POTENTIAL BENEFITS OF PHILIPPINE FRUITS

Danilo T. Dannug
Senior Agriculturist
Bureau of Plant Industry
Manila, Philippines

Food and Agriculture Organization of the United Nations  International Tropical Fruits Network  Department of Agriculture Bureau Plant of Industry
The Philippines has 7,100 islands. Floral diversity is between 10,000 and 14,000 species of vascular and non-vascular plants, more than half of which are endemic to the Philippines. Altogether, the country is host to some five percent of the world’s species of flora and is ranked 5th in the world in terms of number of plant species.
What is SUPERFRUIT?

Nutritional

Pharmaceutical

Export value

Cosmeceutical

Market Driven
Major Producing Areas, by Region

Region 1
- Mango
- Tamarind
- Dragonfruit

Region 2
- Banana
- Mango
- Citrus

Region 3
- Mango
- Tamarind

Region 4A
- Papaya
- Banana
- Lanzones
- Rambutan

Region 5
- Pineapple
- Pili

Region 6
- Mango
- Guava

Region 7
- Mango

Region 8
- Jackfruit

Region 9
- Car
- Banana
- Citrus
- Strawberry

Region 10
- Mango
- Banana
- Pineapple

Region 11
- Mango
- Banana
- Durian

Region 12
- Mango
- Banana
- Durian
- Mangosteen

Source: PCAARRD
Three Categories why we consider Philippine Fruits as “SUPERFRUITS”

✓ 1st Category = Potential for Export
✓ 2nd Category = Medicinal Benefits from Other Important and Underutilized Philippine Fruits
  ➢ R&D Initiatives
✓ 3rd Category = Policies regarding the Registration, Accreditation and Certification of Fruit crops to heighten their importance as “Superfruits”

➢ Future Directions
TOP 5 Export Fruit Crops

1st Category

- MANGO
- BANANA
- PAPAYA
- PINEAPPLE
- CALAMANSI
Banana production this quarter was estimated at 2,136.40 thousand mt, 4.0 percent more than the 2,053.42 thousand mt output level in the same period last year.

Scn. Name: *Musa acuminata* “Cavendish”  
Family Name: Musaceae

![Banana Pie Chart](image_url)

Banana: Percent distribution of production by variety, Philippines, January-March 2015

## Volume of Export

### Export and Destination for Banana

<table>
<thead>
<tr>
<th>KIND</th>
<th>DESTINATION</th>
<th>METRIC TONS (MT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fresh Fruits</td>
<td>Japan</td>
<td>859,324.0125</td>
</tr>
<tr>
<td>Cavendish</td>
<td>China</td>
<td>482,441.0395</td>
</tr>
<tr>
<td></td>
<td>South Korea</td>
<td>303,008.4135</td>
</tr>
<tr>
<td></td>
<td>Iran</td>
<td>257,340.6470</td>
</tr>
<tr>
<td></td>
<td>Kuwait</td>
<td>188,220.3645</td>
</tr>
<tr>
<td></td>
<td>Jebel Ali</td>
<td>100,747.3430</td>
</tr>
<tr>
<td></td>
<td>KSA</td>
<td>92,339.2565</td>
</tr>
<tr>
<td>Other Countries</td>
<td></td>
<td>259,751.1408</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td><strong>2,543,172.2173</strong></td>
</tr>
</tbody>
</table>

*Source: BPI-NPQSD*
# Volume of Export

## Export and Destination for Banana

<table>
<thead>
<tr>
<th>KIND</th>
<th>DESTINATION</th>
<th>METRIC TONS (MT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fresh Fruits</td>
<td>South Korea</td>
<td>15,978.9600</td>
</tr>
<tr>
<td>Cardava</td>
<td>Japan</td>
<td>1,119.2880</td>
</tr>
<tr>
<td>Jebel Ali</td>
<td></td>
<td>19.8700</td>
</tr>
<tr>
<td>Canada</td>
<td></td>
<td>0.2110</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td><strong>17,118.3290</strong></td>
</tr>
</tbody>
</table>

Source: BPI-NPQSD
## Volume of Export

### Export and Destination for Banana

<table>
<thead>
<tr>
<th>KIND</th>
<th>DESTINATION</th>
<th>METRIC TONS (MT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fresh Fruits</td>
<td>Japan</td>
<td>3,003.0400</td>
</tr>
<tr>
<td>Lakatan</td>
<td>South Korea</td>
<td>153.0470</td>
</tr>
<tr>
<td></td>
<td>KSA</td>
<td>0.0220</td>
</tr>
<tr>
<td></td>
<td>Canada</td>
<td>0.2110</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td><strong>3,156.1090</strong></td>
</tr>
<tr>
<td>Señorita</td>
<td>Japan</td>
<td>2,750.6050</td>
</tr>
<tr>
<td></td>
<td>South Korea</td>
<td>1,169.5100</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td><strong>3,920.1150</strong></td>
</tr>
</tbody>
</table>

Source: BPI-NPQSD
## Volume of Export

### Export and Destination for Banana

<table>
<thead>
<tr>
<th>KIND</th>
<th>DESTINATION</th>
<th>METRIC TONS (MT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fresh Fruits</td>
<td>Japan</td>
<td></td>
</tr>
<tr>
<td>Tindok</td>
<td>South Korea</td>
<td>153.0470</td>
</tr>
<tr>
<td></td>
<td>KSA</td>
<td>0.0220</td>
</tr>
<tr>
<td></td>
<td>Canada</td>
<td>0.2110</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td><strong>3,156.1090</strong></td>
</tr>
</tbody>
</table>

Source: BPI-NPQSD
## Volume of Export

### Export and Destination for Banana

<table>
<thead>
<tr>
<th>KIND</th>
<th>DESTINATION</th>
<th>METRIC TONS (MT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fresh Fruits</td>
<td>Japan</td>
<td>842.2180</td>
</tr>
<tr>
<td>Saba</td>
<td>Australia</td>
<td>107.8940</td>
</tr>
<tr>
<td></td>
<td>Canada</td>
<td>78.8090</td>
</tr>
<tr>
<td></td>
<td>KSA</td>
<td>39.0060</td>
</tr>
<tr>
<td></td>
<td>UAE</td>
<td>11.9953</td>
</tr>
<tr>
<td></td>
<td>Qatar</td>
<td>9.2430</td>
</tr>
<tr>
<td></td>
<td>Belgium</td>
<td>6.8410</td>
</tr>
<tr>
<td>Other Countries (10)</td>
<td></td>
<td>8.4398</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td><strong>1,104.4461</strong></td>
</tr>
</tbody>
</table>

Source: BPI-NPQSD
Mango production this quarter was estimated at 148.85 thousand mt, 7.5 percent below the 2014 production level of 160.94 thousand mt.

MANGO
Scn. Name: *Mangifera indica* Linn.
Family Name: Anacardiaceae

Mango: Percent distribution of production by variety, Philippines, January-March 2015

## Volume of Export

### Export and Destination for Mango

<table>
<thead>
<tr>
<th>KIND</th>
<th>DESTINATION</th>
<th>METRIC TONS (MT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fresh Fruits</td>
<td>Hongkong</td>
<td>7,251.9848</td>
</tr>
<tr>
<td></td>
<td>South Korea</td>
<td>4,781.4503</td>
</tr>
<tr>
<td></td>
<td>Japan</td>
<td>1,267.7970</td>
</tr>
<tr>
<td></td>
<td>Malaysia</td>
<td>559.2600</td>
</tr>
<tr>
<td></td>
<td>Singapore</td>
<td>282.6989</td>
</tr>
<tr>
<td></td>
<td>Canada</td>
<td>57.5570</td>
</tr>
<tr>
<td></td>
<td>Qatar</td>
<td>28.9270</td>
</tr>
<tr>
<td></td>
<td>Other Countries (28)</td>
<td>137.0778</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td><strong>14,366.7526</strong></td>
</tr>
</tbody>
</table>

Source: BPI-NPQSD
The country produced 583.14 thousand mt of pineapple this quarter which is 1.8 percent higher than the 573.08 thousand mt output in 2014.

PINEAPPLE
Scn Name: *Ananas comosus (L.) Merr.*
Family Name: Bromeliaceae

Calamansi production in January-March 2015 was estimated at 16.95 thousand mt. This was 2.9 percent below the 2014 production level of 17.45 thousand mt.

CALAMANSI
Scn. Name: *Citrus microcarpa Bunge*
Family: Rutaceae

## Volume of Export

### Export and Destination for Pineapple

<table>
<thead>
<tr>
<th>KIND</th>
<th>DESTINATION</th>
<th>METRIC TONS (MT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fresh Fruits</td>
<td>Japan</td>
<td>183,630.5555</td>
</tr>
<tr>
<td></td>
<td>South Korea</td>
<td>73,555.4240</td>
</tr>
<tr>
<td></td>
<td>China</td>
<td>36,112.7380</td>
</tr>
<tr>
<td></td>
<td>UAE</td>
<td>17,048.9100</td>
</tr>
<tr>
<td></td>
<td>Kuwait</td>
<td>13,536.6200</td>
</tr>
<tr>
<td></td>
<td>Jebel Ali</td>
<td>13,225.6870</td>
</tr>
<tr>
<td></td>
<td>New Zealand</td>
<td>9,861.8790</td>
</tr>
<tr>
<td></td>
<td>Other Countries (30)</td>
<td>35,461.8061</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td><strong>388,277.1922</strong></td>
</tr>
</tbody>
</table>

Source: BPI-NPQSD
# Volume of Export

Export and Destination for Calamansi

<table>
<thead>
<tr>
<th>KIND</th>
<th>DESTINATION</th>
<th>METRIC TONS (MT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fresh Fruits</td>
<td>UAE</td>
<td>16.715</td>
</tr>
<tr>
<td></td>
<td>KSA</td>
<td>10.852</td>
</tr>
<tr>
<td></td>
<td>Kuwait</td>
<td>1.843</td>
</tr>
<tr>
<td></td>
<td>Qatar</td>
<td>3.7200</td>
</tr>
<tr>
<td></td>
<td>Dubai</td>
<td>0.9850</td>
</tr>
<tr>
<td></td>
<td>Austria</td>
<td>0.0300</td>
</tr>
<tr>
<td></td>
<td>USA</td>
<td>0.0020</td>
</tr>
<tr>
<td></td>
<td>Belgium</td>
<td>0.0730</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td><strong>34.2200</strong></td>
</tr>
</tbody>
</table>

Source: BPI-NPQSD
**Volume of Export**

Export and Destination for Papaya

<table>
<thead>
<tr>
<th>KIND</th>
<th>DESTINATION</th>
<th>METRIC TONS (MT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fresh Fruits</td>
<td>Hongkong</td>
<td>14,814.4140</td>
</tr>
<tr>
<td></td>
<td>Japan</td>
<td>1,902.9735</td>
</tr>
<tr>
<td></td>
<td>China</td>
<td>546.9800</td>
</tr>
<tr>
<td></td>
<td>New Zealand</td>
<td>539.1360</td>
</tr>
<tr>
<td></td>
<td>Singapore</td>
<td>272.9800</td>
</tr>
<tr>
<td></td>
<td>South Korea</td>
<td>144.3950</td>
</tr>
<tr>
<td></td>
<td>UAE</td>
<td>26.3450</td>
</tr>
<tr>
<td>Other Countries (8)</td>
<td></td>
<td>47.0009</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td><strong>18,294.2244</strong></td>
</tr>
</tbody>
</table>

Source: BPI-NPQSD
A typical Philippine pineapple market

Market stalls for Philippine Carabao Mango Fruits
A “Bagsakan” Center (Whole Sale Market) for Fruits and Vegetables in Manila, Philippines.
Medicinal Benefits of Important and Underutilized Philippine Fruits
Department of Agriculture through the Bureau of Agricultural Research launched the “National Health and Wellness Tourism Month” for the month of October with Proclamation No. 1280 Series of 2007.

- This gave way for the exploration of indigenous plant species for further research.
Lipote
Scn. Name: *Szygium curranii*
Family: Mrytaceae
- As pickle, preserved, jelly, jam or beverage, wine making
- Dietary value: the 83% edible portion contains (per 100g) 83.4g water, 77kcal energy, 0.7g protein, 2.5g fat, 12.9g carbohydrates, 1.7g crude fiber, 93mg calcium, 22mg phosphorous, 0.2mg iron, 50µg β-carotene, 10 µg total vitamin A, 0.01 mg thiamin, 0.02 mg riboflavin, 0.3 mg niacin, and 16 mg ascorbic acid

Mabolo
Scn. Name: *Diospyros blancoi*
Family: Ebenaceae
- Folkloric usage of mabolo suggest its unripened fruit has natural treatment for diarrhea and first aid treatment for wounds; the bark, leaves and roots are useful in treating respiratory disease and skin ailments such as eczema
- Scientific research on the fruits boasts of its nutritional, medicinal and biofuel potential. Biofuel from mabolo emits lower amounts of carbon monoxide and carbon dioxide.
Marang
Scn. Name: *Artocarpus odoratissima*
Family: Moraceae

- **Dietary value:** marang contains beneficial nutrients such as, ash, ascorbic acid, beta-carotene, carbohydrates, crude fiber, fat, iron, niacin, phosphorous, protein, retinol, riboflavin, thiamine and vitamin A.
- **As food products:** vacuum-fried marang, ice cream, jelly, conserve, jam, juice, concentrate, blanched pulp; vinegar; from seeds- eaten raw or roasted, made into coffee and nut butter

Yambos
Scn. Name: *Zyzygium jambos*
Family: Myrtaceae

- **As medicinal,** it is good for the liver and brain as it boots the vigor of these major organs, fruit is diuretic, flower reduces fever, leaf decoction can be used to relieve sore eyes and rheumatism
• Pulverized seeds used as skin astringent, concoction made from seeds is a good vermifuge and anthelmintic against parasites, head lice and worms. Also used as all natural pesticide against caterpillars, armyworms, and leafhoppers on plants.

• Leaves - sudorific (inducing perspiration), tranquilizing and Sedative properties, treatment for pain, inflammation caused by arthritis and rheumatism, treat eczema and other skin diseases, can help to bring down fever. Sap of young leaves can be applied directly to pimples. Crushed leaves are applied also on skin eruptions for faster healing and preventing scarring. Drinking tea out of boiled leaves may help induce sleep. Bark, roots and leaves are used to treat diabetes, green and unripe guyabano fruit has more flavonoids than its yellow and ripe form which may help in preventing cancer, allergies, infections and viruses. Guyabanos outdid Metformin, the most commonly used drug maintenance of diabetics, in lowering blood glucose levels (Department of Science and Technology-Industrial Technology Development Institute (DOST-ITDI)).

• As food, processed into candies, jam, jelly, preserves, tarts, shakes, ice cream, sherbets and other beverages

• Nutritional value as the fruit is rich in fructose, vitamins C, B1 and B2, potassium, magnesium, thiamin, copper, niacin, folate, iron, riboflavin and dietary fiber
BIGNAY
Scn. Name: *Antidesma bunius Spreng.*
Family: Euphorbiaceae

- Leaves for snakebites
- Juice of fruits for heart disease and hypertension
- Made into wine, vinegar, jelly, jam

SAPINIT (Phil Wild Raspberry)
Scn. Name: *Rubus rosifolius Linn.*
Family: Rosaceae

- rich in phytochemicals that inhibit the development of Alzheimer’s disease and exhibited moderate COX inhibitory activity and the greatest potential to inhibit cancer cell growth (colon, breast, lung, and gastric human tumor cells). The high anthocyanin content of the fruits suggest a health benefit for a functional food.
- Made into jam, juice and wine, yields purple dye
TIESA - Egg Fruit
Scn. Name: *Lucuma nervosa A. DC*
Family: Sapotaceae

- Excellent source of Carotene (provitamin A which is needed for healthy eyesight. And fair levels of multivitamins and minerals
- Study showed high amount of total phenols and antioxidants

DUHAT – Black Plum
Scn. Name: *Syzygium cumini Skeels.*
Family: Myrtaceae

Fruit, Seeds – anti-diabetic, anti-inflammatory, high in phytochemicals
Leaf – anti-allergy, anti-bacterial, anti cervical cancer
R&D INITIATIVES

- Use of Recommended Varieties for these important fruits
- Multiplication and micro-propagation of disease-free planting materials
- Improvement of protocols for plant nursery management
- Development and management strategies against insect pests and diseases
- Enhancement of pre and post harvest management practices
R&D INITIATIVES

- Improvement of packaging and marketing scheme
- Promotion and technology transfer of improved production practices (ICM and IPM)
- Packaging and distribution of IEC materials
- Impact assessment studies

Source: PCAARRD
3rd Category

Regulations and Policies
The National Seed Quality Control Services (NSQCS) as mandated by the Seed Industry Act of 1992 (Republic Act 7308) supports the major thrusts of the Department of Agriculture through the:

- provision of quality assurance and control services for seed and planting material production, processing, storage and distribution, seed research and seed training in seed quality control towards sustainable agriculture and environmental protection.
Validation and Inspection

Plant Nursery (CRPSD)

Validation and Evaluation

Registered Varieties (NSIC – TWG)

• RPT
• F/S trees
• (PMC-NSQCS)

Accredited Plant Nursery

Accreditation

Certification

Certified trees and seedlings
FLOWCHART FOR VARIETY REGISTRATION

1. Promising Variety
   - TWG Meeting
     - Meet criteria?
       - Yes
       - Technical Secretariat Meeting
         - Meet criteria?
           - Yes
           - Council Meeting
             - Issuance of Certificate of Registration
           - No
           - Evaluation for three consecutive productive years
           - Evaluation of data gathered
           - Provide additional data or for further evaluation
         - No
         - Finalize and submit nomination form (PC-Form No. 1) to the NSIC Secretariat
         - Discuss and further evaluate the merits of the variety
     - No
2. Council members approve the varieties by affixing their signatures
3. Executive Director issue certificate to the owner
To ensure the production and distribution of quality plant materials of recommended crop varieties / species that are true to type and free from region pests and diseases to orchardists and grower clients.
Procedures on Plant Nursery Accreditation

FLOW

START

Receive application

Assign to Designated Regional Plant Nursery evaluator

Inspect and evaluate the nursery and applicant (Nursery Owner)

Comply?

Yes

Prepare evaluation report

No

Inform applicant about the discrepancy

PERSON RESPONSIBLE

Clerk

Chief Agriculturist

Designated Plant Nursery Evaluator

Plant Nursery Evaluator

Plant Nursery Evaluator

DETAILS

Application from PNO is recorded (refer to NSIC PNA-Form #1)

Refers to S.O. #503 Series 2006

Refer to MC 3 Series of 2006 and S.O. #503 Series 2006

Refer to MC 3 Series of 2006 for non-complying applicants, 7 days period are given to meet the requirement

Evaluation Report is finalized and submitted to Division Chief

A
FLOW

A

Facilitate preparation of certificate

Receive certificate

Issue certificate

Monitor and evaluate

END

PERSON RESPONSIBLE

Plant Nursery Evaluator/Clerk

Secretary II

Plant Nursery Evaluator

Plant Nursery Evaluator

DETAILS

Facilitation is finished within 3-12 days

Director approves the certificate

Certificate is issued to PNO through the Crop Production Division

Post accreditation evaluation report is submitted to the Director. Refer to MC 3 Series of 2006
Plant Material Certification

- Aims to produce and distribute high quality planting materials of superior crop varieties of known genetic and varietal purity including freedom from the seed-borne systemic diseases.
• Formulation of standards for specific crops
• Revalidation of registered parent trees
• Field inspection of Foundation/Scion Trees
• Fruit Evaluation
• Tagging and Certification
• Training on Plant Material Certification
PLANT MATERIAL CERTIFICATION SCHEME FOR FRUITS AND PLANTATION CROPS
(For Foundation/Scion Groves)

PROCESS FLOW

Application for Certification

A

Validation for RPTs, Evaluation of FSGs based on formulated requirements/standards

NO

Approved?

A

B

DETAILS

Fill up BPI-NSQCS Form AC#1 (Only those NSIC registered) varieties/strains are eligible for certification)

Fill up BPI-NSQCS-PMC Form #2 and #3: Preliminary and Final Inspection Reports. Two (2) evaluations will be done by PMC staff and/or PMIs during its fruiting stages to conduct qualitative and quantitative parameters before analyzing the results.
YES

Approval of Evaluated FS trees

Tagging and Labeling

Issue Certificates

Periodic Monitoring

B

END

NSQCS to inform the owners or caretakers of the F/S trees and plant nurseries of the results of evaluations made.

Formulated codes include NSIC reference numbers and NSQCS Control Codes and numbers embossed in a tin plate and waterproof seedling tags.

Certificates will be issued by NSQCS, Central office. For seedlings, certificates are valid only while certified seedlings lasts from the accredited nursery owner.

Re-evaluation of foundation/scion trees after 3 years from certification to check the performance of these certified trees as source of quality planting materials.
Tagging of Certified Parent Tree as source of seeds/propagules for propagation
PLANT MATERIAL CERTIFICATION SCHEME FOR CERTIFIED SEEDLINGS OF FRUITS AND PLANTATION CROPS

PROCESS FLOW

Application for Certification by the nursery owner/manager

ACCREDITED?

NO

YES

Evaluate and inspect the rootstocks ready for asexual propagation in the nursery

DETAILS

Fill up application form for Certification of Certified Seedlings (BPI-NSQCS-PMC AC#1)

Only those accredited nurseries are eligible to apply for seedling certification and produce certified seedlings

Preliminary inspection done by NSQCS staff and/or deputized plant material inspectors in their areas of responsibility. PMIs will fill up BPI-NSQCS-PMC Form #2A. Preliminary inspection report on Plant Material Certification
Nursery owners collect scions from certified foundation/scion trees from established groves

Nursery owners/managers/operators shall inform the owner of the foundation/scion groves and NSQCS and/or plant material inspectors of his/her intention to gather certified scions and their presence during the collection for reporting purposes. Official receipts as proof of purchase is necessary as evidence of the sale.

Plant propagators to do the propagation

The PMI should be present during the asexual propagation time and include in the second inspection report. BPI-NSQCS-PMI Form #2B

Propagated seedlings will be housed in a separate area from non-certified seedlings of different crops

PMIs shall periodically inspect the grafted/budded seedlings and accomplish final inspection report to the NSQCS-PMC Form #3A of the status of the seedlings before approval or rejection of the application.
The NSQCS-PMC Central Office will approve or reject the application based on the inspections reported, submitted and monitoring results.

NSQCS-PMC will issue the tags to the PMIs based from the reports submitted with the presence of the nursery owner or manager or operator.

Periodic monitoring is mandatory for the PMIs to report the status of sales and conditions of the certified seedlings.

NSQCS Central Office will issue the certificates corresponding to the crops and number of certified seedlings. The effectivity of this certificate will end until such time when the seedlings were sold/distributed.
Mango certified seedlings being inspected by the regional plant material inspector from an accredited plant nursery before being distributed to intended beneficiaries.
A typical assorted fruit market showcasing the best collection of SUPERFRUITS
Future Directions

- Market-driven outcomes
- Complementation with industry direction
- Strong government and private sector partnership
- Multistakeholders’ involvement
- Capability Enhancement
- Sustainable Development
- Enhancing Productivity
Thank you and Good Day!!!