

Ethnobotany. Lecture 14

Alexey Shipunov

Minot State University

September 28, 2016



Outline

- 1 Centers of cultivated plants origin
- 2 Legumes
 - Soya beans, soybeans, *Glycine max*
 - Beans (*Phaseolus vulgaris*)
 - Pea (*Pisum sativum*)

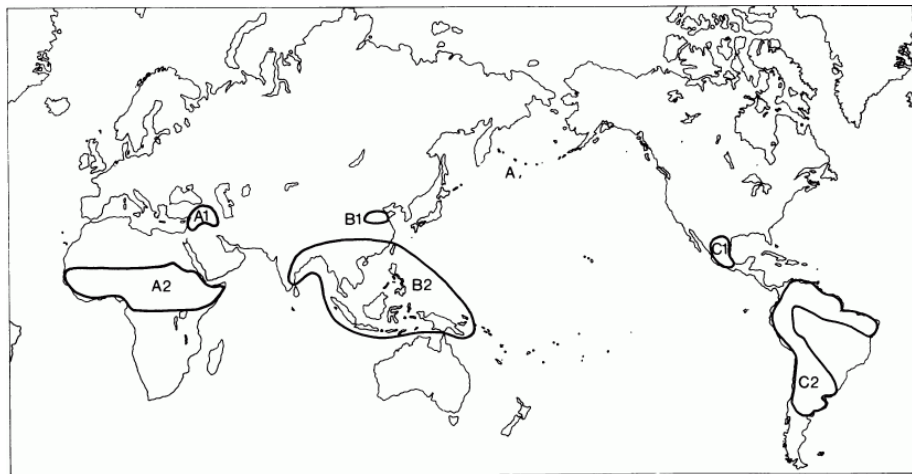


Outline

- 1 Centers of cultivated plants origin
- 2 Legumes
 - Soya beans, soybeans, *Glycine max*
 - Beans (*Phaseolus vulgaris*)
 - Pea (*Pisum sativum*)



Harlan's centers of agricultural beginnings

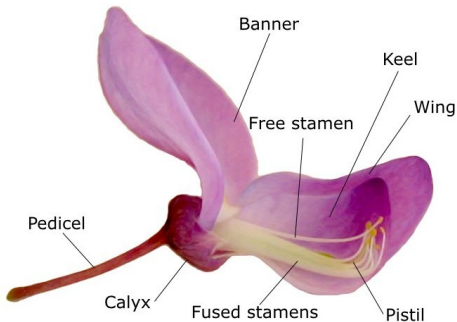
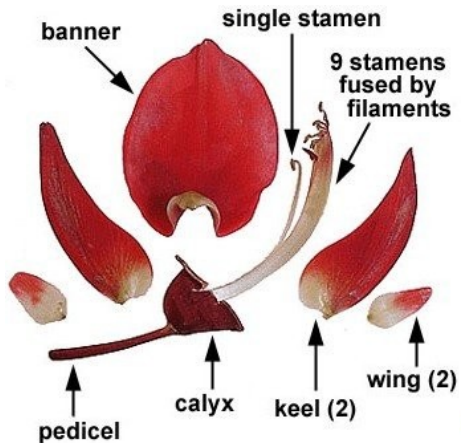


Main characteristics of legumes

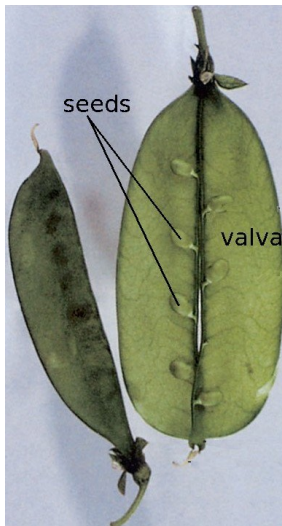
- One of the biggest plant families, more than 15,000 species
- Two most important characters: monosymmetric flowers with banner and keel; and monomerous legume fruit
- Nitrogen-fixing bacteria form root nodules (for cultivation, there are special *nitragines*)
- Consequently, all parts of legumes are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



Monosymmetric flower of legumes



Legume: the fruit of Leguminosae



Root nodules



Legumes

Soya beans, soybeans, Glycine max



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 (B1)
- 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



Legumes

Beans (*Phaseolus vulgaris*)



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* and similar species
- 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



- Navy beans (*Phaseolus vulgaris*, multiple cultivars)
 - Lima beans (*Phaseolus lunatus*)
 - kidney beans (*Phaseolus vulgaris* cv. 'Red Kidney')
 - Pinto beans (*Phaseolus vulgaris* cv. 'Pinto')
- and many others...



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 (C1); important plant for Aztec civilization
- Spread around the world in XIX century
- Top producers now are Brazil and India



Legumes

Pea (*Pisum sativum*)



Pea (*Pisum sativum*)

- Old culture of Old 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 an 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 (A1); 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



Summary

- Legumes are rich of proteins including essential amino-acids
- They mostly require humid climates and do not need specific soils



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.

Mode of access:

http://ashipunov.info/shipunov/school/biol_310/zhukovskij1962_cultivated_plants.pdf.

