**Mango**

*Family* Anacardiaceae  
*Genus* Mangifera  
*Species* indica

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**Readings**

- Crane and Campbell. 1994.  
  *The Mango*  
  Univ. Florida, IFAS, Fact Sheet HS-2.
  *Common diseases of Mango in Florida*  
  Univ. Florida, IFAS, PP-23.

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**Taxonomy**

- Related plants in the Anacardiaceae:  
  - Cashew  
  - Pistachio  
  - Poison Ivy
- Origin: Indo-Burma Region  
  - About 40 related species

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**Vegetative Structure**

- Tree:  
  - Large trees, 30’ to up to 100’  
  - Canopy trees of Tropical Forests  
  - Trees dispersed in wild  
  - Deep tap root  
  - Long-lived (300 years old)

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**Flowers**

- Inflorescence:  
  - Terminal panicles  
  - Up to 4,000 flowers
- Flowers:  
  - Most male  
  - Few hermaphroditic  
  - Insect pollinated  
  - Flies, thrips
- Ability to set fruit related to # hermaphroditic flowers  
  - Flower over 4-6 weeks
- Flower over 4-6 weeks

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Andrew, 1995. The Mango in Australia, CSIRO.
**Only a few fruit set per panicle**

In Florida, mangos set less than 1 fruit per 5 panicles.

**Mango has been cultivated in India for 4,000 years**

**Tropical Fruit Production**

<table>
<thead>
<tr>
<th>Crop</th>
<th>Production (1000s mt)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Banana</td>
<td>72,167</td>
</tr>
<tr>
<td>Plantains</td>
<td>25,309</td>
</tr>
<tr>
<td>Mangos</td>
<td>28,730</td>
</tr>
<tr>
<td>Pineapple</td>
<td>15,723</td>
</tr>
<tr>
<td>Papaya</td>
<td>5,878</td>
</tr>
</tbody>
</table>

FAOSTAT database, 2000-2002

**World Production of Mango**

<table>
<thead>
<tr>
<th>Region</th>
<th>1,000s mt</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa</td>
<td>2,556</td>
<td>9%</td>
</tr>
<tr>
<td>Asia</td>
<td>22,684</td>
<td>79%</td>
</tr>
<tr>
<td>Americas</td>
<td>3,490</td>
<td>12%</td>
</tr>
<tr>
<td>Total</td>
<td>28,730</td>
<td></td>
</tr>
</tbody>
</table>

FAOSTAT database, 2000-2002

Production in the USA is 3,000 mt

**Mango Production in the World**

<table>
<thead>
<tr>
<th>Year</th>
<th>Production (1000s Mt)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970</td>
<td></td>
</tr>
<tr>
<td>1975</td>
<td></td>
</tr>
<tr>
<td>1980</td>
<td></td>
</tr>
<tr>
<td>1985</td>
<td></td>
</tr>
<tr>
<td>1990</td>
<td></td>
</tr>
<tr>
<td>1995</td>
<td></td>
</tr>
<tr>
<td>2000</td>
<td></td>
</tr>
</tbody>
</table>

FAOSTAT database, 1970-2000

**World Production Of Mango**

<table>
<thead>
<tr>
<th>Region</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa</td>
<td>Nigeria (730), Egypt (347), Madagascar (210), Congo (209)</td>
</tr>
<tr>
<td>Asia</td>
<td>India (11,100), China (3,276), Thailand (1,678), Pakistan (1,021), Philippines (833), Indonesia (554)</td>
</tr>
<tr>
<td>Americas</td>
<td>Mexico (1,517), Brazil (621), Haiti (253)</td>
</tr>
<tr>
<td>Total</td>
<td></td>
</tr>
</tbody>
</table>

FAOSTAT database, 2000-2002

Production in the USA is 3,000 mt
**Mango Per Capita Production in the World**

FAOSTAT database, 1970-2000

**World Yields of Mango**

Yield in the USA is 4.3 mt/ha

<table>
<thead>
<tr>
<th>Region</th>
<th>Mt/ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa</td>
<td>7.2</td>
</tr>
<tr>
<td>Asia</td>
<td>8.0</td>
</tr>
<tr>
<td>Americas</td>
<td>9.5</td>
</tr>
</tbody>
</table>

FAOSTAT database, 1998-2002

**Adaptation**

- Evolved as canopy tree in lowland tropical forests
  - < 300 to 600 m
- Temperature Limitations
  - Best growth between 25-30°C (77 - 86°F)
  - Very high temperatures may cause fruit sunburning
  - Low temperatures
    - Flowers/fruit killed below 40°F
    - Cool temp (5°C - 41°F) during flowering decrease set
    - Below 30°F damage young trees
    - Below 25°F damage established trees
- Adapted to areas with distinct dry season
  - Excessive rains during flowering
    - Reduce fruit set
  - Excessive rain during fruiting
    - Anthracnose
    - Bacterial black spot
    - Fruit flies
  - Best production in dry areas with irrigation
  - For good floral initiation a dry period of 3-4 months desirable
- Best soils
  - Deep, well drained, fertile, loam, high OM
  - pH 6.0 to 7.0
- Tolerant of soils that are
  - Infertile sands, volcanic ash, limestone based soil
  - Excessively drained or periodically flooded
  - pH range of 4.5 to 7.5
- Sensitive to saline and sodic soils
- Windbreaks used to minimize wind damage
  - Protect young trees by staking
  - Older trees
    - Limb breakage
    - Poor pollination, flower/fruit drop if dry wind
    - Leaf rub
Mango has been cultivated in India for 4,000 years and in Southeast Asia for 2,500 years.

**Indian Type**
- Highly colored fruit
  - Many with red blush
  - Yellow to orange ground color
- Susceptible to
  - Anthracnose
  - Mildew
- Strong flavor (hints of turpentine)
- Monoembryonic

**Indochinese Type**
- Poorly colored
  - Pale green/yellow
  - No red blush
- Resistant
  - Anthracnose
  - Mildew
- Fruit shape
  - Often cylindrical or flattened
- Lack strong aromatic flavors
  - Most are less acidic
- Polyembryonic

**Mono vs Poly Embryonic**
- Monoembryonic
  - Indian race
  - Sexual
  - Variable from seed
- Breeding implications

- Polyembryonic
  - IndoChinese race
  - Asexual
  - True from seed
  - Zygotic is suppressed

**Florida developed Mango Varieties**
*Indian Types with Red Blush - First Important Commercial Variety in Florida*
- **Mulgoba**
  - June to July
- **Haden**
  - June to July
- Seedling selections
  - Capt. Haden
  - Coconut Grove, FL
  - 1910
- Thick skin
- Dominated Florida for 25 years
- Replaced
  - S to anthracnose
  - Inconsistent production
  - Internal breakdown
Florida developed Mango Varieties

Indian Types with Red Blush
Two Main Mango Varieties in Florida

- Tommy Atkins
  - Seedling selections
  - Discoverer's name
  - Made in Florida
  - 1930s and 1939
  - Thick skins
  - Ship well
  - Some R to anthracnose
  - Productive
  - June to July

- Keitt
  - June to early October

Florida developed Mango Varieties

Indian Types with Red Blush
Used Commercially throughout the Americas

- Tommy Atkins
  - Drought resistant
  - Good flavor
  - June to July

- Haden
  - July to August
  - Susceptible to Anthracnose

- Kent
  - August to early October

- Keitt
  - August to early October

Asia Uses Different Varieties

- Mulgoba
  - India

- Carabao
  - ??

- Manila
  - Philippines

- Nam Doc Mai
  - Thailand

Varieties from SE Asia are frequently longer and flatter than Indian types

Propagation

- Seed
  - Viable for 80 - 100 days
  - 3 - 10 years to bearing
  - Rootstocks
  - Scions if polyembryonic

- Vegetative - Monoembryonic varieties
  - Grafting
  - 4 years to full production

Production

- Transplanting - clear cut forest
  - Spacing 10 x 10 M Standard trees
  - 6 x 6 M Dwarf trees

- Pruning varies
  - Open center with frequent tipping to induce more terminals
  - Minimal

Fertilization

- Mango can usually absorb adequate nutrients from fertile soil

- Heavy N appl can cause Soft Nose
  - Corrected with Soil appl of CaNO₃, CaSO₄, CaCO₃

- Zn deficiency corrected with 1pt NZN per 100 gal H₂O
Forcing Flowering

- Cessation of vegetative growth needed to induce vegetative to reproductive transformation
  - Water stress
  - Cold period
- Induction of early flowering
  - Reduce irrigation to induce water stress
  - Foliar applications of
    - KNO₃ (2 - 8%, 1 or 2 times)
    - NH₄NO₃ (1-4%, 1 or 2 times)

Anthracnose
Colletotrichum gloeosporioides

- Most important disease in Florida
- Attacks
  - Fowers, young fruits
  - Leaves, young twigs
- Black sunken irregular lesions
  - Causing leaf spotting
  - Fruit staining
  - Fruit rot

Anthracnose Spread and Control

- Spread by rains
- Controlled by weekly Cu sprays*
  - From panicle appearance until fruit set.
  - Follow with mid May & mid June Cu sprays until harvest.
* Neutral Cu at 1.5 to 2 lbs metallic Cu.

Harvesting - by hand

- First harvest in 4th year
  - Remove fruit first 3 years
  - Fruit set < 1%
- Fruit development period
  - 100-150 days
- Harvest over 6-8 week period
  - Bloom over 6-8 week period
- Pole harvesting

Harvesting

- N latitudes - begins in April
- Peak in summer months
- Pole harvesting
- Water bath for latex
**Marketing**

- Perishable - Quality problem
  - Necessity to harvest immature
  - Need more rapid shipping
  - Lowest storage temperature - 55 F
  - Below 50 F - chilling injury
- Heat treatment for fruit flies

Any Questions about Mango?