
- Quality Planting Material: The Key to Success in Limited-Land Fruit Production.

Thank you