Ethnobotany. Lecture 5

Alexey Shipunov

Minot State University

September 2, 2016

Outline

1. Main food source plants: grains

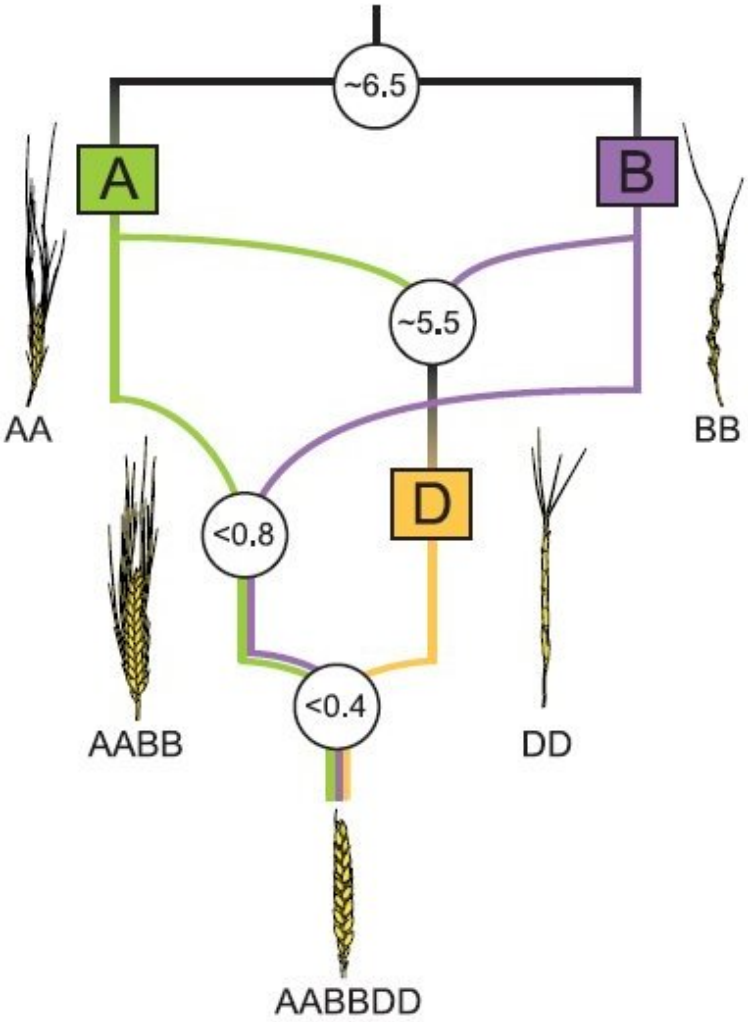
2. Other C_3 grains
   - Rye

Outline

1. Main food source plants: grains

2. Other C_3 grains
   - Rye

Origin of wheats

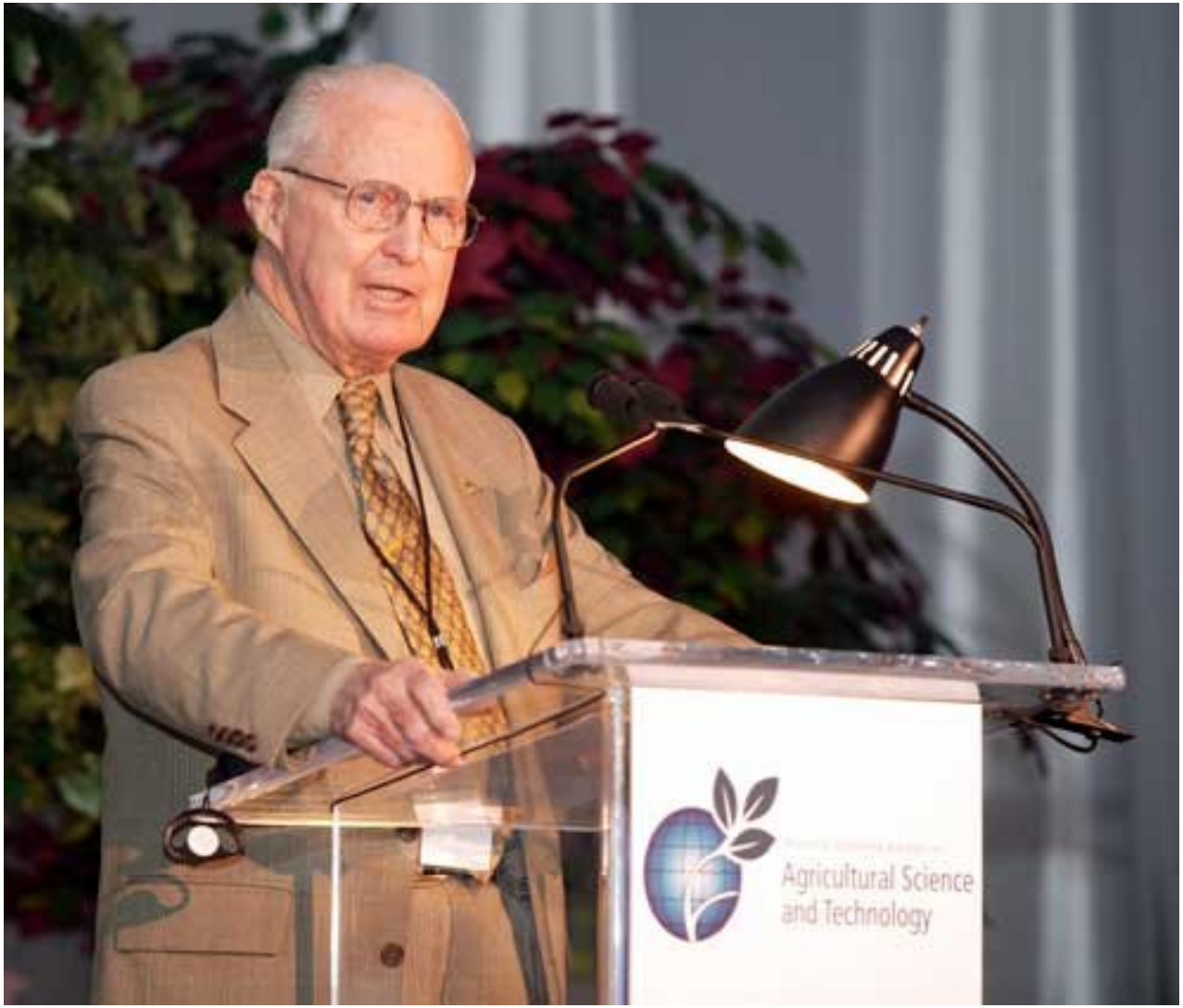


- Tetraploid and hexaploid wheats are *allopolyploids*, **inter-generic hybrids** between diploid wheats and *Aegilops* (goatgrass)!
- Tetraploid wheats have genome AABB (A from diploid wheats, most likely *Triticum urartu*, B from *Aegilops speltoides*)
- Hexaploid wheats have genome AABBDD (D from *Aegilops tauschii*)

Aegilops speltoides

Aegilops tauschii

Norman Borlaug, University of Minnesota, 1914–2009



Father of “green revolution”, Nobel Prize (1970)

Norman Borlaug started contemporary wheat selection

- Dwarf wheats (especially in common wheat) are selected with transition from sickle to harvesting machines, they withstand many weather problems and are more drought-resistant
- Wheats with branched spikes (based on tetraploid *Triticum turgidum*, rivet wheat and hybrids)
- Octoploid forms ($2n = 56$) are artificial, typically have bigger grains
- Hybrids with rye, $\times$ *Triticosecale* (*Triticum* $\times$ *Secale*)

Rivet wheat, *Triticum turgidum*

× *Triticosecale*

Other C_3 grains

Rye

Rye, *Secale*

- Belongs to the same tribe with wheat, Triticeae
- Much “younger” cultivated plant
- Cultivated mostly in temperate regions of Eurasia (Russia, Germany, Sweden) and Canada

Rye features

- Hardy plant, likes sandy soils, survives with a frost, has a short life cycle adapted for long days, however, yield is low, $\approx$ 1 ton/hectare
- Many winter cultivars
- Cross-pollinated
- Rich of proteins, therefore rye bread is growing hard faster than pure wheat bread; typically, rye bread contains wheat additives (sometimes up to 70%)
- Has multiple uses: as a forage plant become available early in the spring, as a source of ethanol, as a source of straw

Rye taxonomy

- Several species, only one is cultivated: *Secale cereale*
- Has two subspecies: one is a cultivated rye, *Secale cereale* subsp. *cereale*, second is a weed (occuring mostly in wheat crops): *Secale cereale* subsp. *segetale*
- Chromosome number is diploid ($2n = 14$), similar to primitive diploid wheats

Rye origin and history

- Weed rye originated from wild species and become annual (other ryes are perennial) in order to correspond with wheat life cycle
- Cultivated rye is a domesticated weed rye
- N. Vavilov stated that rye outperformed wheat on the northern slopes of Caucasus mountains where spring may come two months later than on southern slopes; this competition sometimes resulted in pure rye crops
- Than selection started for bigger grains, since rye is cross-pollinated, selection went faster
- First remains of rye dated 300–400 AD (Black Sea coast)
- Since rye has open flowers, it sensitive to ergot (*Claviceps purpurea* fungus) containing hallucinogenic lysergine acid which was the cause of *ergotism disease* in medieval centuries. In times of the “small ice age” (13–18 centuries), when wheat in most of Europe was replaced with rye, ergotism was probably the reason of the widespread “witch hunting”.

Cultivated rye, *Secale cereale* subsp. *cereale*

[Note the dark ergot (*Claviceps purpurea*) fruiting bodies]

Weed rye, *Secale cereale* subsp. *segetale*

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