

Ethnobotany. Lecture 2

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Outline

- 1 Ethnobotany
 - Classification
- 2 Main food source plants: grains
 - Introduction to grasses
 - Wheat (*Triticum*)



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Ethnobotany

Classification



Basics of scientific classification

- Every plant belongs to several embedded taxonomic groups
- Every group has **name** and **rank**
- Names usually are one Latin word, but species have **binary names**: name of genus + species epithet
- Most important ranks are (in sequence from bigger to smaller): **kingdom, family, genus** and **species***



Taxonomic framework for cultivated plants

- All plants belong to its own kingdom, Vegetabilia.
- Most of cultivated plants are angiosperms (flowering plants, Angiospermae).
- In most cases, we will need to **memorize the family** of plant. This is important characteristic since families are stable natural units of common evolutionary origin.



Folk classification

- Folk classification is an ancient approach to plant diversity
- Folk taxonomic groups are created artificially, mainly for practical use (like “edible”/“non-edible”)
- Typically, plant in folk classification belongs to so-called “genus-species” and then to bigger group. As an example, “raspberry” is genus-species and it in turn belong to “berries”. In science, raspberry is a groups of species in genus *Rubus* which belongs to Rosaceae family.



Artificial classification of plant uses

This artificial classification will serve as a course plan:

- 1 **Main** plants (most important food sources): grains, starch-containing, legumes
- 2 **Sugar and oil** plants
- 3 **Fruits and vegetables**: fruits, vegetables, nuts
- 4 **Technical**: fiber, wood, latex, dye, feeding
- 5 **Aromatic and psychoactive**: spices, stimulating, narcotic
- 6 **Medicinal**: vitamin, ethereal oil, glycoside, alkaloid etc.
- 7 **Ornamental**: outdoor annuals, perennials, trees and shrubs, cut plants, indoor pot plants



Main food source plants: grains

Introduction to grasses



Grasses (Gramineae, or Poaceae)

- One of the biggest family of flowering plants
- Grasses (except bamboos)
- Hollow stems
- No main root, underground rhizomes form tussocks
- Compound inflorescences
- Simplified, wind-pollinated flowers
- Fruit is *caryopsis*, seeds should be *threshed* from fruits



Groups inside a family

- C₃ grasses—bamboos, wheat (*Triticum*), rye (*Secale*), barley (*Hordeum*), rice (*Oryza*), indian rice (*Zizania*), oat (*Avena*)
- C₄ grasses—corn (*Zea*), sugar cane (*Saccharum*), sorghum (*Sorghum*), millet (*Panicum*)



C₃ and C₄ plants

- C₃ plants have photosynthesis effective when temperatures are “cool”, below 24° C; if temperature increases, photorespiration makes photosynthesis ineffective
- C₄ plants show much better results growing on temperatures higher than 24° C; they are best suited for tropics



Triticeae tribe

- Tribe is a taxonomic group which is bigger than genus but smaller than family
- Triticeae are small-sized grasses with one spike per stem, spike scales with long awns, caryopses rounded, contain high percent of starch and little amounts of proteins
- Several wild genera (most important are *Aegilops* and *Agropyron*: bluegrass and wheatgrass), and cultivated **wheat** and **rye**



Main food source plants: grains

Wheat (Triticum)



Main features

- One of three most important plants ever
- 30% of world grains
- Yield is up to 2.4 ton/hectare
- Main source of breads and bread-like products (similar products from other grains are growing hard much faster mostly because of more proteins)
- 70-75% of hydrocarbonates (starch) and 10% of proteins; 100 g give \approx 350 calories
- However, wheat is not a rich source of lysine (indispensable amino acid), therefore, it is important to eat protein sources if menu is rich of wheat (pizza!)



Morphology of wheats

- Annuals, root system of secondary and especially adventive roots
- From 1–6 long stems with spikes per plant
- Flowers have 3 stamens
- Both wind- and self-pollinated
- Genus has more than 20 species

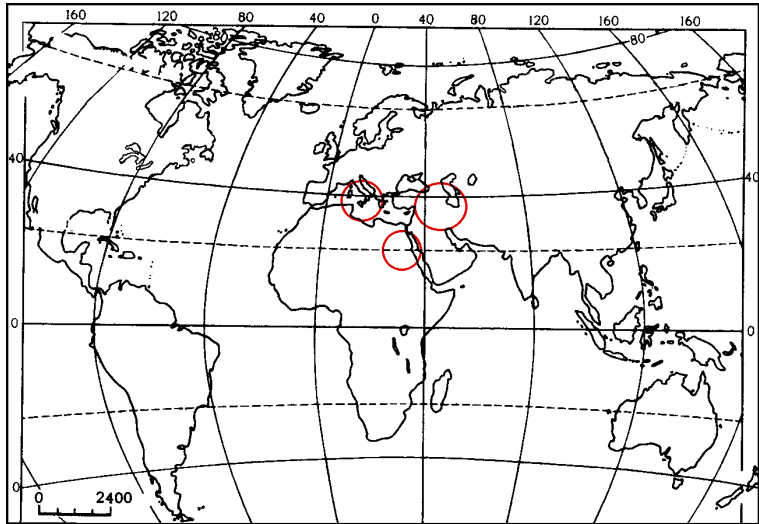


History of cultivation

- One of the most ancient cultivated plant, first traces date \approx 6–7,000 yr ago
- Main centers: West Asia (Iran, Mesopotamia and Caucasus) and ancient Egypt
- During the history, “ancient” species (like eincorn) cede to “modern” species (like hard wheat)



Centers of wheat origin and cultivation



Features of wheat agriculture

- Wheats are well adapted to relatively dry regions, with amount of precipitation 600–800 mm per year (sometimes survive even with 400 mm)
- Easily endure small (!) droughts
- Temperatures for flowering should be in 18–28 ° C range; seedlings may survive under a snow; do not like high temperatures and do not give high yield in tropics (however, do not grow well in cold regions)
- Most critical for cultivation is the soil quality: should be light, well-aerated, rich of nitrogen (this is why wheats grow better after legumes)



Species and species groups

- Diploid species ($2n = 14$): einkorn
- Tetraploid species ($2n = 28$): emmer wheat, hard wheat
- Hexaploid species ($2n = 42$): common wheat



Spring and winter races

- Most cultivated species have two races
- *Winter race* does not flower if planted in spring; it typically grows under a snow and should be planted in autumn
- *Spring race* does not survive under snow; it should be planted in spring
- These two forms are partly genetically inherited; it is possible, however to change behavior from winter to spring (vernalization: hard selection + epigenetic effects)



Summary

- In the ethnobotany course, we will approach plants in accordance with artificial classification of plant uses
- Wheats (*Triticum*) are ancient cultivated plants, originated in West Asia



For Further Reading



A. Shipunov.

Ethnobotany [Electronic resource].

2011—onwards.

Mode of access:

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

