

Ethnobotany. Lecture 4

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Outline

1 Main food source plants: grains

- Oat
- Rice

2 Lesser C₃ grasses

- Indian rice, *Zizania*
- *Digitaria exilis*, fonio
- *Eragrostis tef*, tef



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Main food source plants: grains Oat



Oat (*Avena*)

- Belongs to different tribe, Aveneae
- Morphology is also different: oats have branched inflorescence, panicle
- Several species in cultivation, as a forage plants (especially for horses) and as cereals



Oat features

- Hardy culture, cultivated mostly in temperate regions, yield relatively low, is ≈ 1 ton/hectare
- Grains contain high amounts of proteins and lipids
- Mostly spring forms (winter cultivars also exist); life cycle longer than in barley (should be planted earlier in a spring)
- Not sensitive to many fungal diseases



Oat taxonomy

- Several dozens species, only two are widely cultivated
- *Avena byzantina*, red oat, is more hardy and also better adapted to dry climates, has long grains
- *Avena sativa*, common oat, main cultivated oat, has shorter grains



Origin of oats

- Red oat is a domesticated form of wild oat, *Avena sterilis*. Cultivation started with invention of big cavalry armies (\approx 400 BC) of Alexander the Great
- Common oat was the weed of emmer wheat (*Triticum dicoccum*), and became pure culture when crops went northward (similar to rye)



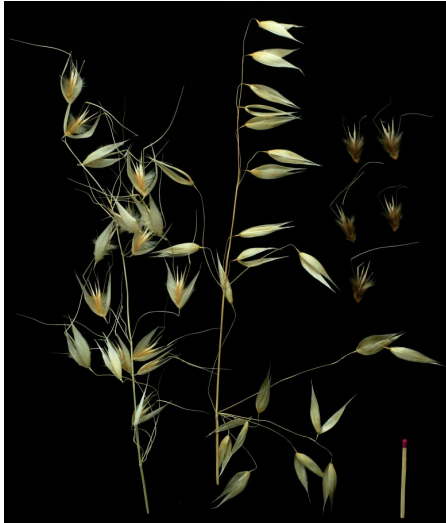
Red oat, *Avena byzantina*



Common oat, *Avena sativa*



Oat ancestor, *Avena sterilis*



Main food source plants: grains

Rice



Rice (*Oryza sativa*)

- Belong to the tribe Oryzeae
- Has panicle as an inflorescence, flowers with 6 stamens (uncommon in grasses)
- More than half of human population use rice as a main food source
- Cultivated mostly in tropics and subtropics, below 42° latitudes



Rice features

- High calories (360 cal / 100 g), up to 10% of proteins, including lysine amino acid (!)
- White (polished) rice does not contain embryo and therefore deficient of many vitamins; beriberi disease is a deficiency of vitamin B₁ (thiamine) originated in richer families of Indonesia (because they were wealthy enough to buy a “better” rice)
- Rice is not used for bread, if cooked it become extremely brittle
- Yield is higher than wheat, \approx 6 ton/hectare
- Rice is a coastal plant, requiring water, especially when young; seedlings are often manually planted in the soil covered with water
- Ancestrally, rice requires monsoon climate: first season is wet (rice germinates), second is dry (rice matures)



Rice taxonomy

- 28 species, only one is widely cultivated: *Oryza sativa*, common rice
- Several main varieties, including Japanese (short-grain) and Indian (long-grain) rice. Japanese variety has sticking (high proteins) and non-sticking forms.



Rice origin and history

- First remains (Thailand) are 7,000 BC; mass cultivation started in East Asia 4–5,000 BC
- Most probably, perennial *Oryza perennis* is a wild relative of cultivated rice
- Came to Europe with Arabs in first millennium
- From 1865, is cultivated in U.S. (first plantations in North Carolina)
- After the “Green Revolution” in 1960s, genetically modified rice cultivars allow to finish hunger in India and China



Rice agriculture

- Seeds are germinated in nurseries
- After several weeks, seedling are transplanted (often manually) to flooded fields
- Water should be removed after 1–2 month from transplanting
- There are also “mountain” rice which does not require flooding (but yield is less)



Common rice, *Oryza sativa*



Rice flower



Ancestor of rice, *Oryza perennis*



Lesser C₃ grasses

Indian rice, *Zizania*



Indian rice, *Zizania*

- Small (3 species) genus of water grasses distributed in East Asia and North America
- Big (up to 1.5 m), partly submerged grasses with unisexual flowers
- Inflorescences are panicles
- Has a long grains



Zizania aquatica, or manoomin

- Only one species was used by Native Americans
- Odjibwe name “manoomin”, Dakota name “psi”
- Half-cultivated (supported but not planted)
- Stems tied (precaution against birds), then harvested from canoe



Ricing 1



Ricing 2



Ricing 3



Ricing 4



Ricing 5



Ricing 6



Lesser C₃ grasses

Digitaria exilis, fonio



Digitaria exilis, fonio

- Main crop of West Africa
- The only cultivated species of big (≈ 300 species) genus *Digitaria*
- Low, heavily branched grasses
- Grains are extremely small (2–3 mm); however, the yield is comparable with primitive wheats



Fonio agriculture

- Well adapted to short days, high temperatures and low precipitation
- Need only surface development of soil, planted by scattering
- Manual harvesting and threshing



Fonio



Fonio threshing



Lesser C₃ grasses

Eragrostis tef, tef



Eragrostis tef, tef

- One of the main cultures of East Africa
- Used for making bread
- Small, branching plants with small spikelets and grains
- Grains are rich of iron (used also for medical purposed, for treating anemia)
- Well adapted to high altitudes



Tef



Tef grains



Summary

- **Rye** and **common oat** were originated from weeds
- **Rice** is the old culture with extremely complicated agriculture but high yield
- Wild, or Indian rice was the only grain used widely in northern tribes



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].

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Mode of access:

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