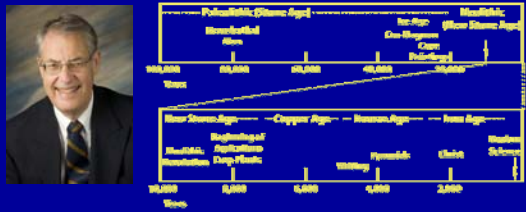



Lecture 3
Neolithic Revolution and the Discovery of Agriculture
Dating the Past



100,000 50,000 10,000 10,000 5,000 2,000
Years

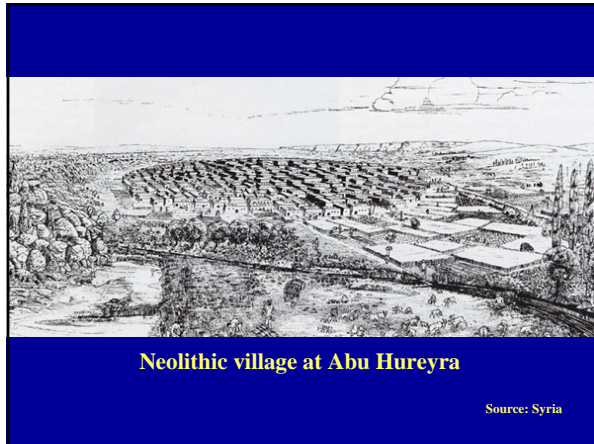
The Great Technological Discoveries of Pre-history

- The discovery of tools
- The discovery and control of fire
- The invention of agriculture
- The invention of the wheel



Reconstruction of Paleolithic landscape
Source: Syria

History of Horticulture: Lecture 3



Tools




Adze and axe
7000 BCE

Earliest tools were made from flaked flint.
Later certain tools began to be shaped from hard stone that was polished with an even harder stone, like emery, could take 4-8 weeks.
These tools had to be fitted into a shank made of antler before they could be fixed to a handle.

Source: Syria

Tools

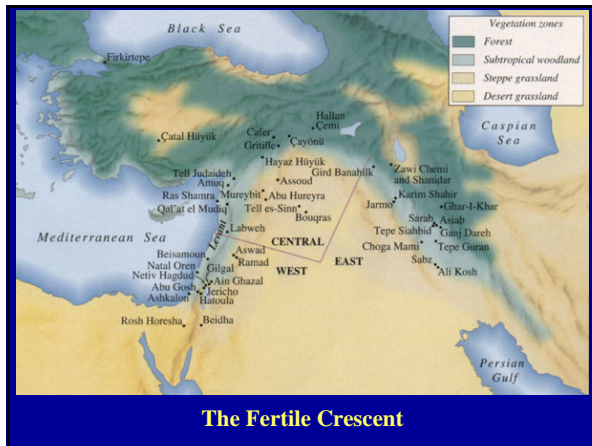


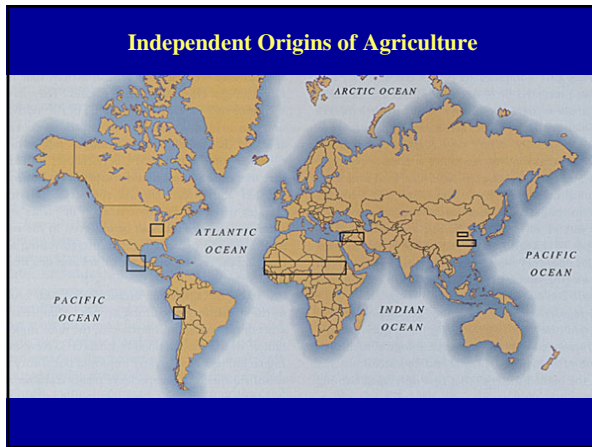
Terra cotta spindle whorls
5000 BCE




These objects were used as weights in the process of spinning threads.
In Syria, flax was the first fiber to be spun (into linen), predating the use of sheep's wool.

History of Horticulture: Lecture 3





Development of Villages and Housing



The first houses in prehistoric Syria were round; later houses became rectangular, with rounded corners.

By 6000 BCE, near Palmyra, three-part rectangular houses were constructed with plaster floors and equipped with food store houses and hearths for cooking.

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Model of a fortified Turkish village of Hacilon, about 5400 BCE

- 1. West wall
- 2. East wall
- 3. Northwest gate
- 4. North courtyard
- 5. Parching oven
- 6. Granary
- 7. House
- 8. Small courtyard
- 9. Kitchen
- 10. South gate
- 11. South courtyard
- 12. Basket weaving area
- 13. Pottery workshop
- 14. Pottery courtyard
- 15. Shrine
- 16. Well



Source: First Farmers

Why Did Agriculture Develop?

- Nomadism
- Population Pressure
- Domestication for religious reasons

Agriculture and Social Surplus: Conventional Theory

Agriculture and Conflict

- Abel & Cain (Nomad vs. Farmer)
- Hunters vs. Cultivators
- Territoriality warfare
- Ranchers vs. Farmers

Domestication

Domestication Process (change from wild plant to crop)

- Cultivation (management)
- Selection (differential reproduction)

Cultigens:

- Crops unknown in the wild

Some wild plants are still gathered:

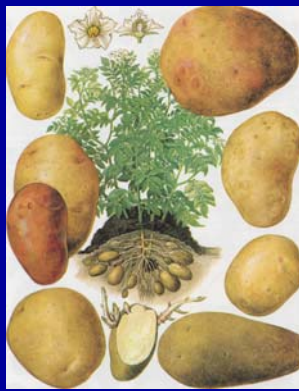
- Blueberry (*Vaccinium* spp.)
- Brazil nut (*Bertholletia excelsa*)
- Chickpea (*Cicer arietinum*)
- Indian rice (*Zizania aquatica*)
- Rubber (*Hevea brasiliensis*)
- Sugar maple (*Acer saccharum*)

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Changes from Wild Species to Domesticated Crop

1. **Gigas characteristics:** Cultivated plants appear larger, more robust, larger thicker leaves, fleshier roots, larger flowers, fruits, and seeds.
 - a. Polyploidy (Examples: strawberry is an octoploid, bread wheat is a hexaploid)
 - b. Possibility of internal changes in the chromosomes which are often larger and thicker in cultivated plants
 - c. Mutation
2. **Reduction in fertility**
 - a. Decrease in fertility though reduction in seed number, increase in seed size
 - b. Loss of fertility, particularly true for crops in which economic portion is not the seed
Many sweet potatoes no longer flower
Many seedless crops (banana, orange)
Thus, crops are dependent on humans for survival

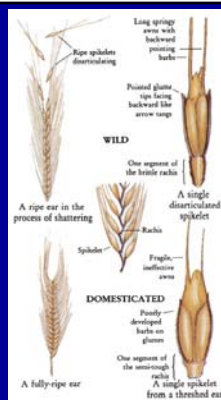
3. **Loss of survival characters**
Shattering ability in grains
Potato tubers borne close to plant in domestic types, spread in wild types
Thin vs. thick shells in nuts



Wild and domesticated forms of einkorn wheat

Wild forms need to disperse seeds effectively and evolved easily shattered ears with brittle rachises and thin, arrow-shaped spikelets designed to penetrate surface litter and imbed in ground cracks

In domesticated form, plumper spikelets have lost some key structures necessary for self-implantation, seed dispersal, and success in the soil



Source: Smith 1995, p.73.

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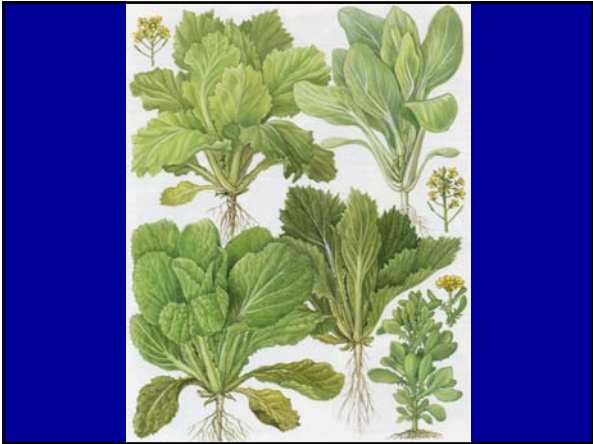
- 4. *Loss of bitter and toxic substances*
 - Hydrocyanic acid in cassava
 - Tannins in apples
 - Bitter principles (cucurbitacins) in cucurbits
 - Bitterness in lettuce
- 5. *Loss of protective, defensive structures*
 - Spines (citrus, apples, locust)
 - Prickly fruits and seeds (cactus)



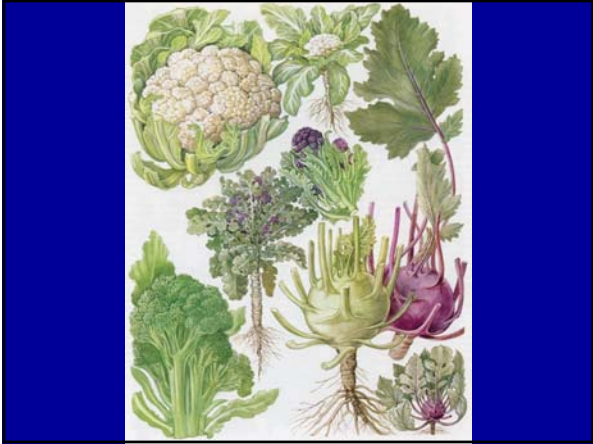
- 6. *Loss of delayed germination*
 - Loss of dormancy separates weeds from many annual crop plants
 - Typically ornamentals (closer to wild plants) have seed
- 7. *Early and simultaneous ripening*
 - This change is occurring in tomato
- 8. *Change in life span*
 - Seed crops—shortened
 - Vegetative crops—lengthened
- 9. *Changes in organ shape and size*
 - roots—carrots, parsnip, beets
 - flowers—doubleness
 - buds—cauliflower
 - fruits—increasing apple fruit size



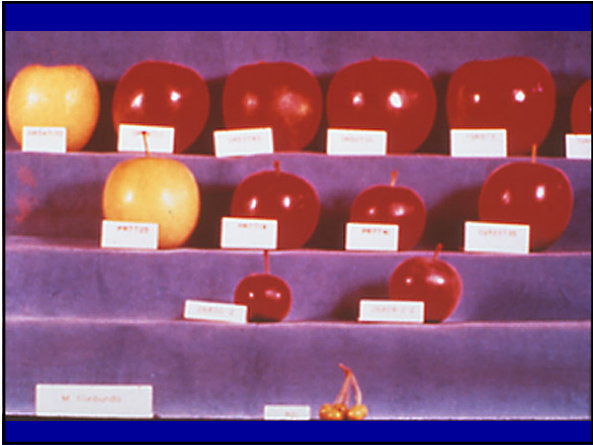
History of Horticulture: Lecture 3











10. Increase in self pollination
Cultivated types are often highly self pollinated
Self-pollination is rarer in wild species
