

CONSUMER TRENDS AND QUALITY STANDARDS OF MANGO EXPORT FROM INDIA



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Consumer Trends and Export of Tropical and Subtropical Fruits – Bangkok
(July 14-16, 2008)

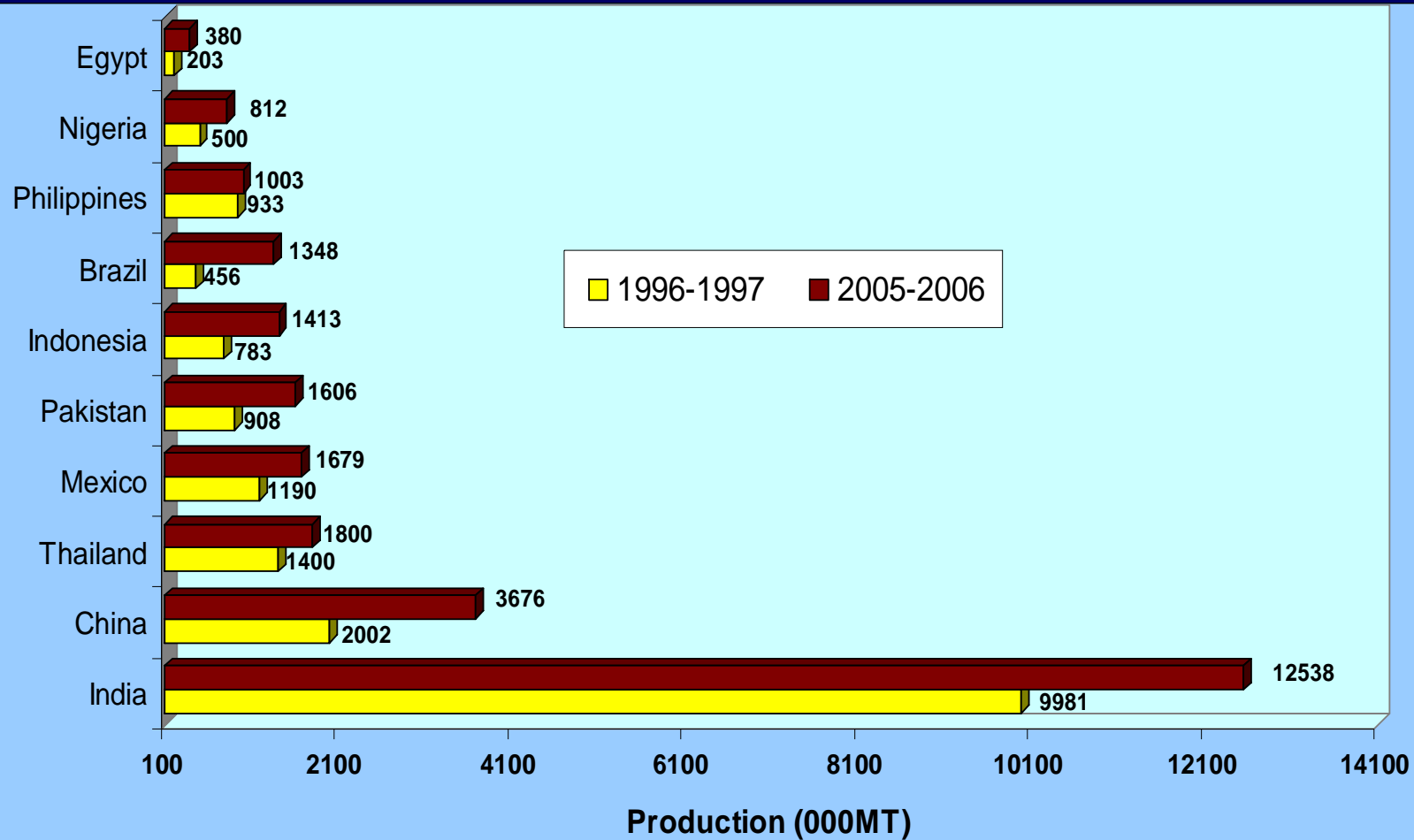
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Current status of mango

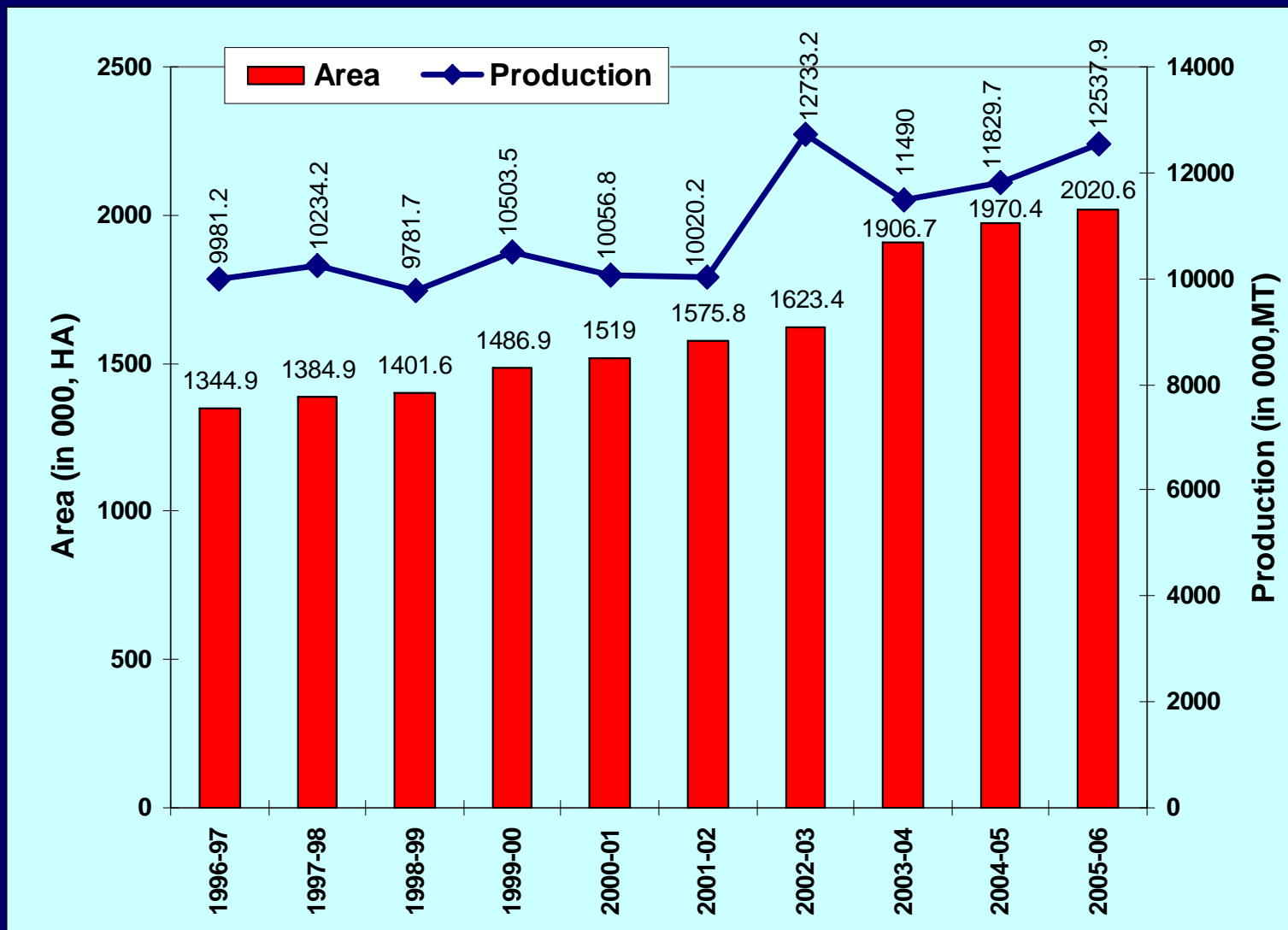


- There is a growing demand for mango across the globe due to exquisite flavour, taste and nutraceutical properties
- The major mango producing countries are India, China, Bangladesh, Thailand, Mexico, Pakistan, Philippines etc
- India is the largest producer of mango in the world.
- It produces 40 percent of the total world production.

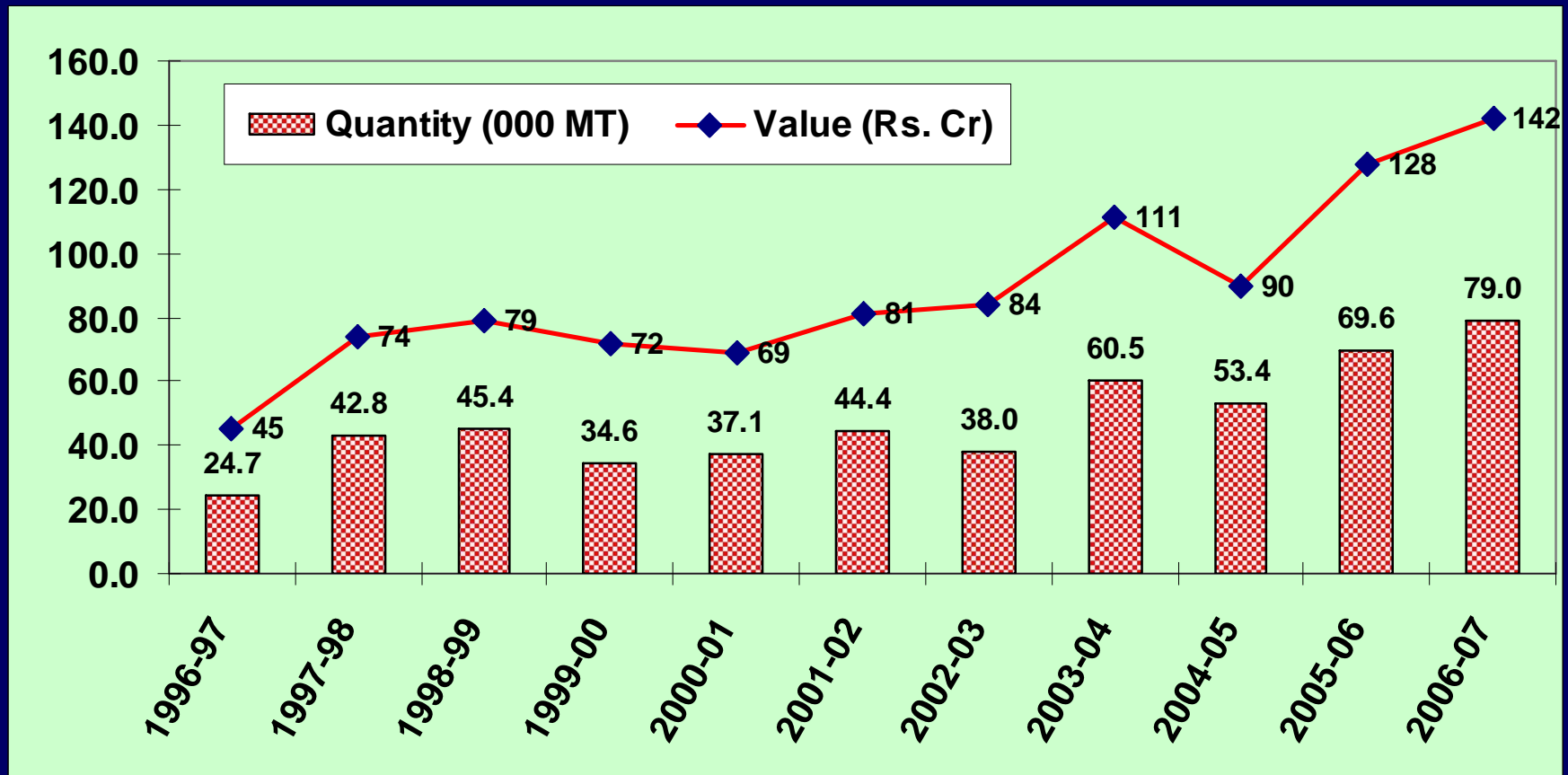
Major mango producing countries of the world



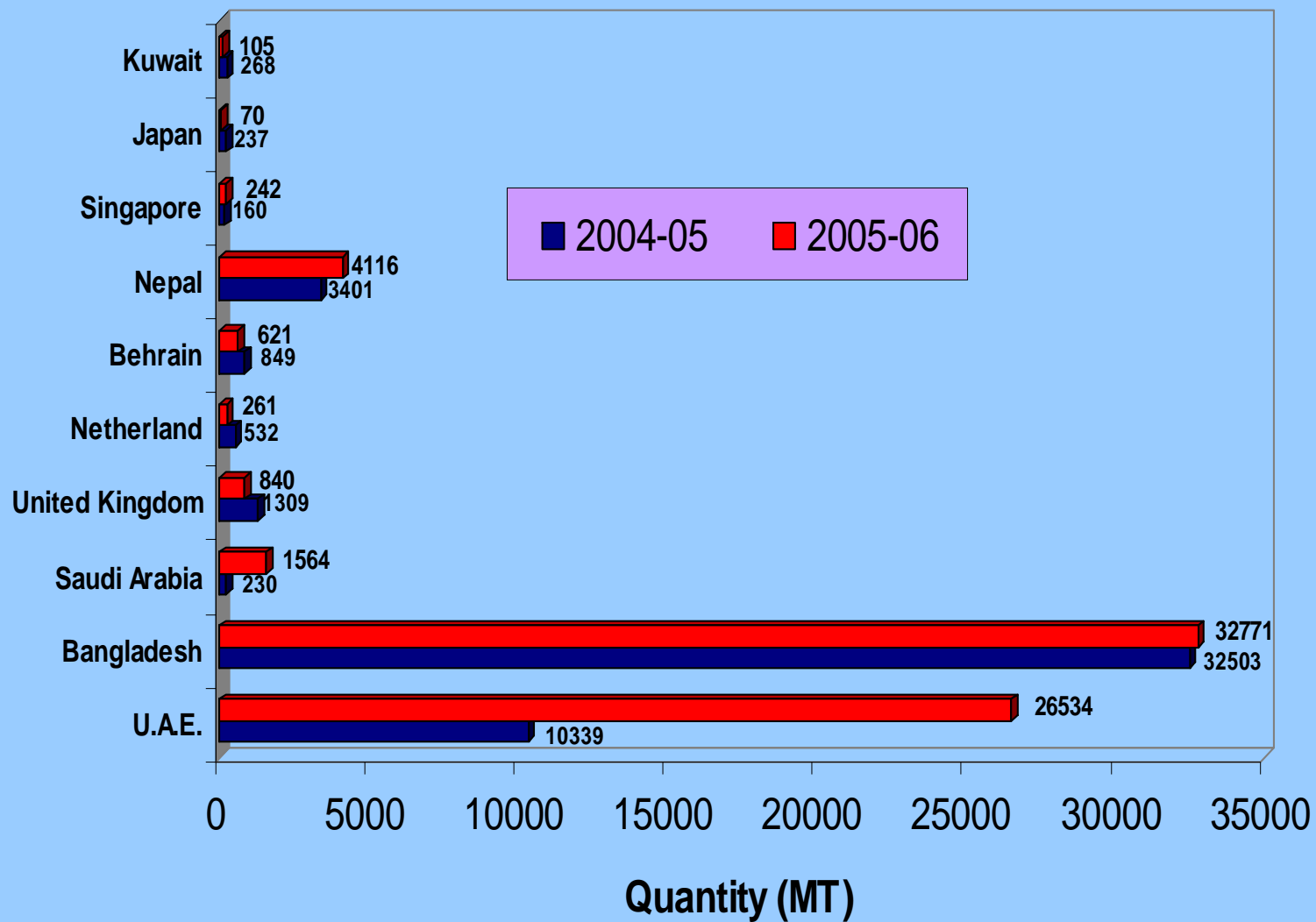
Area and Production of Mango in India



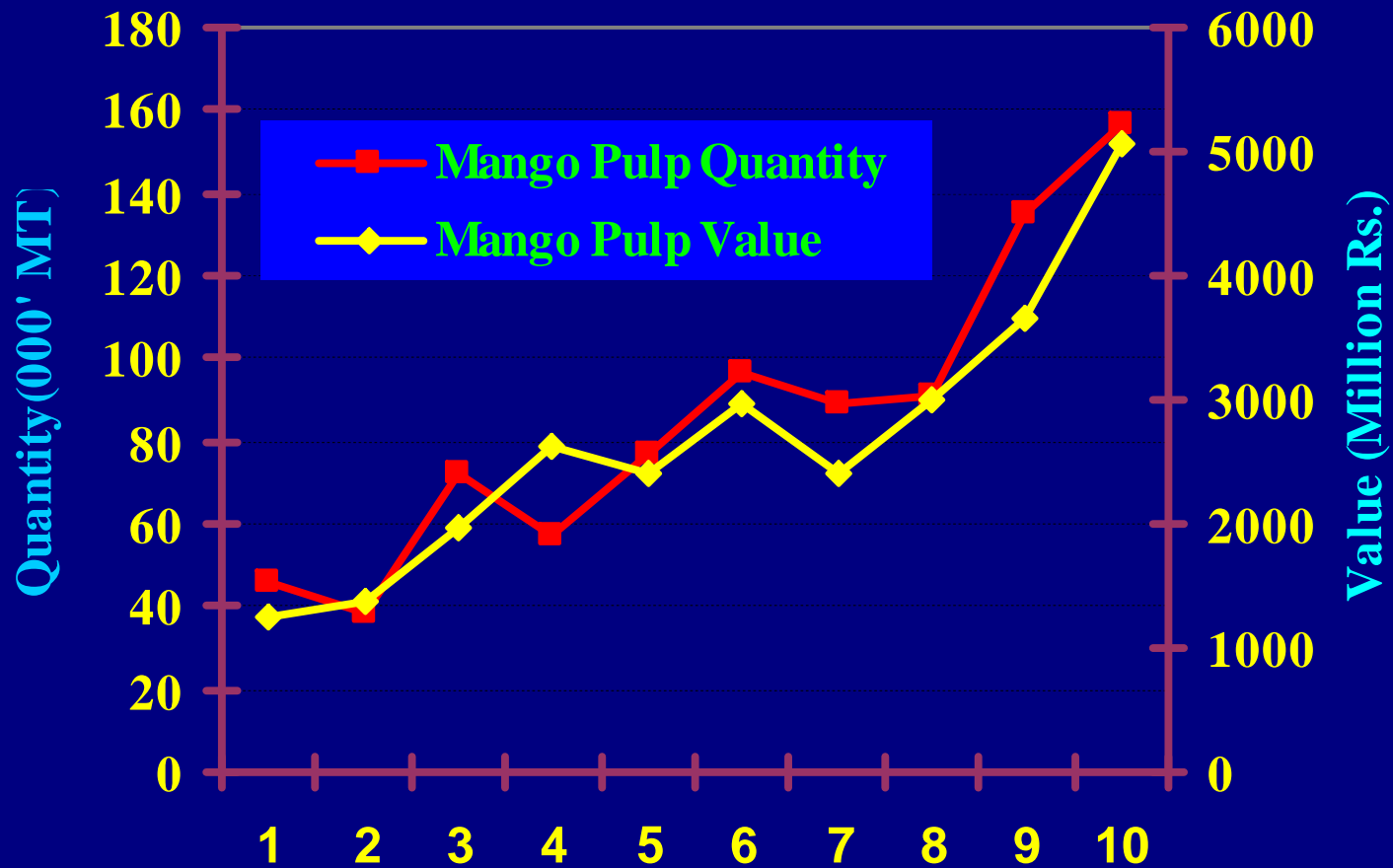
Growth of mango export from India



Destination of mango export from India



Export of processed products

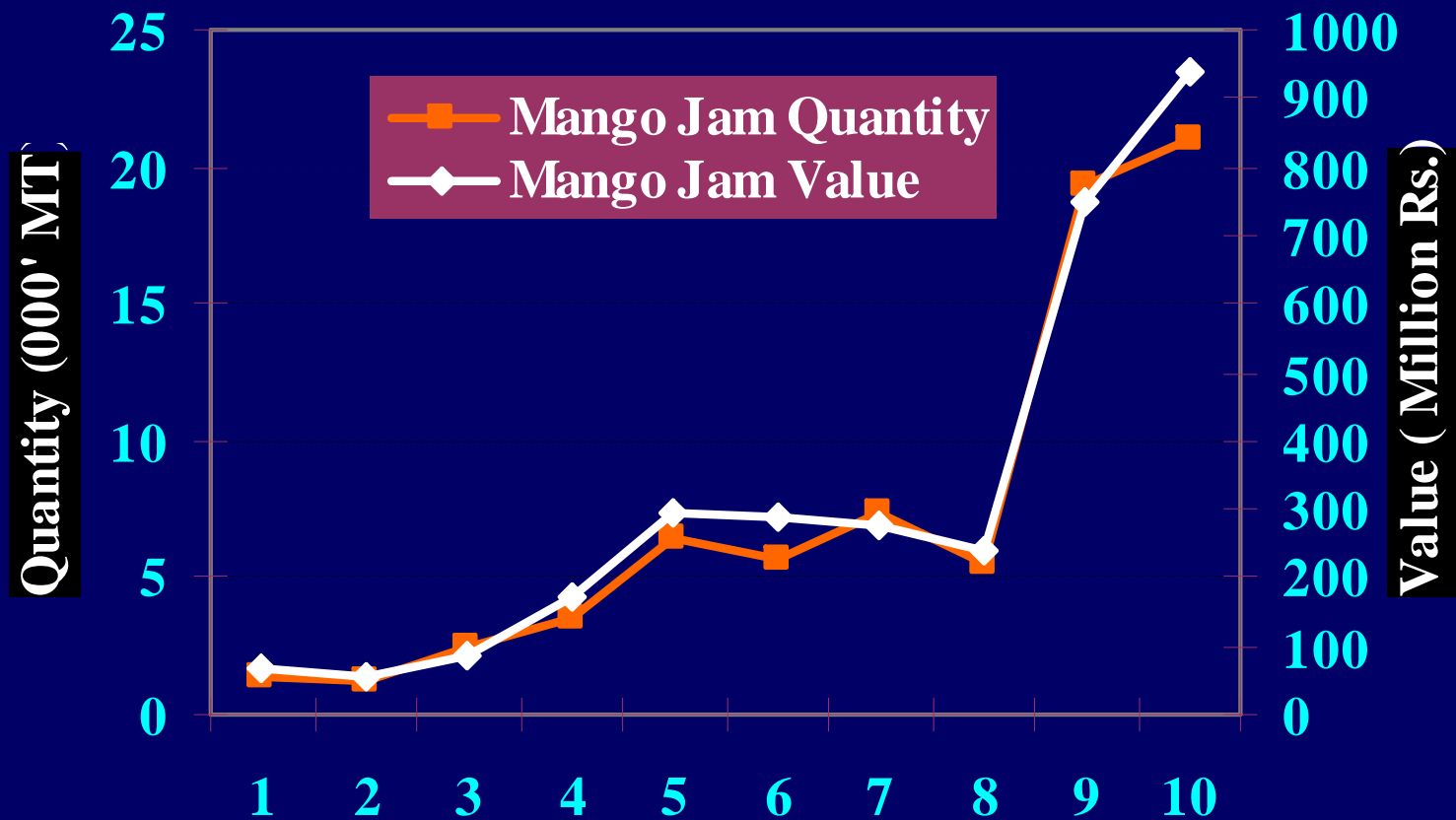


YEAR (1 : 1997-98; 10 : 2006-07)

EXPORT OF MANGO PULP FROM INDIA
(1997-98 to 2006-07)

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Export of mango jam from India



YEAR (1 : 1997-98; 10 : 2006-07)

Mango varieties exported

- Alphonso (March - June) →



- Banganapalli (March - June) →



- Dashehari (May - July) →



- **Langra (June - July)**



- **Kesar (April - July)**



- **Chausa (June - August)**



Potential Exportable Varieties

- Ratoul



- Mallika



- Himsagar



Varietal preference in different part of India



Andhra Pradesh	Banganapalli, Suvarnarekha, Neelam and Totapuri
Gujrat	Kesar, Alphonso and Rajapuri
Karnataka	Banganapalli, Alphonso, Pairi, Neelum and Malgoa
Maharashtra	Alphonso, Kesar and Pairi
Tamil Nadu	Alphonso, Totaapuri and Banganapalli
Uttar Pradesh	Dashehari, Langra and Chausa
West Bengal	Himsagar, Kishenbhog and Gulabkhas
Bihar	Langra, Bombay Green, Jardalu, Sepia, Sukul

Strength of India in Mango export



- Climatic variability – allows to harvest mango for a longer period
- Availability of different type of variety, which suits the different groups of consumers
- Research and R&D system in place
- Developed infrastructure for export through air and sea.

Consumer Preference of Importing Countries



- In most of the importing countries – Appearance of fruit (peel colour – yellow / red colour)
- **Fruit quality**
 - Fleshy with attractive pulp colour
 - Fiber less pulp
 - Firmness
 - Sugar and Acid blend
 - Free from any damage

Can we change the consumer preference - YES



- Availability of varieties with attractive peel and pulp colour
- Availability of assorted varieties
- Varieties with longer shelf life
- More nutritive value – Vitamin C, β carotene
- Hygienic – free from any pest / disease damage and pesticidal residue

Research Initiatives



- Institute engaged on Mango Research
 - Indian Council of Agricultural Research (ICAR), New Delhi
 - Central Institute for Subtropical Horticulture (CISH), Lucknow and
 - Indian Institute of Horticultural Research (IIHR), Bangalore
 - Indian Institute of Agricultural Research (IARI), New Delhi
 - All India Coordinated Research Project (AICRP) – Centres in different parts of the country

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- Develop cultivars suitable for export market – Arunima and Arunika.



Arunima



Arunika



- Develop technology for production of exportable quality fruit.
- Develop post harvest management strategies for long distance transport.
- Monitor and promote the export of fresh fruits and processed products.

Research Achievements



- Largest collection of mango accession
- Identified suitable cultivars for different agro-climatic conditions
- Developed mass production technology for production of plants through out the year
- Developed >35 new cultivars
- Developed nutrient and water management technologies
- High density planting
- Technology for green production

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Research Achievements



- Integrated management of pest and diseases.
- Bagging of fruits for control of fruit fly and post harvest diseases.
- Post harvest techniques for grading, packaging, storage and transport.
- Developed vapour heat treatment to check fruit fly.
- Irradiation technology developed.
- Uniform ripening procedure protocol developed.

Development strategies



- Department of Agriculture and Cooperation – NHM
- National Horticulture Board (NHB) – Post Harvest Management
- Agricultural & Processed Food Products Export Development Authority (APEDA) – Export Promotion
- Ministry of Food Processing Industries - Processing

Export Promotion and Regulations



- Registration of farmers by APEDA for export
- Adherence to Codex Alimentarius norms
- Pre harvest spraying of recommended chemicals
- Maturity
 - Full mature – Export through air
 - 75-80% maturity – Export through sea

Minimum quality standards of mango



Fruit shall be:-

- whole, firm, sound and fresh in appearance;
- **clean, practically free of any visible foreign matter;**
- free of marked bruising,
- **free from damage caused by low/or high temperature;**
- free of any foreign smell and/or taste;
- **free of damage caused by pests;**
- sufficiently developed and display satisfactory ripeness;
- **when a peduncle is present, it shall not be no longer than 1.0 cm.**
- Mangoes shall comply with the residue levels of heavy metals, pesticides and other food safety parameters as laid down by the Codex Alimentarius Commission for exports.

Grade designation and quality of mangoes



Grade designation	Grade Requirements	Grade tolerances
Extra class	Mangoes must be of superior quality, characteristic of the variety and free of defects	5% by number or weight.
Class I	Mangoes must be of good quality, characteristic of the variety and may have slight defects (shape, suberized stains and healed bruises).	10% by number or weight.
Class II	This grade includes mangoes which do not qualify for inclusion in the higher grades, but satisfy the minimum requirements.	10% by number or weight.

Grading and size tolerance



Size Code	Weight (grams)	Maximum Permissible difference within the packet (grams)	Max. permissible difference between fruit in each package (grams)
A	100 - 200	90 - 220	50.0
B	201 - 350	180 - 425	112.5
C	351 - 550	251 - 650	150.0
D	551 - 800	426 - 925	187.5

- **Harvesting** - Fruit should be harvested with utmost care either by hand with a clipper or harvester having 8-10 mm pedicle.



- **Desapping** – Invert the fruit in a desapper for about 25 – 30 minutes for complete removal of sap.



Post harvest treatment



- Hot water treatment -
 - Hot water at $52\pm 1^{\circ}\text{C}$ supplemented with Prochloraz (0.1%) for 10 min for diseases control
 - At $48\pm 1^{\circ}\text{C}$ for 40 min for fruit fly control

- Vapour heat treatment
 - Temperature of the treatment chamber shall be raised step by step to 50°C for 20 minutes. — for export to Japan

- Irradiation
 - At 400 Grays using Cobalt-60. — for export to USA



Vapour heat treatment system

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Packaging

- Use of good packaging material
(Corrugated Fiber Board)

Dimensions of box

- Alphonso (320x230x90 mm)
- Banganpalli (390x260x115 mm)
- Chausa (390x280x105 mm)



Storage

- Fruits are stored in a cold room having a temperature range of 10 – 15°C, and 85 – 90 % RH, according to variety .
- The controlled atmosphere (CA) refrigerated containers for long term storage and shipment of mangoes (up to 4 weeks).
(CO₂ and O₂ both @ 5%)



Ripening



- Ripening of fruit by ethylene gas,
 - Either direct from cylinder as liberated from catalytic generator (100 ppm).
 - Ethephon / ethrel at $52\pm 1^{\circ}\text{C}$ for 5 min (250 - 750 ppm)



Ripening chamber

Process flow chart in pack house



Receipt of fruit at pack house

Desapping (25-30 min)

Washing

Hot water and fungicide treatment ($52\pm 1^{\circ}\text{C}$ for 10 min)

Drying (forced hot air at 40°C)

Sorting and grading

Packing and cooling

Pre cooling (10°C)

Palletization and storage (cold storage- $10-15^{\circ}\text{C}$)

Container loading

Transportation

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Changing trend in consumer preference



- Demand for assorted cultivars of different colour
- **Better firmness of pulp**
- Mild flavour / aroma
- **Rich in carotene content and nutritive values**
- Organically grown mango

What is needed?



- Adoption of Good Agricultural Practices (GAP)
- Assortment of cultivars and its promotion
- Development of cultivars and technology
- Traceability of expected produce
- Ensuring safe mango

Outlook



Mango cultivation is predominant in Asia. There is emerging opportunity due to increasing preference for mango fruits and its products. The potential could be harnessed through effective R&D activities and promotional strategies. Coordinated approach will be needed to achieve the goal.

Thanks



Let us think together for **King of Fruits**



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