

Ethnobotany. Lecture 18

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Outline

- 1 Oil plants
 - Oil palm, *Elaeis guineensis*
 - New oil cultures
 - Lesser oil plants



Oil plants

Oil palm, *Elaeis guineensis*



Oil palm, *Elaeis guineensis*

- Used in Africa from prehistorical times, but the mass cultivation started only in the beginning of XX century
- Belongs to palm family, Palmae
- Palm oils are semi-solid at the room temperature: plant fats



Fruits of oil palm



Blocks of palm oil



Oil palm features and history

- Oil is rich of saturated fatty acids, especially palmitic (C₁₆) acid, also rich of carotenes and often has a reddish color
- Yield is high (up to 100 kg of oil from one tree per year), and therefore palm oil is very common in tropics
- Biggest producers are Malaysia and Indonesia
- Also famous as the source of Greek fire and **napalm** (mixture of palmitic acids, several other organic compounds and aluminum)



Making of palm oil (Kongo)



Napalm



Oil plants

New oil cultures



Sacha inchi, *Plunkettia volubilis*—perspective oil plant

- South American, Amazonian tree from spurge family, Euphorbiaceae
- Capsules contain several large seeds, rich of oil ($\approx 60\%$)
- Sacha inchi oil contains highest amounts of omega-n-unsaturated fatty acids (93%!) and vitamin E
- Cultivation started in 2000s, mostly in Peru



Sacha inchi



Oil plants

Lesser oil plants



Coconut, *Cocos nucifera*

- Belong to Palmae, cultivated around the world as technical and nut plant
- Oil is similar to Africal oil palm: rich of saturated fatty acids, especially lauric acid (48%)
- Oil extracted from either coconut milk (wet process), or copra (dry process)
- Apart from food, has a wide technical use (lubricant, fuel, cosmetics)

[Coconut palm will be covered in more detail later]



Drying coconut copra for oil making



Soybeans, *Glycine max*

[The plant was covered earlier]

- Apart from protein food, soybeans produce one of most widely used cooking oil (“vegetable oil”), with high smoke point (232°C)
- Soybean oil is rich of poly-unsaturated fatty acids (especially 2-unsaturated linoleic, 51%)
- Soybean oil may also be used for painting (because it is drying slowly), as insect repellent, as fuel, and as fixative to essential oils



Soybean oil



Soybean oil as biofuel



Flax, *Linum usitatissimum*

- Obtained from flax (*Linum usitatissimum* from Linaceae family) which is also used as technical plant
- Bright yellow, very fast drying oil because it is rich of triply unsaturated fatty acid, α -linolenic acid (up to 55%), smoke point is low (107°C)
- Normally, used as a technical substance for painting, for finishing wood, for linoleum (one of the first half-synthetic floor covering) and also as rich and useful food supplement (α -linolenic acid = ω -unsaturated acid, EFA)

[The plant will be covered in more details later]



Wood finishing with flaxseed oil



Cottonseed, *Gossypium* spp.

- Extracted from seeds of cotton (several species of *Gossypium* from Malvaceae family)
- Oil contains up to 52% stearic (monounsaturated) fatty acid, very stable (does not dry) and with high smoke point (232°C) (Rice oil has the highest smoke point, 254°C)
- Used in many foods, especially for salad dressings and chips, for deep frying
- High of tokoferols (vitamin E)
- Contain amounts of *gossypol*—biologically active phenolic compound which may be used in medicine (e.g., as contraceptive, for curing viral infections etc.) but should be removed from food oil

[Mostly known as a fiber plant, will be covered later]



Cottonseed oil



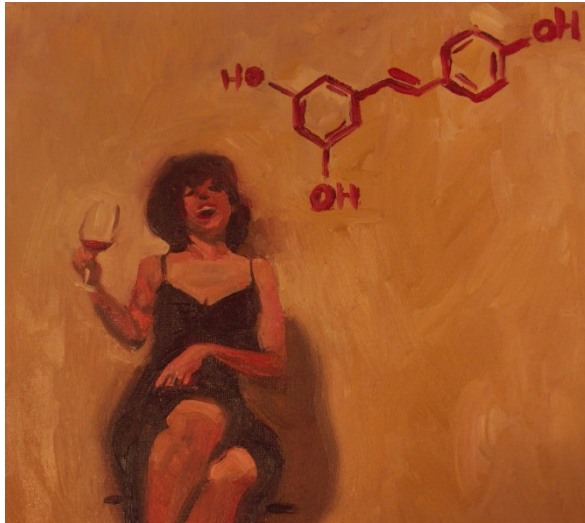
Grapeseed, *Vitis vinifera*

- By-product of winemaking, extracted from grape (*Vitis vinifera* from Vitaceae family)
- Similarly to soybean oil, rich of 2-unsaturated linoleic acid (72%)
- Used similarly to cottonseed oil: salad dressings and deep frying
- Has high medicinal value: contains *phytoalexin* (plant non-specific immune chemical) **resveratrol** (also component of red wine) which is anti-cancer and anti-hypertensive drug

[Mostly known as fruit, will be covered later]



Resveratrol



Cocoa butter, from *Theobroma cacao*

- Cocoa butter from *Theobroma cacao* (Malvaceae family) is plant fat, rich on non-saturated fatty acids (stearic and palmitic together $\approx 60\%$)
- Has 37°C melting temperature and therefore used a lot as a subsidiary oil in medicine (e.g., in suppositories) and in cosmetics; also used for making white chocolate
- Normally, does not contain theobromine and caffeine (components of dark chocolate)

[The plant will be covered in more details later]



Cocoa flower



Shea butter, from *Vitellaria paradoxa*

- Shea butter from *Vitellaria paradoxa* (Sapotaceae, you already know miracle fruit from this family) is similar to cocoa butter (with similar melting temperature)
- African tree
- It has a double use as edible and as technical
- Used for cosmetics from Ancient Egypt times



Shea tree



Traditional preparation of the shea butter



Summary

- Oil palm and cocoa tree produce high amounts of plant “fats”
- The most promising contemporary oil cultures are canola and sacha inchi



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. Abridged translation from Russian.

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