

Ethnobotany

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Lecture 3

Outline

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

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 “mats” (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 less effective
- 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, North Dakota state grass is *Pascopyrum*), 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 tonnes/hectare (2,400 kilograms per 10,000 m²); Guinness book record is 21 ton/ha (New Zealand, 2010)
- 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!)

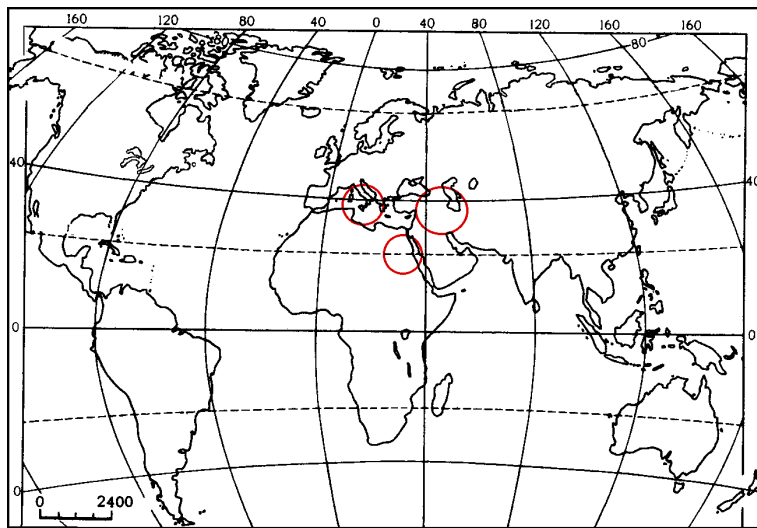
Morphology of wheats

- Annuals, root system of secondary and especially adventive (adventitious) roots (roots which grow out of the stem)
- 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), ancient Egypt, Mediterranean region
- 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 ($2n = 14$): eincorn
- Tetraploid species ($2n = 28$): emmer wheat, hard wheat
- Hexaploid species ($2n = 42$): common wheat

Common wheat is a “genetic monster” with the *chimeric genome*.

Summary

- Wheats (*Triticum*) are ancient cultivated plants, originated in West Asia
- Tetraploid and hexaploid wheats are intergeneric hybrids

For Further Reading



P. Stamp.

Virtual cereal cultivar garden [Electronic resource].

2008.

Mode of access:

<http://www.sortengarten.ethz.ch/?content=start>



A. Shipunov.

Ethnobotany [Electronic resource].

2011—onwards.

Mode of access:

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