

Outline and Study Guide

Storage Roots and Tubers

I. Roots and Tubers

Tuber—underground storage organ that is a stem e.g potatoes
Storage root—enlarged root that stores carbohydrate

Meristems (Handout)

Regions where cells are immature and can produce new cells.

Terminal meristem: at the end of stems, branches and roots
Lateral meristem: at the side of the plant

Root has no lateral meristems or leaf scars.
Internal anatomy of stem and roots differ
Plants use different tissues of stem or root to develop storage
Capacity (Handout)

Root and tubers: adaptive significance of structure

Tubers and storage roots are linked to biology of species in nature
Tubers and storage roots occur in biennial and perennial plants
Biennial (live two years and flower second year)
Perennial (live multiple year; flower after a juvenile stage)
Stores carbohydrate from one growing season to the next
Allows the plant to grow rapidly in the spring

Farmers harvest the swollen storage root of biennials at the
end of first year when it is filled with nutrients.

II. Nutrition of various crops:

Large difference among kinds of roots and tubers for vitamins
Lack of beta carotene (the precursor to Vitamin A)
Lack of vitamin a is a serious health problem in the tropics
Causes night blindness, retardation, etc.

Substituting one tuber for another as a staple in the diet may cause
nutritional deficiencies
Eg substituting cassava for the native yams in Africa

II. White Potatoes

tuber of *Solanum tuberosum* (in the nightshade family)

Green tissue produces poisons (solanine, a glycoalkaloid)

Ranks fourth as major food staple.

Spanish explorers found potatoes all along the Andes from Colombia to Chile

Archaeological evidence that wild potatoes were eaten 13,000 bp in Chile and cultivated for the last 7,000 years

Andes: very cold at night and hot in day and extremely high elevation

Local cultures have adapted food preparation

Potatoes: Indigenous people freeze potatoes at night and let dry in air during the day. Is a primitive method of freeze drying

Beans: water boils at cool temperatures at high elevations and beans can't readily be cooked by boiling. Local cultures use

a "popping" bean prepared like popcorn

Potatoes rapidly spread to Europe

Spanish imported them to Spain in 1565

English had them by 1590

Irish Potato Famine

Ireland 18th century—potatoes became popular because they grew well in cool, moist climate.

Small amount of land could produce enough calories to meet needs of an entire family.

By 1840 population was dependent on potatoes. Was a monoculture

Potato blight arrived in the British Isles between 1843 and 1844

Due to *Phytophthora infestans*, a fungus

Within 5 years the Irish and British potato crop was destroyed.

Estimate 1-2 million people died of starvation.

Another million emigrated, many to US