Mango

Family	Anacardiaceae
Genus	*Mangifera*
Species	*indica*

Common Names: Mango, Mangot, Manga, Mangou.

Readings

- Crane and Campbell. 1994.
  - The Mango
  - Univ. Florida, IFAS, Fact Sheet HS-2.
- Pernezny and Marlatt. 1993.
  - Common diseases of Mango in Florida
  - Univ. Florida, IFAS, PP-23.

Vegetative Structure

- Tree
  - Large trees, 9 to up to 30 m
  - Canopy trees of Tropical Forests
  - Trees dispersed in wild
  - Deep tap root
  - Long-lived (300 years old)

Vegetative Structure

- Leaves
  - The leaves are simple.
  - The length and breadth varies from 12 to 45 cm and 2 to 12 cm, respectively.
  - Leathery in texture.

Vegetative Structure

- Roots
  - Effective root system of an 18 year old mango tree may observe a 1.2 m depth with lateral spread as far as 7.5 m.

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

Flowers

- Small amounts of pollen are produced in mango.
- the mango is self-fertile but cross-pollination increases fruit set.

Flowers

FIGURE 5. Mango flower. Note developed anther below disc and central stigma.

- Alexander, 1986. The Mango in Australia, CSIRO.

Only a few fruit set per panicle

Drupes

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

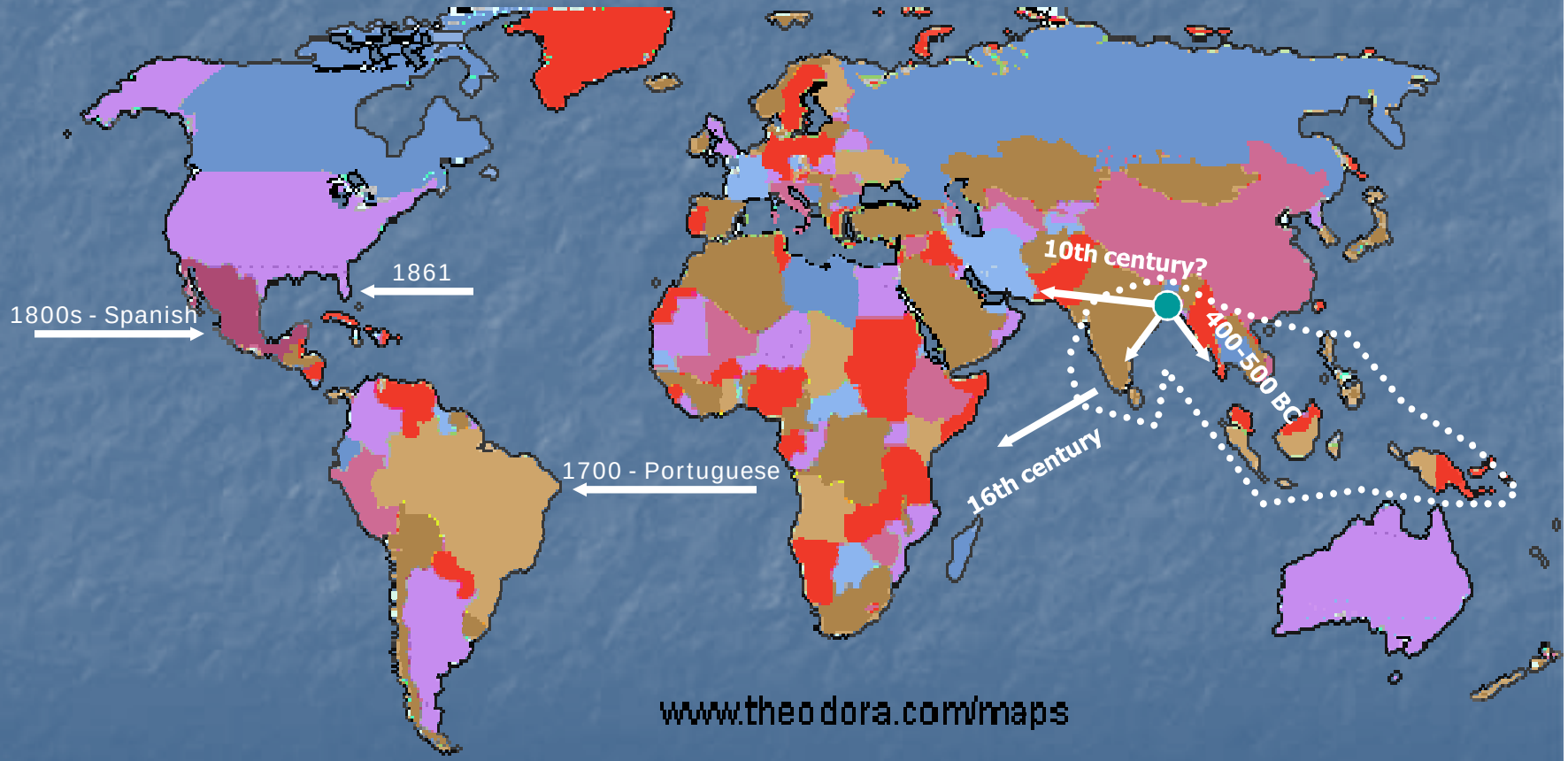
Fruits

- The fruit is a, fleshy drupe.
- It varies considerably in size, shape, colour, presence of fibre, flavour, taste and several other characters.

Health benefits and Economic Importance:

- Mangos are rich in vitamins A, B and C and also contain potassium.
- Mangos are a good for our daily diets.
- Mangos are high in fibre but low in calories
- Used in making baby foods.
- Bark used as fuel
- Waste used as animal feeds

Mango has been cultivated in India for 4,000 years



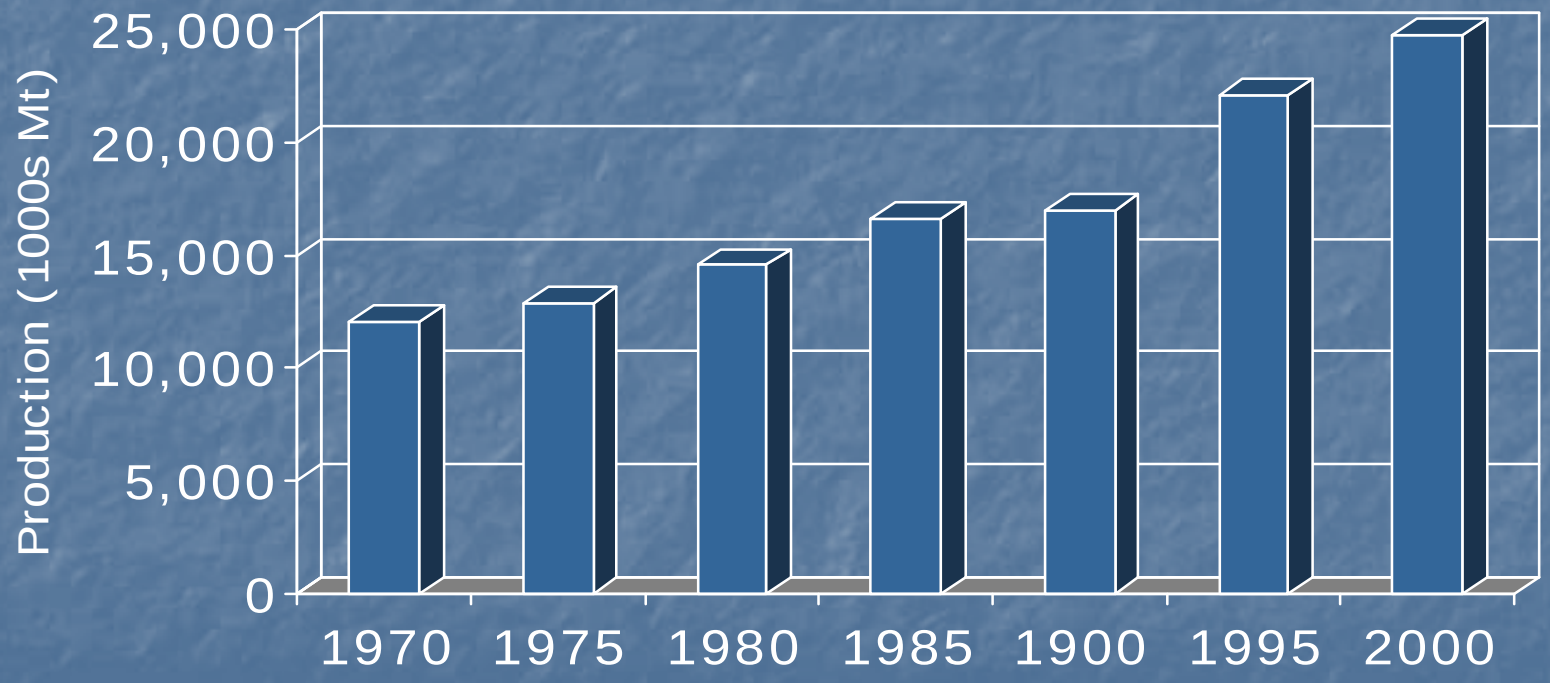
Tropical Fruit Production

Crop	Production (1000s mt)
Banana	72,167
Plantains	25,309
Mangoes	28,730
Pineapple	15,723
Papaya	5,878

FAOSTAT database, 2000-2002

Mango Production in the World

FAOSTAT database, 1970-2000



World Production Of Mango

Region	1,000s mt	%
Africa	2,556	9%
Asia	22,684	79%
Americas	3,490	12%
Total	28,730	

FAOSTAT database, 2000-2002

Production in the USA is 3,000 mt

World Production Of Mango

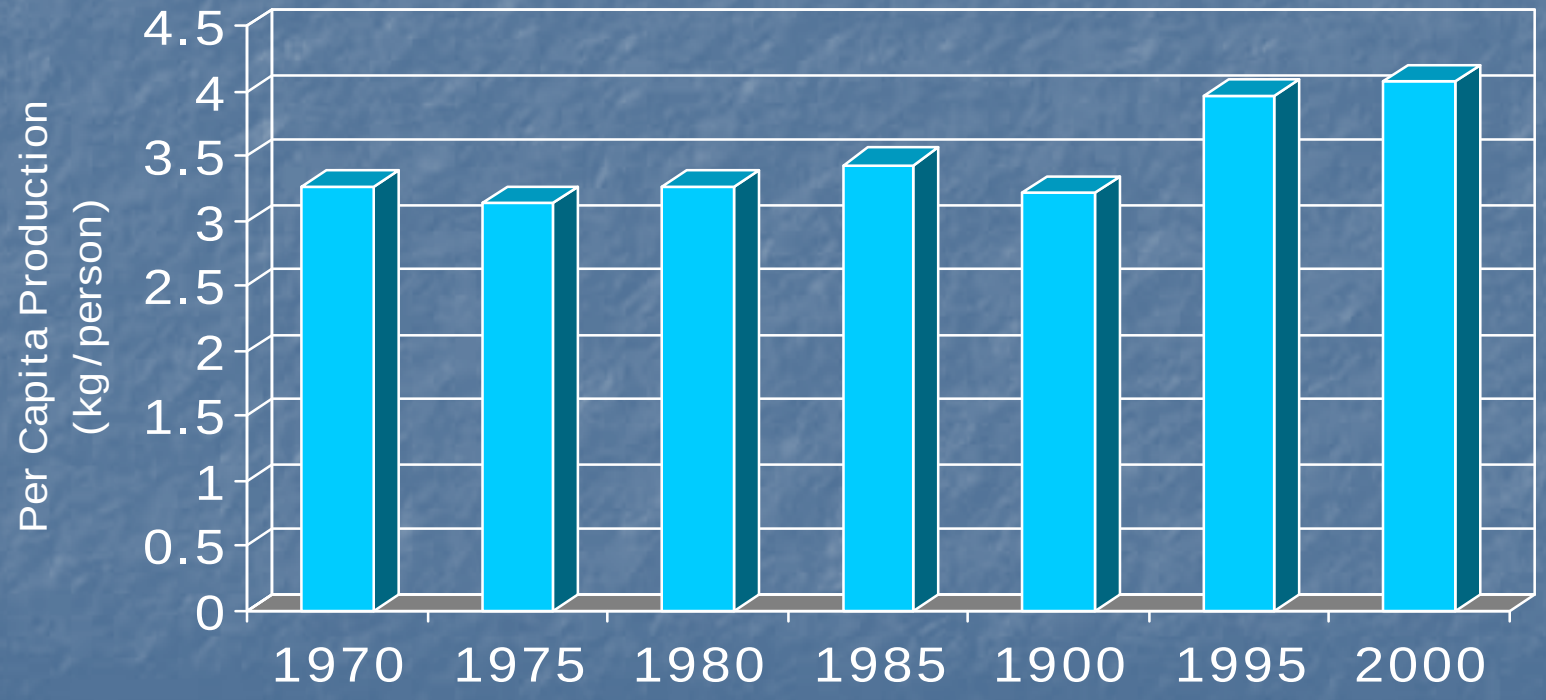
Region	
Africa	Nigeria (730), Egypt (317), Madagascar (210), Congo (209)
Asia	India (11,100), China (3,276), Thailand (1,678), Pakistan (1,021), Philippines (873), Indonesia (854)
Americas	Mexico (1,517), Brazil (621), Haiti (253)
Total	

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

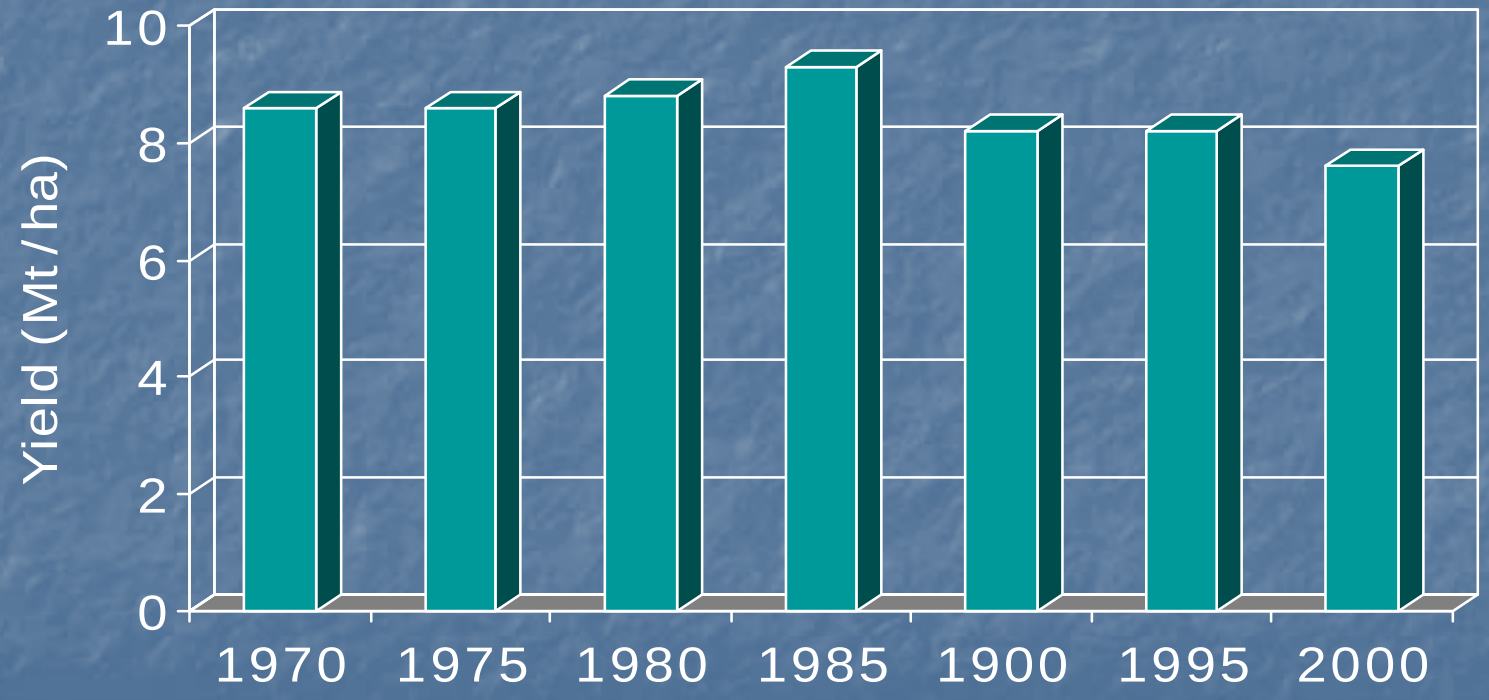
Yield in the USA is 4.3 mt/ha

Region	Mt/ha	
Africa	7.2	
Asia	8.0	
Americas	9.5	

FAOSTAT database, 2000-2002

Mango Yield in the World

FAOSTAT database, 1970-2000



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

Adaptation

- 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

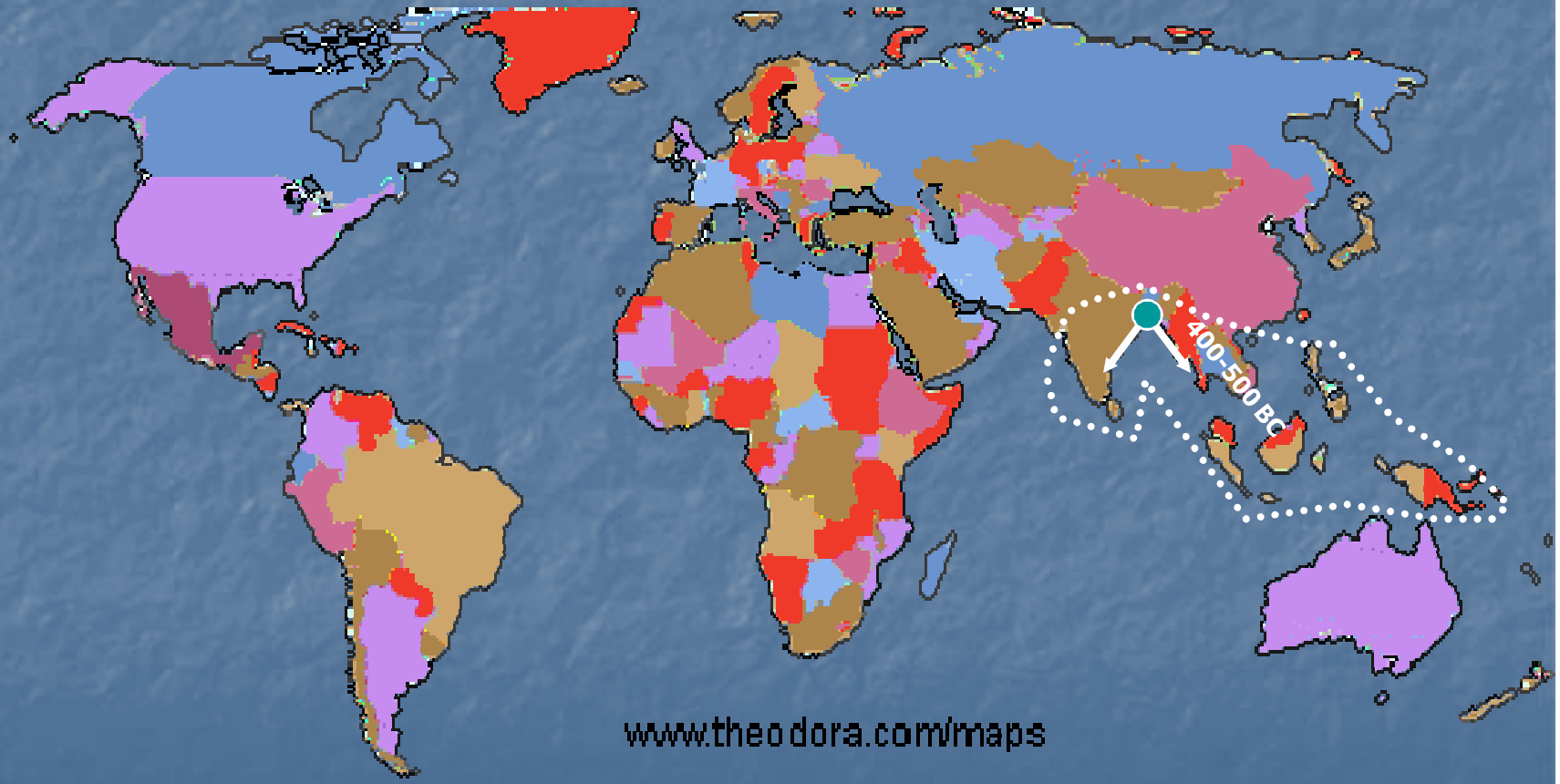
Adaptation

- 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

Dietary value, per 100 gram edible portion:

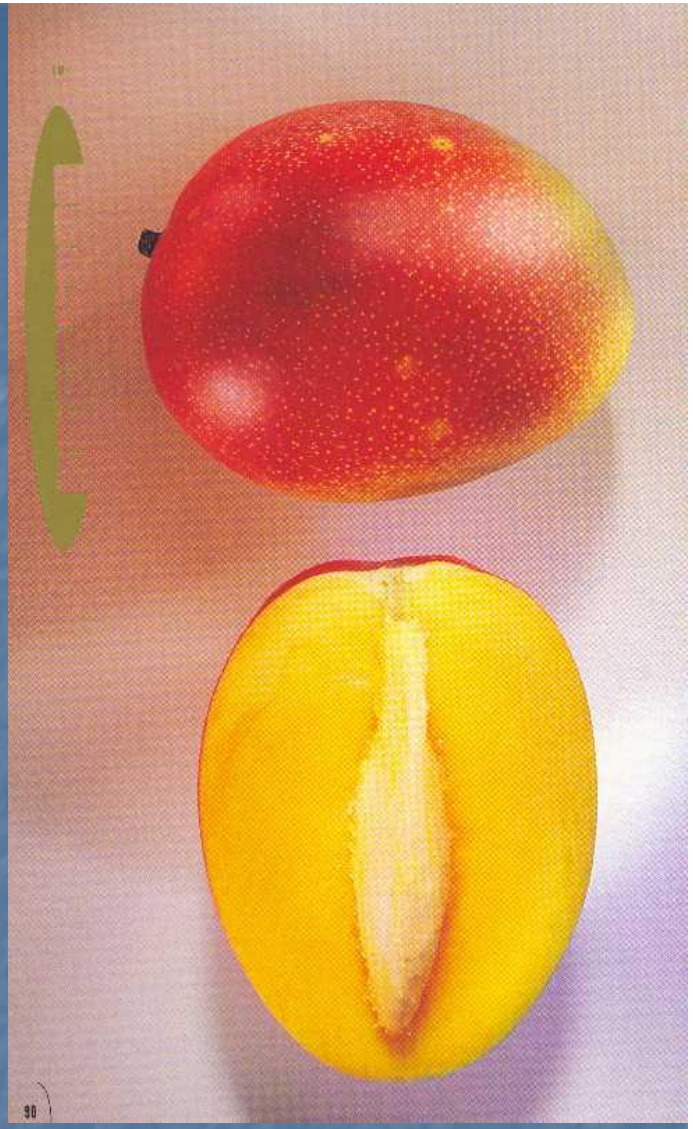
- Water (%) 80
  Calories 63
  Protein (%) 0.4
  Fat (%) 0.4
  Carbohydrates (%) 16
  Crude Fiber (%) ..... ---
- Vitamin A (IU)..... 3894
  Thiamin, B1 (mg) 0.06
  Riboflavin, B2 (mg).....0.05
  Niacin (mg)..... ..... 0.58
  Vitamic C (mg)..... 28
  Calcium (mg)..... 10
  Phosphorus (mg)..... 11
  Iron (mg)..... 0.13
  Sodium (mg)..... 2
  Potassium (mg).....156

Mango has been cultivated India for 4,000 years Southeast Asia for 2,500 years



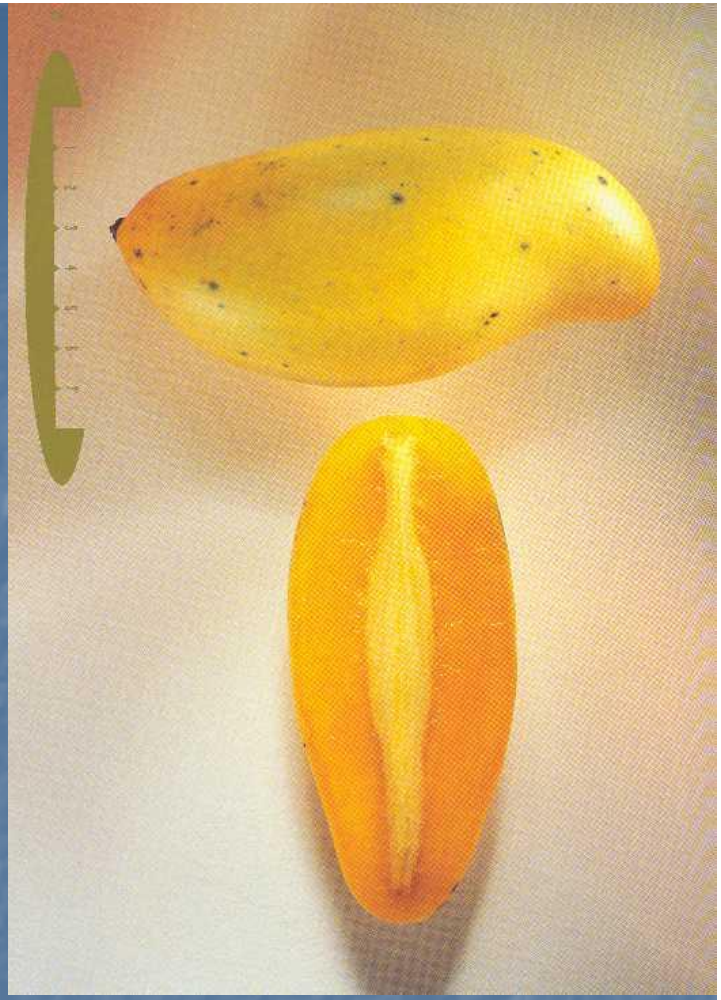
Indian Type

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

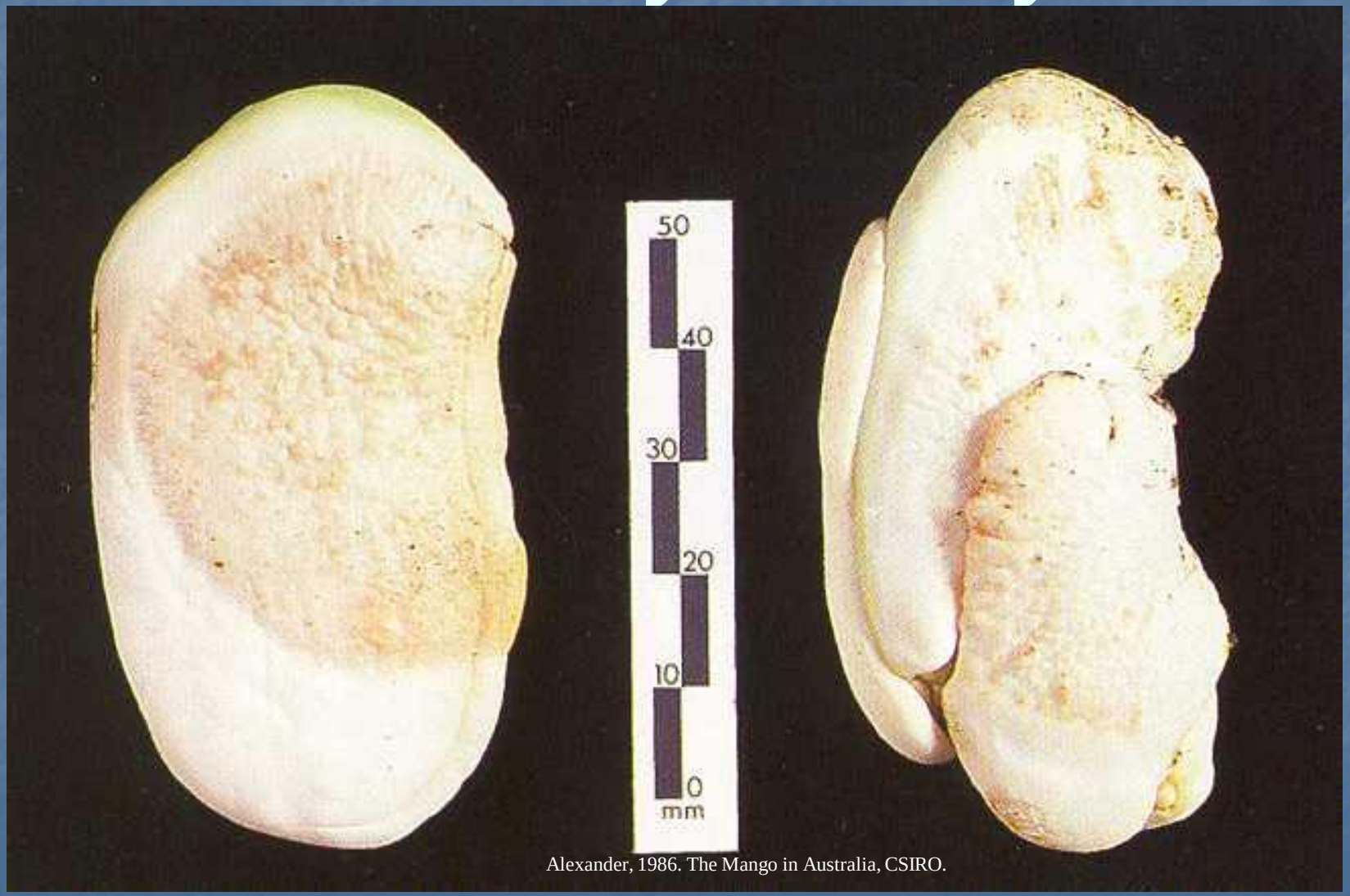


Indochinese Type

- 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



Alexander, 1986. The Mango in Australia, CSIRO.

Mono vs Poly Embryonic

- Monoembryonic
  - Indian race
  - Sexual
    - Variable from seed
- Breeding implications

Alexander, 1986. The Mango in Australia, CSIRO.

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

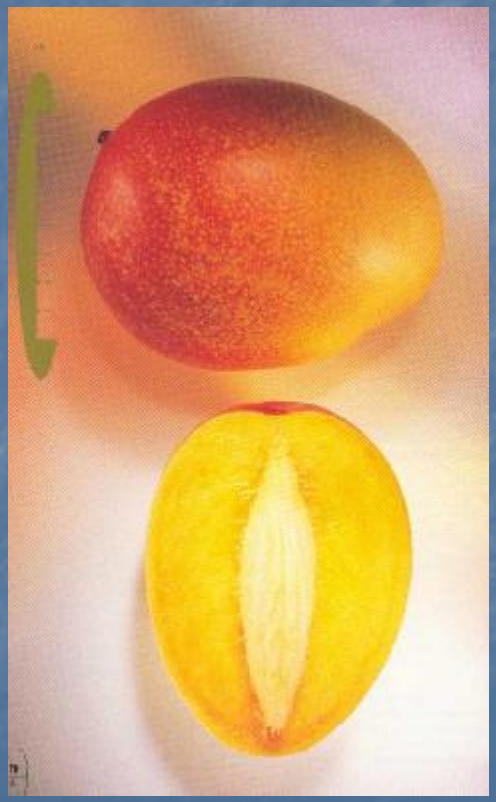
Florida developed Mango Varieties

Indian Types with Red Blush

First Important Commercial Variety in Florida

Mulgoba

Haden



June to July

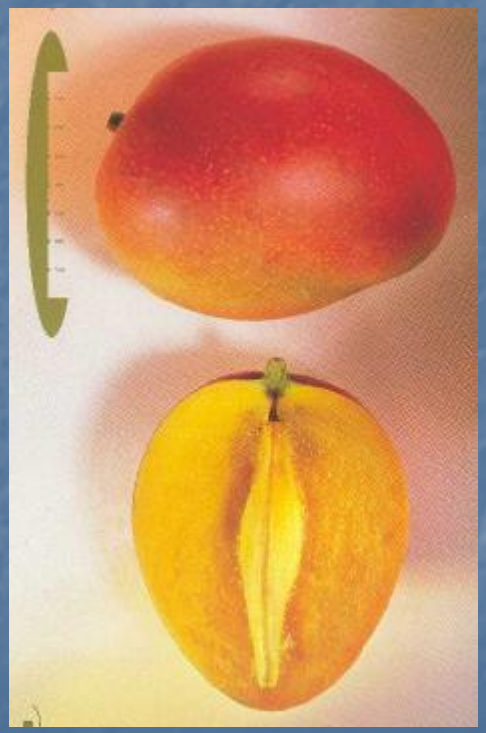
- Seedling selections
  - Capt. Haden
  - Coconut Grove,FL
  - 1910
- Thick skin
- Dominated the Florida for 25 years
- Replaced
  - S to anthracnose
  - Inconsistent production
  - Internal breakdown

Florida developed Mango Varieties

Indian Types with Red Blush

Two Main Mango Varieties in Florida

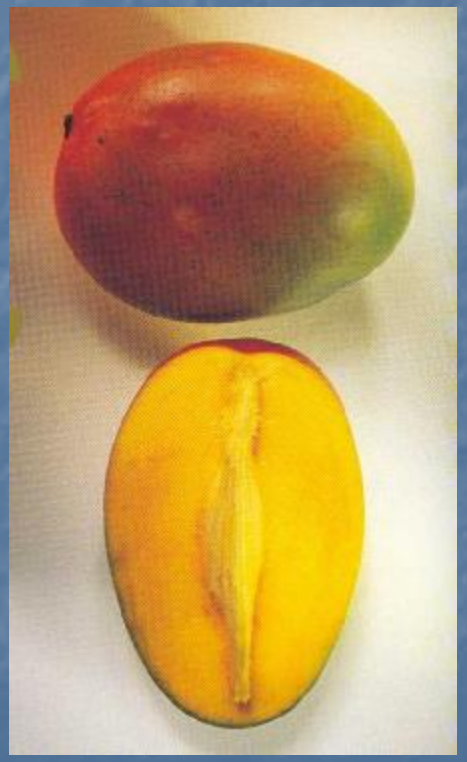
Tommy Atkins



June to July

- Seedling selections
  - Discoverer's name
  - Made in Florida
  - 1920s and 1939
- Thick skins
- Ship well
- Some R to anthracnose
- Productive
-

Keitt



August to early October

Florida developed Mango Varieties

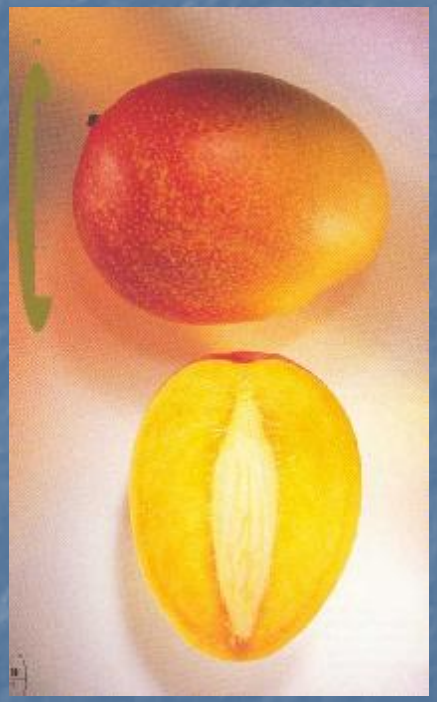
Indian Types with Red Blush

Used Commercially throughout the Americas

Tommy Atkins

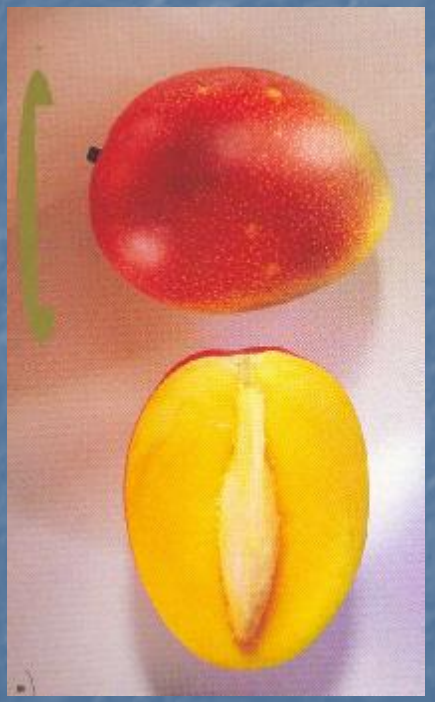
June to July

Haden



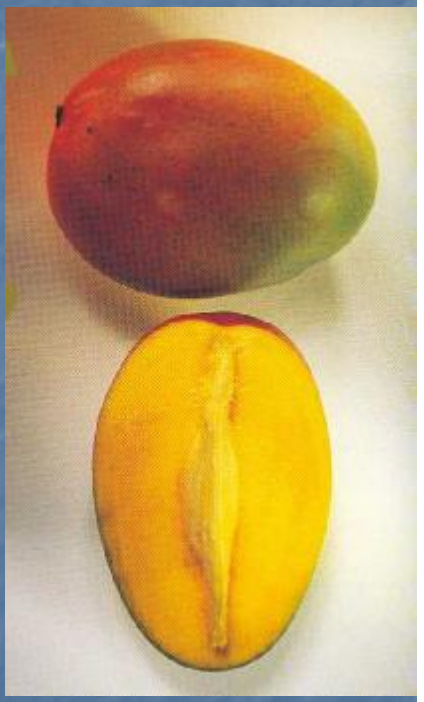
June to July

Kent



July to August

Keitt

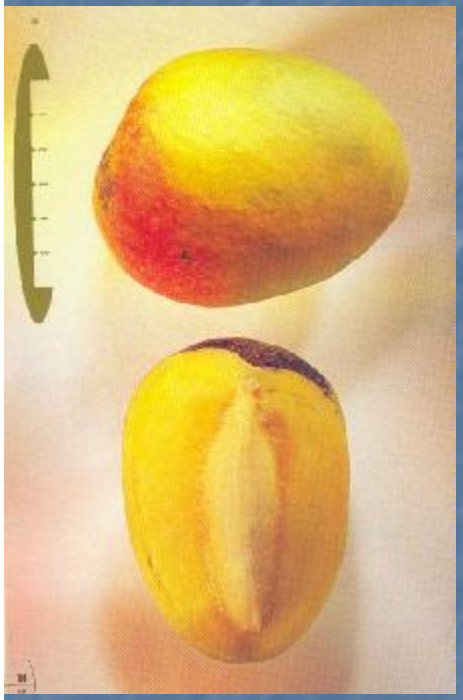


August to early October

Susceptible to Anthracnose

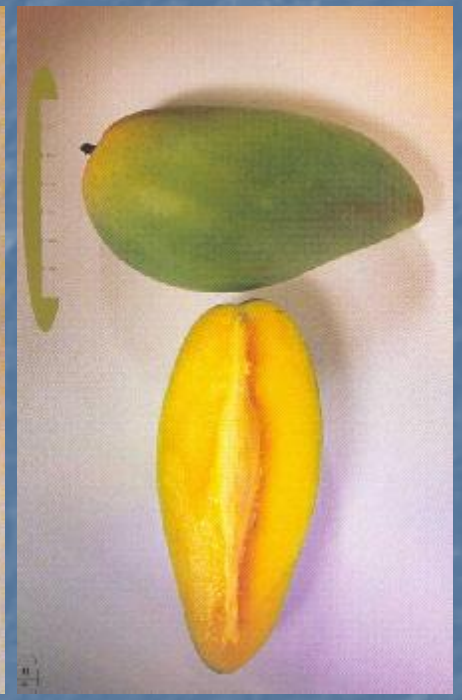
Asia Uses Different Varieties

Mulgoba



India

Carabao



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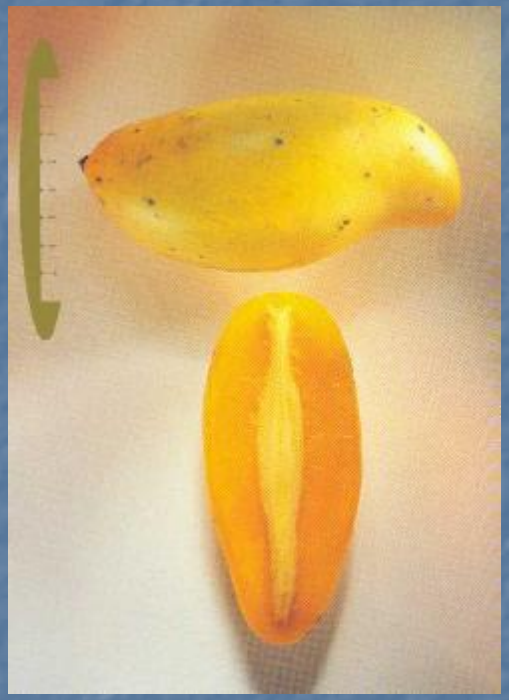
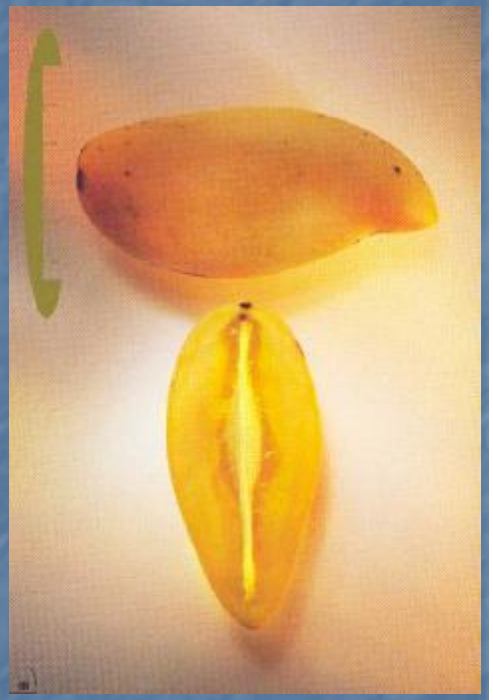
Manila



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 $CaNO_3$, $CaSO_4$, $CaCO_3$
- Zn deficiency corrected with 1pt NZN per 100 gal H_2O

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
    - KNO_3 (2 - 8%, 1 or 2 times)
    - NH_4NO_3 (1-4%, 1 or 2 times)

Anthracnose

Colletotrichum gloesporioides

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

Anthracnose

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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 12 C
  - Below 10 C chilling injury
- Heat treatment for fruit flies


Any Questions about Mango?