

Ethnobotany. Lecture 13

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Outline

- 1 Oil plants
 - Technical oil plants
- 2 Fruits and vegetables
 - Introduction



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Oil plants

Technical oil plants



Essential oils

- Mixture of hydrophobic components bearing plant odors
- Used for aromatherapy and in cosmetics
- The most famous are probably **rose oil** and **eucalyptus oil**



Ylang-ylang, *Cananga odorata*

- Tree from custard apple family (Annonaceae) which is cultivated for perfume oil
- Fast-growing tree from Indonesia
- Has diverse medical applications, used for cosmetics and in aromatherapy
- Comoros is the biggest exporter of ylang-ylang (29% of its annual export)



Camphor tree, *Cinnamomum camphora*

- East Asian tree from laurel family, Lauraceae
- Contain multiple aromatic substances, e.g., camphor—unusual hydrophobic molecule
- Camphor use has the old history, it still has a high ceremonial value in Hinduism, used in sweets, for aromatherapy and in fireworks (highly flammable)



Tung, *Vernicia (Aleurites) fordii*

- Small East Asian deciduous tree from spurge family, Euphorbiaceae
- Highly poisonous seeds contain one of the best drying oils, rich (82%) of 3-unsaturated α -eleostearic fatty acid
- Used for finishing wood (especially for musical instruments) and other staining processes



Tung fruits



Castor oil plant, *Ricinus communis*

- African and Indian shrub from spurge family, Euphorbiaceae
- Cultivated as annual in temperate regions
- Seeds are poisonous, but contain (95%) unique castor oil containing hydroxylated ricinoleic oil (unsaturated oil with –OH group)
- Widely used in traditional medicine as laxative, now used in many modern drugs as a component, and also as technical oil for lubrication, making plastics etc.
- In fascist Italy, was widely used for intimidation of Mussolini opponents (oil is not poisonous but in large quantity may be harmful)



Castor plant



Jojoba, *Simmondsia sinensis*

- Shrub of its own family (Simmondsiaceae) native to southern North America
- Name is a result of botanical mistake: botanist J. Link misread label “Calif” as “China”
- Seeds contain unique liquid wax (10°C is a melting point): combination of long-chained fatty acids and fatty alcohols
- Jojoba “oil” is odorless, colorless and oxidatively stable, used as a substitute for sperm whale oil: cosmetics, as stable lubricant (it is not digested for most organisms); and now also as biofuel
- Widely cultivated in Arizona, California and Mexico



Jojoba male flowers



Fruits and vegetables

Introduction



Fruits—and vegetables

- The main “common sense” difference is the low amounts of sugars in vegetables, plus tree origin of fruits
- However, there are multiple exceptions: beet, avocado, plantains etc.
- In addition, pumpkins and relatives (melon, watermelon, squashes) normally treated as separate group
- Morphologically, fruits are fruits (and sometimes seeds like litchi or pomegranate, or riped inflorescences like pineapple or fig), and vegetables are everything else



Main components of fruits

- Water
- Dietary fiber
- Sugars
- Organic acids
- Vitamins

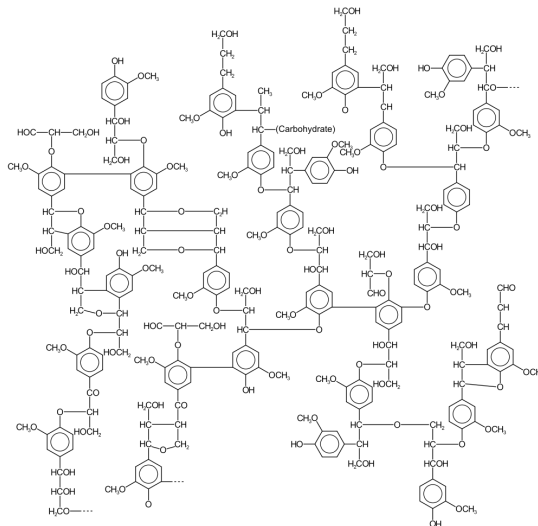


Dietary fiber

- Polysaccharides
- Lignin
- Other constituents of plant cell walls (glycoproteins etc.)
- Improve intestinal transit, lowering the risk of colorectal cancer



Lignin



Fruit sugars

- Mostly fructose and its derivatives (kestoses)
- Sweeter 1.7 times more than sucrose, but only at room temperature

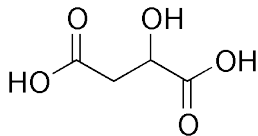
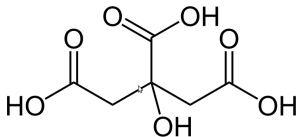


Organic acids

- Malic (*Pyrus malus*, apple and other Rosaceae fruits)
- Citric (*Citrus* fruits etc.)
- Tartaric (e.g., in wine)
- Are good antioxidants



Citric and malic acids

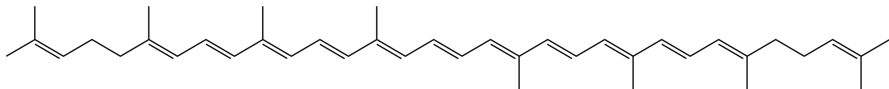
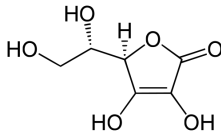


Fruit vitamins

- Vitamin C (ascorbic acid)
- Pro-vitamin A (β -carotene)
- Other carotenes (lycopene etc.)



Ascorbic acid and lycopene

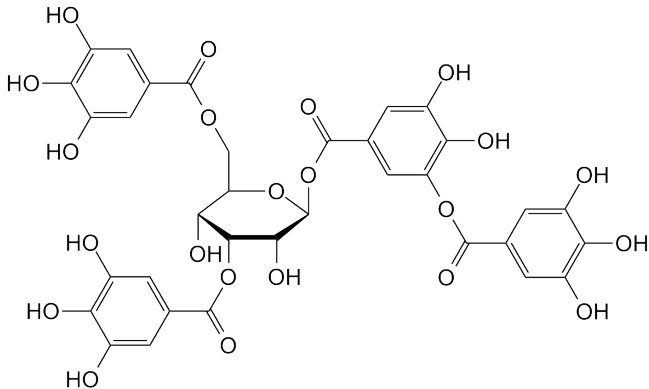


Specific components which are restricted to few species

- Lipids
- Starch
- Gums, mucilages, pectins
- Astringent chemicals (e.g., tannic acid)
- Aroma compounds
- Other secondary* metabolites (latex, alkaloids, glycosides)



Tannic acid



Summary

- The main “common sense” difference of vegetables is the low amounts of sugars, most vegetables are also herbs
- Most of fruits are sources of water, sugars, organic acids and plant vitamins



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.

