

Ethnobotany. Lecture 19



Alexey Shipunov

Minot State University

March 2nd, 2011



Outline

1 Tropical fruits (cont.)

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

Papaya, *Carica papaya*

- Belongs to small family Caricaceae (close to Cruciferae)
- One of the most widely cultivated tropical plants

Papaya biology

- Fast growing, palm-like tree with short lifespan (< 20 years)
- Flowers of three kinds: male, female and hermaphroditic, there are ≈ 50 sexual forms
- Fruits contain seeds rich of mustard oils (like in cabbage family); fruits themselves are rich of starch, sugars, vitamin A and lycopene, and also of papain, peptidase enzyme

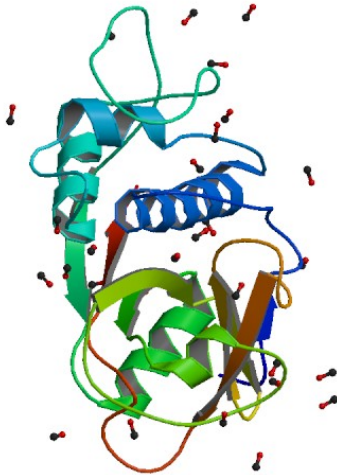
Papaya plantation



Papaya flower



Papain enzyme



Papaya history

- Domesticated in southern Mexico in Aztec time
- It is still unclear if papaya occurred in south-west Asia before the age of exploration
- Culture of wet tropical climate, Brazil is the biggest producer

Avocado, *Persea americana*

- Representative of Lauraceae family
- Fruits are rich of fats (14%, mostly monounsaturated) and poor of sugars ($< 1\%$)
- Also contain vitamins B (including folate, B₉), A, K and potassium

Avocado biology

- Medium-sized evergreen tree
- Flowers are cross-pollinated, there are morning-female (A) and day-female (B) races
- Cultivars are mostly propagated by grafting
- Seeds are easy to germinate

Avocado tree



Avocado flowers



Avocado seedling



Avocado history

- Domesticated in Central America (Mayan civilization)
- Spread in many other places, including California
- Was first fruit of aircraft delivery
- Mexico and China are now biggest producers

Passion fruit, *Passiflora edulis*

- Other names: maracuja, granadilla
- Belongs to Passifloraceae family and passionflower genus, *Passiflora*
- Amazingly complex flower structure

Passionflower



Passionfruit



Passion fruit features

- Perennial vine, flowering twice a year
- Pollinated with birds and big insects
- Extremely rich of vitamin C

Litchi, lychee, *Litchi sinensis*

- Evergreen tree from Sapindaceae family
- Old traditional Chinese culture, cultivation started 2,000 BC

Litchi



Litchi seeds



Litchi features

- Edible part of fruit is seed aril (seed attachment)
- Contain significant amounts of minerals like phosphorous and copper
- Mycorrhizal tree
- Fruits are canned for transportation

Durian, *Durio* spp.

- Several cultivated species, representatives of Malvaceae family
- Large size, unique odor and thorned fruit surface
- “King of the fruits”
- Odor is unusual, it is the reason why durian is banned, e.g., in public transportation. “Smell evokes reactions from deep appreciation to intense disgust, and has been described variously as almonds, rotten onions, turpentine and gym socks”...

Durian



Durian tree



Durian features

- Large tropical trees, fruits may be dangerous because they heavy, thorned and located very high
- Fruit content is rich of carbohydrates and fats
- Originated in Indonesia and became popular in Europe only in XX century

Carambola, starfruit, bilimbi *Averrhoa carambola*

- Tree native to Philippines
- Belongs to Oxalidaceae family
- Tree of tropical wet forests

Starfruit



Carambola features

- Harvested year round
- Fruits are rich of water, vitamin C and oxalic acid (family character)
- Contains antioxidants

Guava, *Psidium* spp.

- Representative of Myrtaceae, the family rich of useful species with medicine and other values
- All parts of plant contain essential oils
- More than 100 species, all are edible, some are cultivated (like *Psidium guajava*)

Guava flowers



Guava fruits



Guava features

- Originated in Central America
- Fruits contain up to 12% of sugars, diverse minerals (e.g., iron), many pectins
- In India, often consumed with salt

Tamarind, *Tamarindus indica*

- The rare fruit legume (Leguminosae)
- One of traditional national Indian fruits
- Edible part of fruit is a pulp, endocarp filling all spaces between seeds

Tamarind



Tamarind candy (India)



Tamarind features

- Plant of multiple uses, legumes used also as starch source (for flour), leaves as vegetables, all parts as medicine
- Normally, do not cultivated in plantations, it is a typical “street tree”
- Well adapted for monsoon climate
- Originated in Africa and was introduced to India in prehistoric times

Acerola, barbados cherry, *Malpighia glabra*

- Caribbean tree from Malpighiaceae family
- Fruits are typically sour, known as a richest source of vitamin C (2% of dry mass)
- Also have antioxidant value

Acerola



Summary

- Multiple tropical fruits are mostly sources of vitamin C
- Many traditional Asian fruit cultures also have medicine value

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 (fruits) and 16–23 (oil plants) + lectures 10–19 + lab 3–5 materials + 4 presentations.