

# Ethnobotany. Lecture 7

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# Outline

## 1 Starch-containing plants

- Inulin plants

## 2 Legumes

- Soya beans, *Glycine max*
- Beans (*Phaseolus vulgaris*)
- Pea (*Pisum sativum*)
- Lentils, *Lens culinaris*
- Chickpea (*Cicer arietinum*)

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# Jerusalem artichoke, *Helianthus tuberosus*

- Belongs to Compositae (sunflower) family
- Tubers are rich of inulin, fructose polymer, useful dietary fiber
- Plant used by eastern Indian tribes and now spread to Eurasia

# Jerusalem artichoke



# Jerusalem artichoke tubers



# Some other inulin plants

- Common chicory, or *Cichorium intybus* from the same family Compositae; this European plant became invasive in North America
- Chicory is cultivated sporadically as vegetable and as a source of chicory drink—coffee supplement; 68% of inulin in dry weight
- Dandelion, *Taraxacum officinale* is again an invasive plant; inulin-containing root is edible after cooking
- Many other Compositae (e.g., thistles) also have edible roots rich of inulin

# Chichory





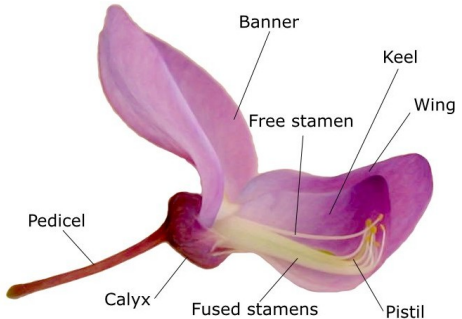
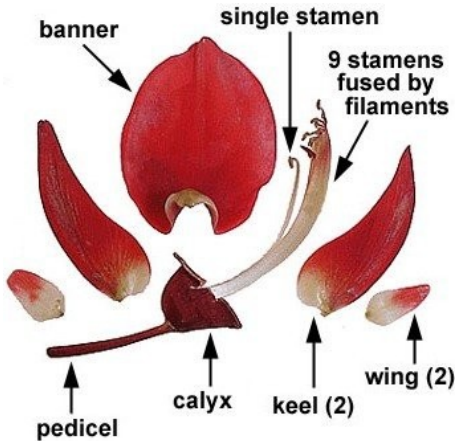
# One of thistles, *Arctium*



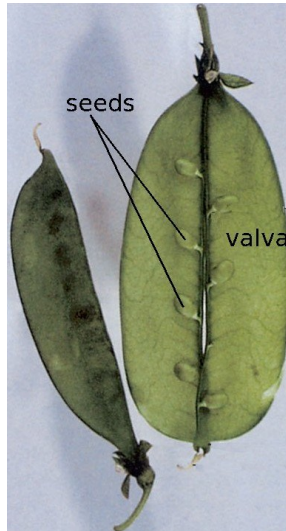
# Main characteristics of legumes

- One of the biggest plant families, more than 15,000 species
- Two most important characters: monosymmetric flowers with banner and keel; and monomeric legume fruit
- Nitrogen-fixing bacteria form root nodules (for cultivation, there are special *nitragines*)
- Consequently, all parts of legumes are rich of proteins, 2–4 times more than in cereals

# Monosymmetric flower of legumes



# Legume: the fruit of Leguminosae



# Root nodules



# Soya beans, *Glycine max*

- The most cultivated legume
- Seeds contain 42% of proteins including essential amino acids lysine, methionine and tryptophan; plus 20% of non-saturated oils
- Nearly universal culture: used as food, as technical culture, as oil culture and for the forage

# Soya flowers



# Soya features

- Cultivated mostly to the south from 50° latitude
- Nitrogen assimilation is slow at the beginning of season and reach the pike when plants start to flower
- Yield is  $\approx$  2 ton/hectare
- Main producer is United States, than Brazil



# Soya agriculture

- Requires warm, wet and shiny climates; tolerates small frosts
- Easily grow on different soils but needs crop rotation
- Relatively fast growing: 120–150 days
- The biggest problem is harvesting: early harvesting leads to decaying of seeds whereas late harvesting results in legume cracking

# Soya beans



# Soya history

- Prehistoric crop in East Asia
- Introduced in Europe and North America about the end of XVIII century
- In U.S., considered as technical and did not used for food until late 1920s

# Beans (*Phaseolus vulgaris*)

- The second most cultivated legume
- “Beans” is the name of multiple cultivated legumes (more than 10 genera), but in strict sense, there are common beans, *Phaseolus vulgaris*
- Seeds are rich of carbohydrates and proteins
- Green legumes are also used as vegetables

# Beans features

- Herbaceous annual vines with deep roots
- High diversity of cultivars
- Beans should be cooked for at least 10 min at 100° C to destroy weakly poisonous *phytohaemagglutinins*

# Beans



# Diversity of common beans



# Beans agriculture

- Extremely heat tolerant, requires average watering
- Does not grow well in colder climates
- Require short days; soil type is not critical
- Often cultivated inside mixed crops (with corn, rice, safflower)



# Beans history

- Native culture of Central America and Mexico; important plant of Aztec civilization
- Spread around the world in XIX century
- Top producers now are Brazil and India

# Pea (*Pisum sativum*)

- Old culture of Wold World, one of most hardy legumes
- Food and forage plant
- Seeds are high of carbohydrates (14%, and 1/3 of them are sugars) and proteins (5%)

# Pea flowers



# Pea features

- Annual herb which is able to climb up to 2 m with tendrils
- Comparing with other legumes, has extremely short vegetation period, from 65 days (!)
- The northern line of cultivation is 68° latitude
- Long-day culture, also requires wet soils

# Pea history

- Domesticated prehistorically in West Asia; wild landraces of same species are still exist
- Spread to both Western Europe and Eastern Asia (common culture in Japan)
- Self-pollinated, and became a famous model plant of first genetic experiments made by Gregor Mendel

# Lentils (*Lens culinaris*)

- One of the oldest cultivated plants, has been part of human diet since Neolithic times
- Rich of proteins (26%) and especially carbohydrates (60%)

# Lentil



# Lentils features

- Annual herbaceous vine up to 1 m high
- Less hardy than pea, requires warm season, vegetation period is often more than 100 days
- Long-day plant, drought tolerant (this is rare among cultivated legumes)
- Has relatively low yield (0.8 ton/hectare)



# Lentils history

- Was domesticated in West Asia before first civilizations appear
- Mentioned in Old Testament since it was a common food for Palestinian nations
- The word “lens” originated from Latin name of lentils
- Biggest producers are now Canada and India

# Red and brown lentils



# Chickpea (*Cicer arietinum*)

- One of primary Indian food plants
- Composition and yield is similar to lentils ( $\approx 23\%$  proteins and  $64\%$  carbohydrates, 0.8 ton/hectare)
- Has big seeds, requiring more boiling time than other legumes (up to 2 hours)
- Green parts are not edible as forage

# Chickpea



# Chickpea features

- Drought tolerant and therefore cultivated in arid climates
- Does not require specific soils
- Prefer long-days: does not go far into tropics; biggest producers are India, Pakistan and Turkey

# Chana masala: Indian cousine



# Summary

- Legumes are rich of proteins including essential amino-acids
- They mostly require humid climates and do not need specific soils
- Crop rotation is needed for most of legume cultures

# For Further Reading



A. Shipunov.

*Ethnobotany* [Electronic resource].

2011—onwards.

Mode of access:

[http://ashipunov.info/shipunov/school/biol\\_310](http://ashipunov.info/shipunov/school/biol_310)



P. M. Zhukovskij.

*Cultivated plants and their wild relatives* [Electronic resource].

Commonwealth Agricultural Bureaux, 1962.

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[http://ashipunov.info/shipunov/school/biol\\_310/zhukovskij1962\\_cultivated\\_plants.pdf](http://ashipunov.info/shipunov/school/biol_310/zhukovskij1962_cultivated_plants.pdf)

**Pages 23–27.**