

MANGOS!!!

YUM, YUM, YUM!



Overview

History

Intro to Case Study

Tree

Fruit

Inside & Taste buds on

Outside & Hands on

Return to Case Study

History

ORIGINS & HOW IT SPREAD TO TAKE
OVER THE WORLD OF FRUIT



Origin

Scientific Name: *Mangifera indica*

Common Names: Mango (English), Mangga (SE Asia), Manuang (Thai), Manguier (French)

Family: Anacardiaceae

Relatives: Cashew, Pistachio, Spondias (Mombin), Poison Ivy

Origin: Mangos originated in the Indo-Burma region and are indigenous to India and SE Asia

History: Mangos have been cultivated in India for more than 4000 years. Beginning in the 16th century, mangos were gradually distributed around the world, reaching the Americas in the 18th century. The first recorded introduction into Florida was Cape Sable in 1833.

Market

Importance:

- Mangos are one of the most important fruit crops in tropical and subtropical areas of the world.
- Increasing commercial acreage and improved handling methods and shipping throughout the world have increased the mango's popularity and availability in US markets.
- Major producers include India, Pakistan, Indonesia, Mexico, Brazil, and the Philippines.
- Other important producers are Australia, South Africa, Ecuador, Peru, Israel, and Egypt. In the US, Florida, Puerto Rico, and Hawaii have small but locally important industries.

Case Study

REAL WORLD CONTEXT TO HELP
HANG YOUR NEW INFORMATION ON...



Trees

BOTANY, PHENOLOGY, AND
PLANT TYPE THINGS



www.alamy.com - JFMBEF

Botany

Two main types of *M. indica*

- **Indian**

- Origin in the subtropics of India
- Monoembryonic and do not come true to seed
- Fruit tend to have lots of color
- Limited disease resistance

- **Indochinese**

- Origin in tropical climates of Maylay Archipelago
- Polyembryonic and have 1-13 seedlings that are genetically identical to the mother tree
- Fruit tend to be green
- Has better disease resistance than Indian types



Botany continued...

Height:

- 9 to 31 meters tall = 27 to 93 feet tall

Leaves:

- mostly evergreen, simple, long lived leaves

Inflorescence:

- terminal flower/fruit bearing
- Many branched terminal panicle holding 300-4000 flowers
- Flowers are either male or hermaphrodite
- Flowers can be green or pink

Fruit:

- Mangos are drupes
- Thick leathery exocarp (ie: Peel) around a thick fleshy mesocarp (ie: flesh) which is around a stony endocarp (ie: husk around the seed), around a single seed with 1 or more embryos (ie: baby with a sack lunch)



<http://beephilippines.info/mango-yields/>

Climate

Well adapted to a range of subtropical and tropical climate influences

Leaves/Shoots:

- Need temperatures between 59°F and 86°F for shoot growth
- Warmer temperatures lead to more flushes of growth in a shorter period of time because it lessens the time it takes for the vegetative growth to mature

Roots:

- Need temperatures over 70°F to grow

Climate continued...

Flowering:

- Indian types
 - To induce floral induction (buds to differentiate from vegetative growth to inflorescence) monoembryonic types need cool, non freezing temperatures below 59°F.
 - Drought during the cool can help intensify the flowering response
- Indochinese types
 - To induce flowers polyembryonic types need drought stress in tropical climates
- Too low (< 39°F) or too high (>111°F) temperatures lead to pollen viability and fruit set being reduced, as well as abortion of fertilized ovules, called 'nubbins'
- Pollinated by flies and bees – [Mango Men Video](#)

Artificial inducing of flowers

- Paclobutrazol
 - ie: Fireworks/gunpower



Photos by Dr. Crane

Environmental Stressors

Drought

- Highly tolerant

Flood

- Moderately tolerant

Freeze

- Intolerant

Salinity

- Intolerant

Wind

- Tolerant



Salinity Stress - Peru



Freeze Damage – Pine Island, FL

Growth Habit

Polyaxial

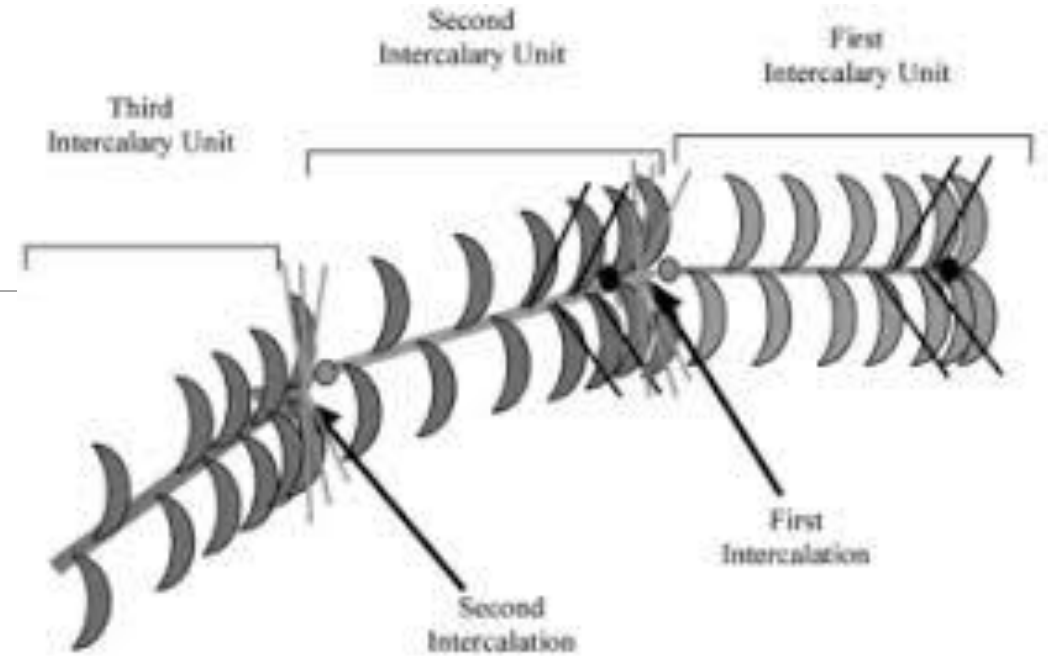
- ie: branched
- ie: not a banana

Synchronous growth pattern

- Alternating root and shoot growth at separate times
- Alternating vegetative and reproductive growth at separate times
- Plants with a synchronous growth pattern are triggered by environmental changes for different types of growth

Plant Nutritional Needs:

- Poor to moderate soil fertility
- Too much N before and during fruiting are not good ideas
 - Too much N causes jelly seed



Propagation

Grafted:

- Turpentine, a polyembryonic variety, is used for rootstock
 - Criollo and No. 11 are also used
- Side Veneer and Cleft
 - Patch and T-bud can also be used
- Top working mature trees is done in orchards to change to new cultivars
 - Large trees are cut, leaving a nurse limb
 - New shoots are selected and grafted onto to become the new branches with the desired cultivar
 - Nurse limb is eventually pruned off as well

Seedlings:

- Polyembryonic varieties can be grown true to seed
- Takes 8-10 years for seedlings to mature and begin to bear fruit



Phenology: cyclical/seasonal natural phenomenon

Pruning/Size Control

Reasons to control tree size:

- Maintain lower canopy production
- Even light throughout canopy
- Improve fruit color development
- Increase air movement
- Decrease disease
- Reduce Hurricane/storm damage
- Easier for fruit harvesting

Timing:

- Early and mid-season varieties: right after harvest
- Late season varieties: periodic pruning that doesn't inhibit fruit harvest or production the next year

Sizing/Spacing:

- Ideally topped at 15-18 feet, hedged to 5-8 feet between rows
- Selective pruning to thin out inner canopy

Pruning continued

Mechanical Topping & Hedging videos

- Topping: <https://www.youtube.com/watch?v=gCT8yKC7juY>
- Hedging (0:39) <https://www.youtube.com/watch?v=I0Kn8n3E4XI>

Richard Campbell

- Tipping/Young trees: <https://www.youtube.com/watch?v=ZlhF-YphevA>
- Vigorous trees: <https://www.youtube.com/watch?v=WMhmNAiRHCO>

Fruit

WHAT YOU ACTUALLY CARE
ABOUT...IS IT RIPE YET?



Cultivars



Cultivars at ECHO FL.

37

Alampur Baneshan	Nam Doc Mai
Baptiste	Palmer
Beverly	Philipine
Carrie	Po Phy Kalai (Lemon Meringue)
Cogshall	Pope
Dot	Rosigold
Edward	Southern Blush
Excalibur	Tommy Atkins
Florigon	Torbert
Glenn	Twistee Treat
Haden	Valencia Pride
Irwin	Van Dyke
Kieth	Wise
Kent	Zillate
Mahdu	
Mallika	



Harvest Indicators

Green Mature

- Fruit size per variety, and time of season
- Filled shoulders
- Rounded cheeks
- Blunt apex/belly button
- Flesh near seed turns light yellow
- Will ripen on counter in correct conditions

Green

- Not all varieties make good green mango varieties
- Picked immature to eat green, will not ripen

Harvesting & Post-Harvest

Pick gently – even hard fruit can bruise

Place harvested fruit in bins in the shade immediately – DO NOT SET IT IN THE SUN

Hydrocool, if possible, this also helps clean off sap

Sort and Pack immediately

Store in cool storage

- 55°F at 90-95% Relative Humidity for storage
- 70-75°F for ripening
- Ideal temps do vary for varieties



Diseases, Pests, & Disorders

Anthracnose (*Colletotrichum gloeosporioides*)

- Fungus that effects fruit and leaves

Powdery Mildew (*Oidium* sp.)

- Thrives in high humidity
- Causes flowers to not be viable/set fruit

Mango Scab (*Elsinoe mangiferae*)

- Scars young fruit

Flower Thrips

Scale

Mango Decline

- Cause by Mn and Fe deficiencies that cause trees to be susceptible to fungi (*Botryosphaeria ribis* and *Physalospora* sp.)
- Causes young stem die back, stunting, and tree death

Internal Breakdown

- Over-ripe flesh by seed, greyish-black spongy flesh, open cavity at stem end
- Cause not fully understood



Case Study

RETURN AND APPLY NEW
KNOWLEDGE...



Resources

Morton, J. “Fruits of Warm Climates”

Crane, J. “20 HOS Mango 2016” Powerpoint

Crane, J. “26 HOS Flowering and Influences on Flowering for Tropical Fruit 2016” Powerpoint

Crane, J., Wasielewski, J., Balerdi, C., & Maguire, I. “Mango Growing in the Florida Home Landscape”

Nakasone, H.Y., and Paul, R.E., “Tropical Fruits”

Blank, D., Boss, A., Cohen, R., Watkins, T., “ECHO’s Catalogue and Compendium of Warm Climate Fruits”