Ethnobotany. Lecture 6

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Outline

1. Starch-containg plants
   - Sweet potato, Ipomoea batatos
   - Yam, Dioscorea spp.
   - Cassava, Manihot esculenta
   - Other cultivated starch plants
   - Starch plants of native use

Sweet potato, *Ipomoea batatos*

- Belongs to morning glory genus *Ipomoea* from Convolvulaceae family
- Cultivated for thickened secondary roots (tuberous roots, not tubers!)
- Contain 12% of starch, 5% of sugars, little proteins and almost no fat
- Rich of vitamins, especially vitamin A precursor beta-carotene

Sweet potato morphology

- Herbaceous vine, perennial plant cultivated as annual
- Tuberous roots are large, up to 25 kg
- Reproduction is both from seeds and vegetative, from root and stem parts (grafts)
- Large, trumpeting, insect-pollinated flowers

Ipomoea batatas, sweet potato

Sweet potato agriculture

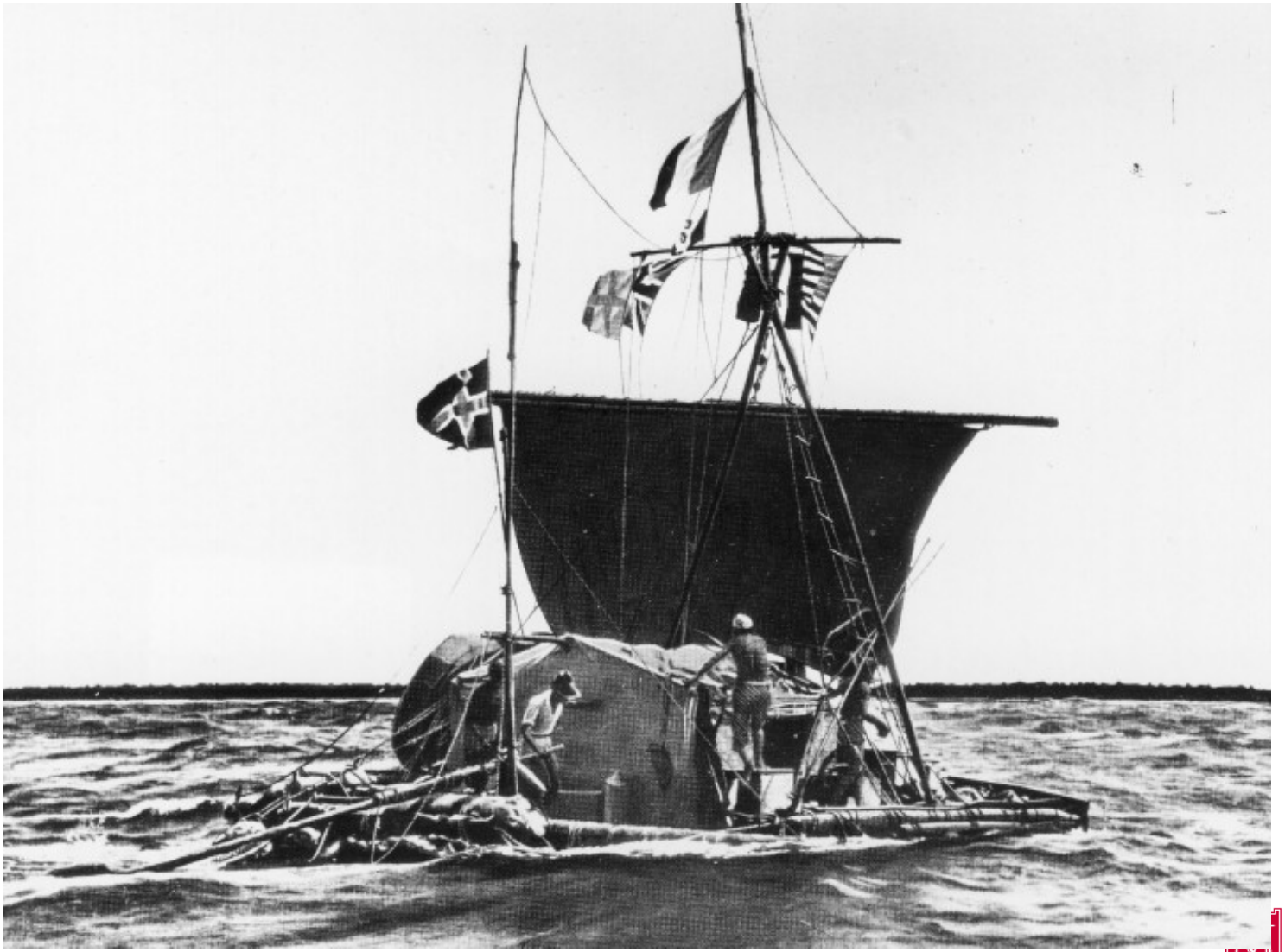
- Pure tropical culture, does not tolerate frost
- Requires short days, full sun, light soil
- Planting as grafts, this increases the number and weight of tuberous roots (subsidiary roots)
- Green part is used as a forage for animals

Planting of sweet potato

History of sweet potato

- Domesticated in Central America almost 3,000 BC and spread to Polynesia before European colonization
- In Polynesia, it is called the “kumara”, remarkably similar to the Quechua “kumar” in Peru: that is one of reasons for Thor Heyerdahl Kon-Tiki expedition
- Now two main producers are China and Nigeria

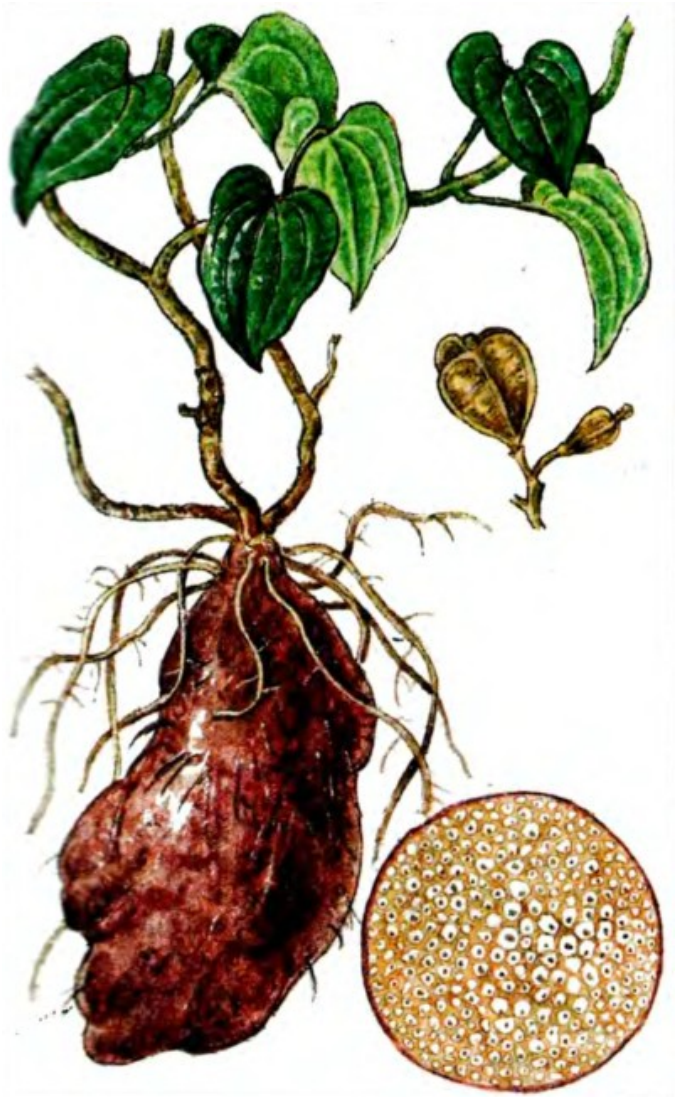
Kot-Tiki raft, 1947



Yam, *Dioscorea* spp.

- Several species of large genus *Dioscorea* and Dioscoreaceae family
- Cultivated for tubers (morphologically similar to potato tubers)
- Frequently used as a flour
- Could be stored up to half-year, even in tropical climate

Yam, *Dioscorea*



Yam features

- Tubers could be huge: up to 2,5 m and 70 kg
- Contain starch, significant amounts of vitamin C, and several microelements
- Hilling is an important stage of cultivation
- Long vegetation period (up to 1 year)
- Due to the size of tubers, harvesting is only manual

Yam plantation

Yam history

- Three most cultivated species: *Dioscorea rotundata*, yellow yam of Africa; *D. alata*, water yam of Polynesia; and *D. opposita*, Chinese yam
- These species were separately domesticated, most probably prehistorically
- During potato pandemic, D. alata cultivation started in Europe, still cultivated in France
- Now the biggest producer is Nigeria

Water yam of Tonga

Cassava, manioc, *Manihot esculenta*

- Belongs to the tree genus *Manihot* from spurge family Euphorbiaceae
- Third largest source of carbohydrates in the world
- It is a shrub cultivated as annual (!)
- Secondary roots (not stems!) are thickening and form tuberous parts

Cassava plantation

Cassava features

- Tuberous roots have high amount of dry mass (30%), high in starch, phosphorous and vitamin C but poor in proteins and essential amino acids
- **Toxic**, contain cyanogenic compounds which are liberating hydrogen cyanide (HCN). Consequently, should be pressed, soaked, cooked or fermented before use. Without preparation caused a *konzo* disease.
- Harvesting is manual; roots are deteriorated fast and should be processed as soon as possible

Cassava preparation: peeling

Cassava preparation: grinding

Cassava preparation: pressing

Cassava preparation: drying

Cassava history

- Domesticated in Brazil around 6,000 BC
- Went to Africa with Portuguese trades and then to south-west Asia
- Now, Nigeria and Thailand are biggest producers

Taro, *Colocasia esculenta*

- Belongs to arum family, Araceae
- African origin
- Large semi-aquatic herbs with thickened underground stem (rhizome)
- Rhizome is inedible because of calcium oxalate which must be removed by cooking

Taro, *Colocasia esculenta*

Taro harvesting

Bread tree, *Artocarpus integer*

- Large tree of mulberry family, Moraceae
- Polynesian origin
- Has a compound “fruit”—ripe inflorescence
- A common product is a cooked or fermented breadfruit mash

Breadfruit

Breadfruit fermentation place, Marshall islands

Sago palm, *Metroxylon saghu*

- Belongs to palm family, Palmae
- Tree of Indonesian origin
- Stem (!) is used for starch (sago) production

Sago palm

Sago harvesting

Sago filtering

Andean starch tuber plants

- Oca, *Oxalis tuberosus*, from Oxalidaceae, wood sorrel family
- Ulluco, *Ullucus tuberosus*, from Basellaceae family
- Mashua, *Tropaeolum tuberosum* from Tropaeolaceae, nasturtium family

Oca, *Oxalis tuberosus*

Ulluco, *Ullucus tuberosus*

Mashua, *Tropaeolum tuberosum*

Arrowhead, *Sagittaria latifolia*

- “Pshitola” (Dakota), “mujotabuk” (Ojibwe)
- Aquatic plant from Alismataceae family
- Rhizomes are used as a source of starch

Arrowhead, *Sagittaria latifolia*

Quamash (*Camassia quamash*)

- Famous “Quamash”, important food source of Native Americans in the West
- Belongs to lily family, Liliaceae
- Bulbs are edible and highly nutritious

Quamash, *Camassia quamash*

Potato bean, groundnut, *Apios americana*

- “Mdo” in Dakota language; belongs to legume family (Leguminosae)
- Grow across all eastern part of U.S.
- Used by Native Americans as a main starch source, tubers also contain significant amounts of proteins; beans are also edible

Potato bean, *Apios americana*

Prairie turnip, breadroot, *Psoralea esculenta*

- “Tipsi” in Dakota language
- Common plant of North Dakota
- Thick main edible after cooking or making flour

Breadroot, *Psoralea esculenta*

Summary

- Sweet potatoes and cassava (manioc) are two largest starch sources after potato
- Andean region contains multiple unrelated tuber starch-bearing species

For Further Reading

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Pages 10–14.

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