Paving The Way For A Competitive Philippine Mango Industry

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Fruit Sector an important component of Philippine Agriculture

- Occupies about 621,861 ha involving 20 different fruit crops.
- It represents 6.76% of total crop land devoted to agriculture.
- Produces 15.7% of total volume of agricultural products worth 59 billion pesos.
- It has a unique role in Philippine economy specially in areas of food security, human health/nutrition and income generation.

Which of these fruit crops is now given priority in the regions?

Criteria for selection:
- Export potential
- Supply capability
- Unique feature
- Domestic demand
- Socio – economic impact
- Other uses

Competitive Advantage of the Philippine Mango

Strength
- Consider as one of the best variety in the world (quality/taste).
- Suitably grown in different agro-climatic conditions in the Visayas.
- Available production and processing technologies.
- Priority crop supported by major programs of the government (DA, DOST and DTI).

Opportunities
- Presence of large domestic markets.
- Untapped demand in foreign markets.
- Opportunities to increase volume of process products.
Economic Contribution of the Mango Industry to Philippine Agriculture

- Value of domestic product is worth 41.6 B pesos
- Export value
  - Fresh fruits – 31,013,488 US $
  - Processed products – 29,743,043 US $
- Contribution to GVA in Agriculture 15 B pesos
- Support livelihood of about 2.5 m farmers

Basic Facts about the Philippines Mango Industry
(tree population, area planted and production)

<table>
<thead>
<tr>
<th>Region</th>
<th>Area Planted (ha)</th>
<th>No. of Bearing trees</th>
<th>Volume of Production (mt)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAR (6)</td>
<td>688</td>
<td>29,217</td>
<td>2,889</td>
</tr>
<tr>
<td>Ilocos Region (4)</td>
<td>21,386</td>
<td>789,408</td>
<td>440,868 (1)</td>
</tr>
<tr>
<td>Cagayan Valley (5)</td>
<td>9,835</td>
<td>945,422</td>
<td>45,166</td>
</tr>
<tr>
<td>Central Luzon (7)</td>
<td>31,426</td>
<td>1,426,164</td>
<td>94,762 (2)</td>
</tr>
<tr>
<td>Region IV-A (5)</td>
<td>15,672</td>
<td>752,280</td>
<td>61,014 (5)</td>
</tr>
<tr>
<td>Region IV-B (5)</td>
<td>3,635</td>
<td>199,121</td>
<td>8,281</td>
</tr>
<tr>
<td>Bicol Region (6)</td>
<td>1,701</td>
<td>60,472</td>
<td>1,914</td>
</tr>
<tr>
<td>Western Visayas (6)</td>
<td>11,148</td>
<td>627,643</td>
<td>61,023 (4)</td>
</tr>
<tr>
<td>Central Visayas (4)</td>
<td>12,448</td>
<td>545,103</td>
<td>64,794 (3)</td>
</tr>
<tr>
<td>Eastern Visayas (6)</td>
<td>624</td>
<td>16,189</td>
<td>487</td>
</tr>
</tbody>
</table>

Trends in mango production (mt/year)

- 2000 – 848,238
- 2001 – 881,710
- 2002 – 956,033
- 2003 – 1,006,191
- 2004 – 967,473
- 2005 – 984,342
Top 10 mango growing provinces (2003)

<table>
<thead>
<tr>
<th>Provinces</th>
<th>Volume of Production (mt)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pangasinan</td>
<td>392,174</td>
</tr>
<tr>
<td>Batangas</td>
<td>38,642</td>
</tr>
<tr>
<td>Ilocos Norte</td>
<td>38,537</td>
</tr>
<tr>
<td>Bataan</td>
<td>33,024</td>
</tr>
<tr>
<td>Iloilo</td>
<td>28,572</td>
</tr>
<tr>
<td>Cebu</td>
<td>27,793</td>
</tr>
<tr>
<td>South Cotabato</td>
<td>26,992</td>
</tr>
<tr>
<td>Cagayan</td>
<td>21,975</td>
</tr>
<tr>
<td>Tariac</td>
<td>19,931</td>
</tr>
<tr>
<td>North Cotabato</td>
<td>18,397</td>
</tr>
</tbody>
</table>

Value of fruit production by crop (2003)

- Agricultural Crops – Php 276.83 B
- Fruits – Php 58.92 B (21.3%)
  - Banana – Php 14.7 B (25%)
  - Pineapple – Php 11.2 B (19%)
  - * Mango – Php 10.61 B (18%)
  - Citrus – Php 1.7 B (3%)

* Ranks 3rd of the major fruit crops
MARKETING CHANNEL OF FRESH MANGO IN CENTRAL LUZON, 2003

- Growers/Contractors
- Processors
- Wholesaler/Retailer
- Institutional Buyer
- Consumers
- Assembler-Distributors
- Exporters

MARKETING CHANNEL OF FRESH MANGO IN VISAYAS (CEBU), 2003

- Grower
- Wholesaler-Retailer
- Institutional Buyer
- Consumer
- Exporter

MARKETING FLOW OF MANGO FRUITS IN MINDANAO (DAVAO), PCARRD 2004

- Growers
- Assembler/Wholesalers
- Processor
- Sprayer
- Assembler/Shippers
- Processors (Industrial consumers)
- Consumers
- Exporters

Volume and value of export, BAS 2003

- Fresh mango (35,799 mt worth 31,013,488 US $)
- Contribution of important export markets (value share)
  - Japan – 52.4%
  - Hongkong – 30.87%
  - South Korea – 7.53%
  - Guam – 3.24%
  - China – 1.63%
  - Others – 4.33%
- Processed products (20,240 mt worth 29,743,043 US $)
  - Dried mango (2,500 mt worth 13.7 M US $)
  - US (40.3%), Hongkong (16.3%), Germany (11.5%), Singapore (8%), Canada (4.31%), Others (19.6%)
Juice other than concentrates (2,639 mt worth 2.5 M US $)
- South Korea (25%), US (20%), Canada (12%), Japan (10%), Brunei Darussalam (7.54%), Others(25%)

Juice concentrates (851 mt worth 284,401 US $)
- Japan (59%), South Korea (38%), Hongkong (1.62%), Guam (0.63%), US (0.13%)

Puree (12.9 mt worth 11.8 M US $)
- South Korea (65%), Japan (9%), US (8%), New Zealand (6.4%), Hongkong (5.17%), Others (6.3%)

Uncooked/Cooked (731 mt worth 1.2 M US $)
- Preserved (0.35 mt worth 866,000 US $)

Edible parts (183 mt worth 224,747 US $)

Status of Mango Importing/Exporting Countries

North American Mango Markets
- Growing fast with 40% increase in demand
- Important suppliers are Mexico (81%), Brazil (5%), Haiti (5%), Ecuador (1%), Peru (1%) and Guatemala (1%)
- Very attractive market during lean season months of mango production in Mexico (October – January)
- Strict quarantine regulation (approval of packing house, fruit fly control, weevil free areas and chemical residues)
- Mango not adequately promoted in US (ranks only 15 of the consumed fruits)
- Philippine mango export limited to Guimaras Island

European Union Markets
- Improvements on transport and storage lead to year round importation
- Brazil accounts for 33% E.U. markets
- Expansion of imports on mango (~ 120,000 tons)
- Considered as ‘special fruit’
- Markets done not require strict quarantine regulation (E.U. standards)
- Philippine mango has narrow window during the cold months (September to December)

Asian Markets
- Hongkong – 79%
- Japan – 19%
- Singapore – 0.79%
- China – 0.37%
- Others – 0.4%

Pakistan
- Dubai accounts for 85% share
- Malaysia, Saudi Arabia, UK, Bahrain and Singapore also supply the market

Thailand and Taiwan
- Important exporters of mango sending it as green-fresh to Malaysia, Singapore, Hongkong and Japan

Egypt
- Saudi Arabia and other Muslim countries of the Middle East
Japan
- Philippines is the largest supplier of mango fruits (18,784 mt in 2003)
- Mexico supplies Japanese market
- Big importer of mango

South Africa
- Canada and Europe
- Ghaza and Middle East

Australian Markets
- Strict quarantine regulation on mango importation
- 2001, Australia allowed Philippine mangoes but only from Guimaras island (2,000 kg)

Processed Mango Products
- less than 2% of world mango production is processed as:
  - Mango pulp – Thailand
  - Mango juice – India, Egypt, Mexico
- Other products
  - Mango puree (Mexico and Philippines)
  - Dehydrated
  - Frozen, glazed (Thailand, Philippines, Taiwan and Malaysia)

What would be our strategic plan of actions to support the growth of the Mango Industry in the different regions?

1. Increase year round production and supply of better quality fruits for domestic and international markets.

2. Enhanced global competitiveness for fresh mango and processed products (dried and puree).

Production Enhancement Strategies

a. Increasing tree productivity through improvement of existing production system
- Development of mango varieties/stains which are prolific, thick peel for longer storage and resistant to pests and regular bearer.
- To ensure the sale of quality planting materials, nursery accreditation and monitoring system be implemented and strengthened.
- Improving access to production inputs particularly on fertilizer, pesticides and equipment. Financing and credit programs with lower interest rate.
- Off-season production programs not to coincide with the regular harvesting season in Luzon.
• Better management of insect pests and diseases through Integrated Pest Management.
• Reduction in post harvest losses through quality assurance program.
• Effective transfer of production technologies.

b. Identification of good production areas

• Where are these areas?
• Provision for support for technical information and credit.
• The need to get these growers organized to: a) consolidate volume for fresh and processed products, b) facilitate delivery of inputs, support services and other critical information.
• Domestic markets absorbs about 95% of total production. Attention should be focused on improving market efficiency, moving the fruits from the farm to consumers at the fastest and the cheapest way, maintaining freshness and affordability.

c. Expansion of new areas for production

• Focus new plantings on suitable areas for production through GIS.
• Use of quality planting materials (GES selections, MMSU Gold, Sweet Elena and Lammao No.1).
• Proper distance of planting coupled with good agricultural practices.

d. Quality improvement

• Reduction on incidence of pest (IPM).
• Nutrition / irrigation.
• Proper harvesting and post harvest handling.

Enhancement of Global Competitiveness

a. Improvement of fruit quality and reduction of post harvest losses

• Proper cultural management (GAP).
• Control of pest through integrated management.
• Proper harvesting and post harvest handling.

b. Expansion of shares on existing export markets (Japan, Hongkong, Singapore, USA and Australia).

• Continuous supply of fruits (year round) through off-season production.
• Extension of shelf life through CA/MA.
• Reduction of transport cost
• Product traceability.
c. Developments of new markets for Philippine Mango

- Open export markets for China, Taiwan, Middle East (priority) and other markets like Canada and Europe.
- Comply with quarantine requirements of these countries.
- Commercialization of CA/MA to extend shelf life and reduce transport cost.
- Intensify market promotion.

BPI-NMRDC has two additional strains of ‘Carabao’ mango, Tanaleon and Guimaras Super ‘Galila’ which are prolific bearer, thin seeded and with excellent eating quality.

These strains are recommended for planting by NSIC and are available at the Mango Center in Guimaras.

Other mango strains: Lamao of Bataan (1), GES strains of Guimaras (6), MMSU Gold of Ilocos (1), Sweet Elena of Zambales (1)

IMPRACTICAL GUIDE FOR IDENTIFICATION OF MANGO VARIETIES AT SEEDLING STAGE

- IPB has come up with procedures on how to identify mango seedlings in the nursery using plant physical characteristics and chemical reaction to leaf extract.
- The practical method of identifying varieties in large number is through color and turgidity of leaf flushes.
- A pictorial guide is now available and published by PCARRD to help buyers obtain the right variety of planting materials.

- Technical upgrading in processing of products (dried mango, puree).
- Development of new products.
- Food safety and quality assurance system.
- Improvement on government / private laboratories for food safety and quality.
- Improvement in packaging.

d. Product development
3. CONTROL OF MAJOR PESTS OF MANGO THROUGH IPM

- BPI/UPLB has reduced damage of mango leafhopper and mango anthracnose through site specific IPM recommendations.
- This involves pest monitoring, appropriate cultural management and application of recommended pesticides using the need based spraying.
- The technology has minimized the number of sprays, minimized pest resistance and residue problems, improved yield and reduced cost of production.

4. MANGO EXPORT TO U.S.A. AND AUSTRALIA

- Comprehensive survey of the Pulp and Seed Weevils by BPI-NMROC, proved the absence of these pests in the island of Guimaras. The study earned Guimaras island international recognition as pulp/seed weevil free area, allowing the export of mangoes to both countries.

5. FRUIT FLY CONTROL

- The on-going suppression of fruit fly in Guimaras through Sterile Insect technique (SIT) reduced insect population to a significant level (99%), lowering field infestations and improving fruit quality.
- Identification of fruit fly species and their biology provided better control measures of the pest through improved cultural management.

6. EXTENSION OF SHELF LIFE FOR ‘CARABAO’ MANGO

- IPB is developing a method of delaying ripening of Carabao mango through biotechnology.
- ACC synthase gene is cloned from Carabao mango and place back in reverse order through biolistic.
- The technology will allow the transport of mangoes to distant markets without involving expensive air freight.
7. ‘CARABAO’ MANGO CAN BE GROWN AND MULTIPLIED IN BOTTLES

- IPB has developed a simple and reliable protocol for multiplication of embryo and regeneration of plantlets using 2 media, MMSE (Mango Medium for Somatic Embryo Induction) and MMRR (Mango Medium Plantlet Regeneration).
- The technology will shorten the time required for breeding and evaluation of desired characteristics.
- It can also be used to preserve genetic materials for future breeding without going into field genebanking.

8. COMMERCIALIZATION OF CONTROLLED ATMOSPHERE (CA) CAN EXTEND THE SHELF LIFE OF MANGO FOR AT LEAST 1 MONTH, ALLOWING LONG DISTANCE SHIPMENT

9. Geographic Information System (GIS) Map for Mango

Guide growers where to plant mango in suitable areas of the country.

10. CULTURAL MANAGEMENT FOR BEARING TREES

- Flower management
  - Flower induction
  - Flower fertilization
  - IPM
  - Pollination

- Fruit management
  - Soft flush
  - Hard flush

- Soil fertilization
  - Soft flush
  - Hard flush

- Irrigation

- IPM

- Pollination

Proper postharvest handling

- Probing

- Proper harvesting
  - IPM (bagging)
  - Foliar fertilization
  - Irrigation
**MANGO ON GOING PROJECTS**

1. Site specific Integrated Pest Management with support coming from ACIAR in collaboration with PCARRD.
   a. IPM on Mango Pulp Weevil (Palawan)
   b. IPM on Major Pests of Mango (Guimaras)
   c. IPM on Major Pests of Mango (Davao)

2. Mango pulp and seed weevil survey in Mindanao. Support coming from AusAid
   a. Davao del Sur (February to November, 2006)
   b. Socksargen (March to December, 2007)

   a. Research and Development
      - Project 1. Irradiation dose for the control of Mango Pulp Weevil (RFU-4 and PNRI)
      - Project 2. Quality assessment of irradiated mango (PNRI and PHTRC)
   b. National survey of the Mango Pulp/Seed Weevils (DA-BPI)

c. Marketing and Pre-commercialization of irradiated mangoes
   - Project 1. Upgrading of irradiation facility (PNRI)
   - Project 2. Control Atmosphere and Modified Atmosphere (MA) for irradiated mangoes (UPLB-PHTRC)
   - Project 3. Market development and promotion (DA-AMAS)

d. Regulatory
   - Project 1. Strengthening Plant Quarantine on International Plant Protection Convention (IPPC) related concerns for irradiation
   - Project 2. Advocacy program on food irradiation

4. Palawan integrated mango action program with emphasis on control of mango pulp weevil. Proposal submitted for funding/support to the Local Government Unit of Palawan.
   - Component I. Increase tree productivity through good agricultural practices and control/eradication of mango pulp weevil in infested areas (Southern Palawan)
   - Component II. Survey for the presence/absence of MPW in the Northern municipalities of Palawan
   - Component III. Strengthening quarantine activities related to movement, spread, confinement and control of MPW
   - Component IV. Product development, promotion and marketing of mango in Palawan
5. **Extend Hot Water Dip (EHWD): Alternative disinestation treatment for mango fruit fly.**

- Interception of fruit fly in mango fruits exported to China
- Implementation of Vapor Heat Treatment (VHT) to control fruit fly
- Disadvantage of VHT
- Experiment on EHWD
  - a. effects of heated water on physical appearance and quality of treated fruits
  - b. efficacy of the treatment for the control of the most resistant stage of fruit fly (3rd instar larvae)
- Commercialization of the treatment