

PLANTS AND PEOPLE
Introduction

Uses of Plants

Indirect

- Oxygen from photosynthesis
- Recycling of nutrients
carbon, nitrogen, sulfur, phosphorus, water
- Shade
- Cooler Earth temperature
- Spirit of nature

Direct

Plant Uses

Direct

- Food
- Spices
- Medicines
- Psychoactives
- Stimulating beverages
- Alcoholic beverages
- Textiles
- Fabrics
- Dyes
- Lumber
 - Construction
 - Fuel
- Aesthetics
- Affection

History of Uses

- Ancient or recent usage
 - Beer
 - Corn
 - Taxol
- Folklore - religions
 - Wine
 - Coca
- Politics
 - Cinnamon
 - Coffee
 - Rubber
 - Marijuana
- Slavery
 - Tobacco
 - Sugarcane
 - Cacao
- Persona
 - Quinine
 - Rubber

Acquisition of Plants

- Gathering

- Farming
 - Subsistence
 - Technological advances

Acquisition of Plants

- Food production controlled by multinational corporations
- Decrease in number of small farmers
- Sustainable farming
- Carbon footprint - buy locally

Plant Manipulation

- Artificial selection
- Hybrids
- Genetically modified foods

Environmental Damage

- Decrease in biodiversity
- Air pollution
- Soil erosion
- Pesticides
- Fertilizer use
- Water pollution

Environmental Damage

- Dust bowl
- Monocrops
 - Sugarcane
 - palm oil
 - corn

Organization of Life

- Atoms
- Molecules
- Organelles
- Cells
- Tissues
- Organs
- Systems
- Organism
- Population
- Community
- Ecosystem

Larger and more complex

Taxonomy

Classification scheme

- Three domains
 - Archaea
 - Bacteria
 - Eukarya

Taxonomy

Classification scheme

- Kingdoms of Eukarya
 - Protocista
 - Fungi
 - Animalia
 - Plantae

Taxonomy

Domain	Eukarya	Eukarya
Kingdom	Animalia	Plantae
Phylum	Chordata	Magnoliophyta
Class	Mammalia	Dicotyledonae
Order	Primate	Gentianales
Family	Hominidae	Rubiaceae
Genus	Homo	Coffea
Species	sapiens	arabica

Taxonomy - Plant Classes

- Monocotyledonae
Monocots
- Dicotyledonae
Dicots
- Seed whole
- Parallel leaf venation
- Vascular bundles dispersed
- Two seed halves
- Netted leaf venation
- Vascular tissue in rings

Taxonomy

- Common name
- Humans
 - Coffee bush

- Scientific name or botanical name
- Uses genus and species names
 - Underline or italicize
 - Capitalize genus, lowercase species
 - *Homo sapiens* or Homo sapiens
 - *Coffea arabica* or Coffea arabica

Chemistry

- Atoms

- Molecules
 - Chemical bonds between two or more atoms

Plant Primary Compounds

- Part of the plants structure and function
- They are part of the food web
 - Carbohydrates
 - Lipids
 - Proteins
 - Nucleic acids

Metabolism

- Sum of all chemical reactions that take place in a cell or plant
- Growth
- Replicate DNA
- Synthesize proteins and other molecules
- Reproduction
- Photosynthesis

Photosynthesis

- $6 \text{ CO}_2 + 12 \text{ H}_2\text{O} \xrightarrow{\text{Light}} \text{C}_6\text{H}_{12}\text{O}_6 + 6 \text{ O}_2 + 6 \text{ H}_2\text{O}$
- A complex metabolic process that converts carbon dioxide and water with sunlight into **glucose** and **oxygen** gas
- Requires sunlight that activates chlorophyll pigments located in chloroplasts

Photosynthesis

- Oxygen
 - Needed for the production of energy molecules (ATP) from food. Aerobic respiration
- Glucose
 - Food (starch or sugars)
 - Conversion into other primary molecules

Other Metabolic Pathways

- Photosynthetic glucose
 - Energy source for ATP production. Aerobic respiration
 - Synthesis of starch, cellulose, and pectins
 - Production all of the biomolecules with minerals and water from the soil
 - Lipid
 - Proteins

Carbohydrates

- Monosaccharides (simple sugars)
- Disaccharides (simple sugars)
- Polysaccharides (complex sugars)

Carbohydrates

- Monosaccharides (simple sugars)
Glucose, Fructose, & Galactose
- Disaccharides (simple sugars)
Maltose, Sucrose, & Lactose
- Polysaccharides (complex sugars)
Starch, Glycogen, Cellulose, & Chitin

Polysaccharides

- Starch
storage molecule in plants
- Cellulose
cell wall component (fiber)
- Pectin
cell wall component

Lipids - Triglycerides (oils)

Functions

- Energy reserve in seeds
- Biopesticides
- Membrane structure
- Waterproofing for leaves

Lipids - Triglycerides (oils)

- Glycerol and Fatty Acids

- Saturated and unsaturated fatty acids

Proteins

Functions

- Structural component in membranes
- Membrane transport
- Communication
 - Plant hormones
- Enzymes
 - Controls metabolic pathways

Nucleic Acids

- DNA
Double stranded, large.
Genetic material and
controls cell activity
- RNA
Smaller molecules involved
in protein synthesis

Secondary compounds

- Common compounds discussed in course
- Chemicals that protect the plant
 - Pesticides
 - Herbicides
- Attract animals
 - Scents
 - Nectars
 - Flower color

Secondary Compounds

Chemical	Example	Use
Terpenes	Essential oils	Spices
Phenols	THC	Psychoactive
Glycosides	Digitoxin	Heart meds
Alkaloids	Caffeine	Stimulant
