

Ethnobotany. Lecture 18

Alexey Shipunov

Minot State University

February 27, 2013



Outline

- 1 Other temperate and subtropical fruits
 - Citrus and related genera
 - Important tropical fruits



Other temperate and subtropical fruits

Citrus and related genera



Citrus and related genera

- Belong to Rutaceae, ruta family, often treated as separate subfamily, Aurantioideae
- East Asian and/or Indonesian origin
- Have specific **hesperidium** fruit with flavedo exocarp, albedo mesocarp and membrane endocarp covered with juicy hairs



Trifoliate, *Poncirus*

- Spiny, hardy citrus, with compound leaves, growing even in warm temperate regions
- Used as a rootstock for grafting other species
- Fruits are bitter but contain vitamins and microelements



Poncirus trifoliata



Orange, *Citrus sinensis*

- All *Citrus* have unifoliate leaves but with a strip between petiole and leaf blade (remained from compound leaf)
- Chinese origin, before the Age of Discovery was known in Europe mostly as a legend about “golden apples”
- Mostly subtropical (not tropical) culture
- Also used as a rootstock for other species (e.g., grapefruit)



Lemon, *Citrus limon*

- Relatively big (4–6 m) spiny trees
- Flowers continuously
- Sour citrus, fruits contain up to 8% of lemon acid
- Introduced to Europe in 1000s
- There are cultivars for home growth

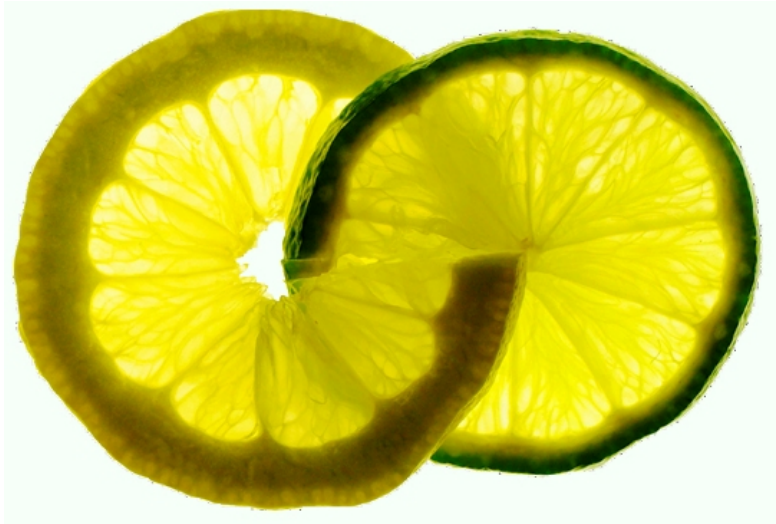


Lime, *Citrus aurantifolia*

- Pure tropical culture, damaged even with small frost
- Originated from Malaysia, but culture started in Caribbean
- Flavedo is green and thin; aroma compounds different from lemon



Lemon and lime



Mandarin, *Citrus reticulata*

- Extremely variable species, with multiple cultivars and hybrids
- Multiple names: tangerine, clementine, satsuma, unshiu
- Small trees or even shrubs with big leaves, some forms (unshiu) are hardy; all require humid climate



Mandarin



Grapefruit, *Citrus* × *paradisi*

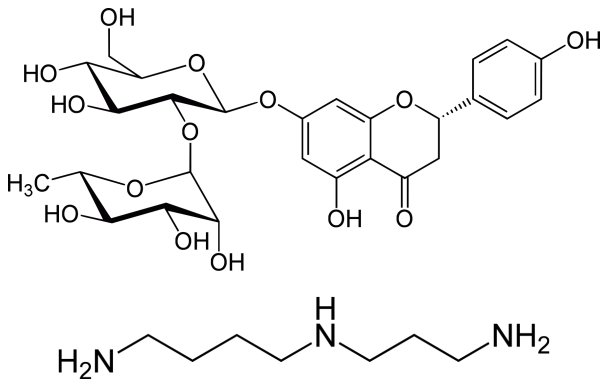
- Originated in 1750 in Barbados, most probably as a unique (!) hybrid between orange and pomelo (*Citrus maxima*)
- Cultivated mostly in USA and Caribbean countries
- Big tree, fruits larger than orange, with bitter taste due to **naringin**, the glycoside with digestive, tonic and anti-atherosclerotic effects
- Also contains significant amounts of vitamins B and polyamine spermidin (which is known to increase lifespan of different laboratory animals)



Grapefruit



Naringin and spermidine



Pomelo, *Citrus maxima*

- Pomelo, shaddock (by name of captain Shaddock who brought it to Caribbean) is widely cultivated in Thailand and neighboring countries
- Largest citrus (up to 15 m), fruits also large, up to 3 kg, contain naringin
- Tropical culture, may be cultivated even on seashores



Pomelo



Bitter orange, bergamot orange, *Citrus aurantium*

- Used mostly as a source of strong aroma compounds
- Also known as appetite suppressant
- Component of different liquors and Earl Gray tea



Bitter orange



Citron, *Citrus medica*

- Have large but somewhat bitter fruits
- Flavedo is thick, used raw and for candies
- Historically, was first citrus cultivated in Europe
- Famous “Buddha’s hand” is *Citrus medica* var. *sarcodactylis*



“Buddha’s hand” citron



Kumquat, *Fortunella* spp.

- Small evergreen trees from other genus (*Fortunella*) and 4 cultivated species, all from East Asia
- Sour fruit with sweet skin
- Widely hybridize with other citrus species



Kumquat



Other temperate and subtropical fruits

Important tropical fruits



Banana, *Musa acuminata*

- Belongs to Musaceae family of monocots
- Genus contains 11–13 species, all tropical
- Cultivated forms are seedless triploids with AAB genome, where “A” is a wild *Musa acuminata*, and “B” is *M. balbisiana*
- Fruits are rich of carbohydrates, vitamins of B group, iron and potassium



Wild diploid banana with seeds



Banana biology

- Perennial herbaceous (!) plant with large underground rhizome
- Rhizome produce groups of leaves with connected petioles (pseudo-stem)
- Inflorescence will grow through pseudo-stem and produce up to 3,000 flowers, male and female
- Wild forms are often bird-pollinated, cultivated forms are parthenocarpic



Banana corms



Banana flowers



Banana agriculture

- Propagated with slices of rhizome (corms)
- Initial growth of pseudo-stem is 5–6 months, then fruits appear after 2–3 month
- Critical to humidity (must be high) and soil richness (planted often on burnt forest plantations)



Banana plantation



Banana history

- Probably originated in southeast Asia and then distributed across the world before age of exploration
- Two main cultivar groups selected: fruit bananas and plantains (vegetable, starch-containing bananas)
- Biggest producers are India, Philippines and China



Pineapple, *Ananas comosa*

- The only fruit from Bromeliaceae family
- Herbaceous plant
- “Fruit” is a ripened inflorescence (infructescence, pseudocarp)



Pineapple biology

- Perennial herb with rigid, spiny, succulent leaves
- Leaf rosette serves as reservoir for water
- Inflorescence is a dense spike, where all flowers are fused



Pineapple flower



Pineapple agriculture

- Needs semi-dry tropical climate and lots of fertilizers
- Flowering is normally being induced by sodium acetylide and water reaction, resulted ethyne acts as a flower-stimulated hormone
- Harvesting is dangerous due to presence of protein-digesting enzyme bromelain



Pineapple field



Pineapple history

- Pineapples are extremely rich of sugars, vitamin C and essential mineral manganese (Mn)
- Originated in South America, probably near contemporary Paraguay, wild relatives are unknown
- Cultivated in greenhouses in XVIII-XIX centuries, burning dung was typically used as a source of ethyne
- Thailand and Brazil are biggest producers now



Summary

- Citrus is a group of genera with no wild species; different species and even genera can hybridize almost freely
- Banana is a giant perennial herbaceous plant with no true aboveground stem
- Pineapple, banana and also star fruit (*Averrhoa*) were covered in presentations.



For Further Reading



A. Shipunov.

Ethnobotany [Electronic resource].

2011—onwards.

Mode of access:

http://ashipunov.info/shipunov/school/biol_310



P. M. Zhukovskij.

Cultivated plants and their wild relatives [Electronic resource].

Commonwealth Agricultural Bureaux, 1962.

Mode of access:

http://ashipunov.info/shipunov/school/biol_310/zhukovskij1962_cultivated_plants.pdf

Pages 28–74.

