

Ethnobotany. Lecture 24

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Outline

- 1 Fruits and vegetables
 - Important tropical and subtropical fruits
 - Berries
 - Nuts
 - Gourd plants
 - Vegetables: general view



Fruits and vegetables

Important tropical and subtropical fruits



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



Grape, *Vitis vinifera*

- Belongs to grape family, Vitaceae
- Genus has 70 species, only several are cultivated

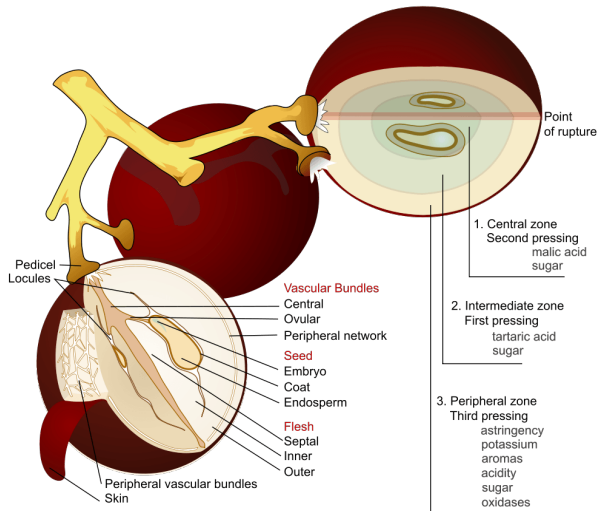


Grape biology and agriculture

- Woody vine with tendrils (modified shoots) and palmately lobed leaves
- Agriculture always depend on local climatic conditions
- Forming and cutting are two extremely important techniques



Grape



Grape history

- Central Asian center of origin, cultivated from 4,000 BC
- In Europe, culture flourished in XVII–XVIII centuries
- Used for wine, glucose sugar (raisins) and oil



Persimmon, *Diospiros kaki*

- Belongs to mostly tropical blackwood family, Ebenaceae
- Large genus (200) but only one deciduous species cultivated



Persimmons



Persimmon features and history

- Originates in China
- Fruits are rich of microelements and carotens
- Used also as dry fruit and in eastern medicine; wood is widely used for furniture



Persimmon tree in Japan



Pomegranate, *Punica granatum*

- Belongs to Lythraceae family, genus has only 2 species
- Semi-evergreen shrub



Pomegranate features and history

- The edible parts of fruit are seed arils (similar to litchi)
- Old Mediterranean culture
- Trees are flowering from 2nd year
- One of the most reach of biologically active compounds fruit: contain ellagitannins, punicalagins, polyphenolic catechins, gallocatechins and anthocyanins. They reduce heart disease risks, oxidation, stimulate digestion and immune system.



Pomegranate flower



Date palm, *Phoenix dactylifera*

- Belongs to palm family, Palmae; genus with several species which are cultivated mostly as ornamental palms
- Plant of multiple use: everything, from roots to dry stems, are used



Date palm



Date palm biology and agriculture

- Extremely tolerant to heat, may grow with temperatures above 50°C
- Does not tolerate precipitation; water is normally taken only from deeper soil layers
- Propagated with subsidiary shoots (grow faster than seeds)



Date palm history

- One of the oldest cultivated plants
- Dry fruits are the main food source in North Africa; ≈ 300 kcal per 100 g (highest among all fruits)
- Dates are rich of minerals, especially potassium, sodium and calcium



Fig tree, *Ficus carica*

- Belongs to mulberry family, Moraceae, and to one of the largest flowering plant genus, *Ficus* ($\approx 1,000$ species)
- One of the rare deciduous *Ficus*



Fig inflorescence



Fig tree biology and agriculture

- Edible part of fruit is the axis of inflorescence (not unlike pineapple)
- Have extremely complicated pollination system, including plants with sterile figs (caprifigs), fertile figs and fig wasps



Fig pollination

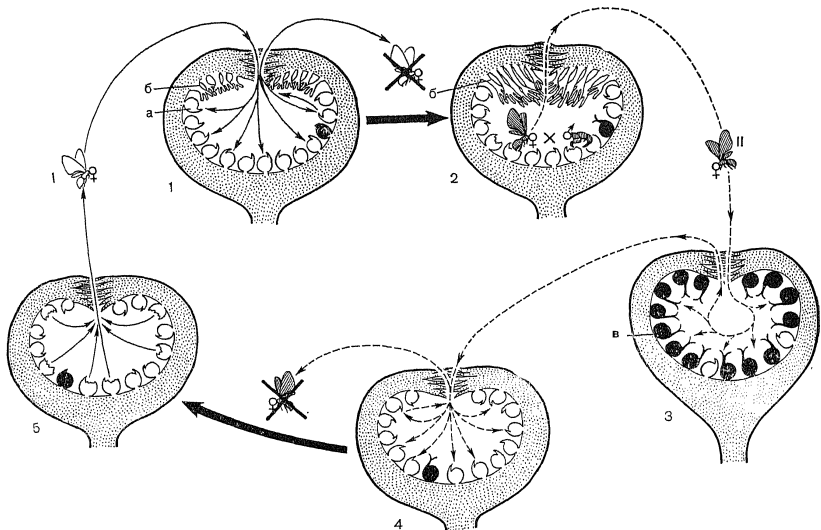


Fig tree history

- Cultivated from Old Testament times in West Asian center
- “carica” is from “Caria”, the region in contemporary Turkey



Accursed fig tree (Tissot, illustrations for New Testament)



Mulberry, *Morus* spp.

- Same mulberry family, Moraceae
- Several species are cultivated: black (*Morus nigra*), white (*M. alba*) and red (*M. rubra*)
- Occurs both in Eurasia and North America



Mulberry



Mulberry features and history

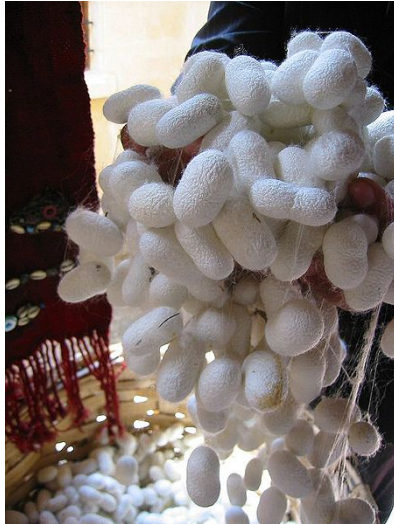
- Deciduous trees, with compact raspberry-like inflorescences
- Infructescences are rich of sugars ($\approx 22\%$), used raw, for wine, syrups etc.
- White mulberry is the feeding plant of silkworm, *Bombyx mori*



Silkworms on mulberry leaves



Cocoons



Kiwifruit, *Actinidia chinensis*

- *Belong to Actinidiaceae family, genus contains ≈ 40 species*
- *Woody vines, cultivated mostly as ornamentals*



Kiwifruit flowers



Kiwifruit biology and agriculture

- *Dioecious, fast-growing plant*
- *Biggest problem is a pollination (needs saturation pollination)*
- *Fruits rich of sugars, pectins, organic acid and enzyme actinidin (analog of papain and bromelain)*



Kiwifruit history

- *In China, was cultivated as ornamental*
- *After 30 years of intensive selection (started in 1904), New Zealand invented the kiwi fruit*



Fruits and vegetables

Berries



Currants and gooseberries

- Belong to Saxifragaceae family; multiple species of genus *Ribes* are cultivated
- All are shrubs, gooseberries (*Ribes uva-crispa*) have spines whereas currants (mostly *R. rubrum* and *R. nigrum*) not
- Rich of pectins and vitamin C



Gooseberry



Black currant



Blueberry and cranberry

- Belong to heath family, Ericaceae and genus *Vaccinium*
- *Vaccinium macrocarpon* is American cranberry; *V. corymbosum* is the most cultivated species of blueberries
- Have high food and medicinal value, provide vitamins, antioxidants (carotenoids) and organic acids; *V. vitis-idaea* (lingonberry) is probably most valuable



Blueberry



Cranberry



Cranberry harvesting



Lingonberry



Fruits and vegetables

Nuts



Nuts in general

- Contain proteins and oil in seed endosperm and/or cotyledons
- The main way of dispersal is the weak memory of collecting animals



Walnut, *Juglans regia*

- Belongs to walnut family, Juglandaceae, only one species is cultivated
- Asian origin
- Huge deciduous tree, nuts are rich of tannins and group B vitamins



Walnut



Pecan

- *Carya illinoensis*, one species of hickory
- American origin
- Similar to walnut, but has less proteins and more sugars



Pecan



Hazelnut, *Corylus avellana* and other species

- Shrub of birch family, Betulaceae; several species are cultivated
- Nut is (among other common compounds) rich of carotenes



Hazel female flower



Pistachio, *Pistacia vera* and cashew, *Anacardium occidentale*

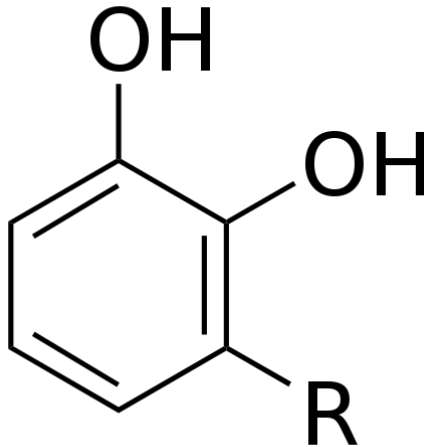
- Deciduous trees of Central Asian origin and evergreen tree from East Asia
- Nuts promote the lowering of cholesterol level
- Green parts of trees contain poisonous urushiol, like all Anacardiaceae family (including poison ivy)
- Cashew has a double use, as cashew apple and cashew nut



Pistachio



Urushiol



Brazil nut, *Bertholletia excelsa*

- Large tropical tree of Lecythidaceae family
- Among others, it is the richest dietary source of selenium



Brazil nut flowers



Brazil nut fruit



Macadamia, *Macadamia integrifolia*

- Member of Proteaceae family; Australian plant
- Rich of fats and microelements; toxic to dogs



Macadamia



Chestnut, *Castanea sativa*

- Member of oak family, Fagaceae
- Old European culture, traditional to France, England and Germany
- Rich of tannins and therefore usually fried



Chestnut



Fruits and vegetables

Gourd plants



Gourds, Cucurbitaceae family

- \approx 900 species, mostly tropical and subtropical plants
- Prefer dry regions, important component of different deserts
- Hairy herbs or vines with tendrils (modified shoots)
- Flowers unisexual
- Petals and stamens fused
- Pistil with 3 carpels, ovary inferior
- Fruit is a berry

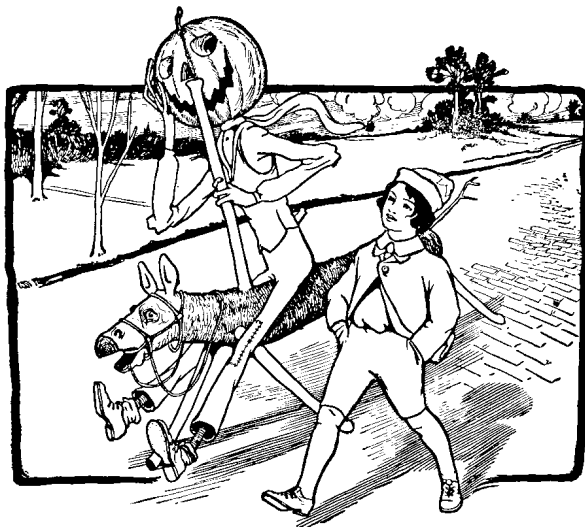


Pumpkins and squashes, *Cucurbita* spp.

- Central American origin
- Plants of multiple uses; it is normal to harvest the underripened



Pumpkinhead, Sawhorse and Tip (Ozma)



Watermelon, *Citrullus lanatus*

- African origin
- The source of water, multiple medicine uses (e.g., for kidney diseases)



Watermelon flower

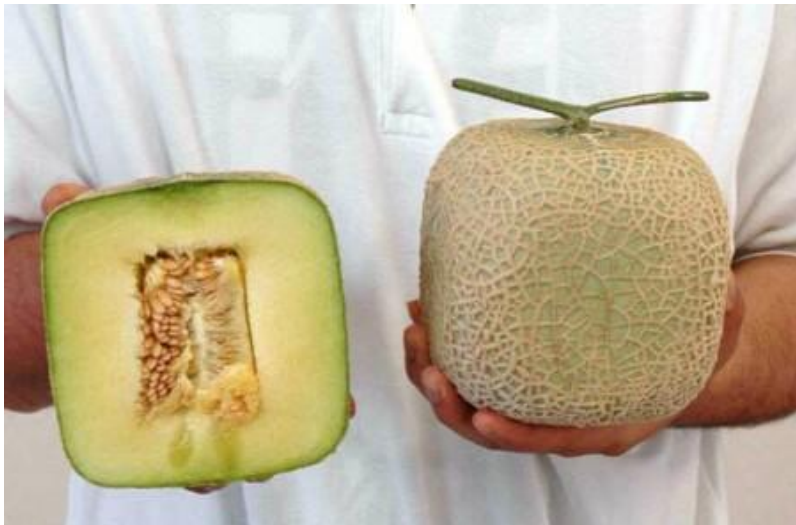


Melon, *Cucumis melo*

- Central Asian origin
- Rich of sugars (some cultivars up to 20%), used as sugar source in Central Asia



Japanese square melon



Cucumber, *Cucumis sativus*

- Annual herbaceous vine from India forests, wild relatives not found
- May grow as water culture, widely cultivated in greenhouses, some cultivars have one week for fruit development



Indian Dosakai round cucumber



Chayote, *Sechium edule*

- *One of relatively “new” cultures from Mexico*
- *High yield culture, one plant may give up to 40 kg of fruits*



Chayote



Fruits and vegetables

Vegetables: general view



Main families of vegetable plants

- Cruciferae, cabbage family, and its main species, *Brassica oleracea*, cabbage
- Umbelliferae, umbel family
- Solanaceae, potato family



Features of vegetables

- All vegetative organs: roots, stems and leaves—may become sources of edible vegetable
- However, fruits of Solanaceae are also considered as vegetables
- Modifications (typically, enlargement) of these organs will increase the value of vegetable
- “Herbs” are intermediates between vegetables and spices



Want more fruits and vegetables? No problem! (1)

- Samphire (*Salicornia spp.*), Amaranthaceae
- Marula (*Sclerocarya birrea*), Anacardiaceae
- Jocote (*Spondias purpurea*), Anacardiaceae
- Guanabana (soursop) (*Annona muricata*), Annonaceae
- Pitaya (dragonFruit-vegetable) (*Hylocereus undatus*), Cactaceae
- Endive (*Cichorium endivia*), Compositae
- Cucamelon (mouse melon) (*Melothria scabra*), Cucurbitaceae
- Winter melon (*Benincasa hispida*), Cucurbitaceae
- Sea-buckthorn (*Hippophae rhamnoides*), Elaeagnaceae
- Buffaloberry (*Shepherdia argentea*), Elaeagnaceae
- Strawberry tree (*Arbutus unedo*), Ericaceae
- Salal (*Gaultheria shallon*), Ericaceae
- Lingonberry (*Vaccinium vitis-idaea*), Ericaceae
- Bignay (*Antidesma bunius*), Euphorbiaceae
- Basil (*Ocimum basilicum*), Labiatae
- Shiso (wild sesame) (*Perilla spp.*), Labiatae
- Carob tree (*Ceratonia siliqua*), Leguminosae
- Langsat (*Lansium domesticum*), Meliaceae
- Santol (cotton Fruit-vegetable) (*Sandoricum koetjape*), Meliaceae
- JackFruit-vegetable (*Artocarpus heterophyllus*), Moraceae
- Yangmei (*Myrica rubra*), Myricaceae



Want more fruits and vegetables? No problem! (2)

- Feijoa (*Acca sellowiana*), Myrtaceae
- Surinam cherry (*Eugenia uniflora*), Myrtaceae
- Jabuticaba (*Plinia cauliflora*), Myrtaceae
- Wax jamboo (*Syzygium samarangense*), Myrtaceae
- Chilean guava (*Ugni molinae*), Myrtaceae
- Salak (*Salacca zalacca*), Palmae
- Rhubarb (*Rheum rhabarbarum*), Polygonaceae
- Jujube (Chinese date) (*Ziziphus jujuba*), Rhamnaceae
- Genipapo (*Genipa americana*), Rubiaceae
- African medlar (*Vangueria infausta*), Rubiaceae
- Kumquat (*Citrus (Fortunella) japonica*), Rutaceae
- Longan (*Dimocarpus spp.*), Sapindaceae
- Rambutan (*Nephelium lappaceum*), Sapindaceae
- Cainito (*Chrysophyllum cainito*), Sapotaceae
- Sapodilla (*Manilkara zapota*), Sapotaceae
- Canistel (*Pouteria campechiana*), Sapotaceae
- Tamarillo (*Solanum betaceum*), Solanaceae
- Goji berry (*Lycium barbarum* and *Lycium chinense*), Solanaceae
- Celery (*Apium graveolens*), Umbelliferae
- Carrot (*Daucus sativus*), Umbelliferae
- Parsnip (*Pastinaca sativa*), Umbelliferae



Summary

- Multiple tropical fruits are mostly sources of vitamin C
- Many traditional Asian fruit cultures have also a medicinal value
- Nuts are plants accumulating oils and proteins in their seeds, they mostly dispersed by “bad memory” animals
- Gourd plants are intermediates between fruits and vegetables



For Further Reading



A. Shipunov.

Ethnobotany [Electronic resource].

2011—onwards.

Mode of access:

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

