Outline of Botany
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Contents

Note: To look up references, see the Consciousness Bibliography, listing 10,000 books and articles, with full journal and author names, available in text and PDF file formats at http://www.outline-of-knowledge.info/Consciousness_Bibliography/index.html.

BIOL>Botany

botany
Biology {botany}| can study bacteria, algae, fungi, lichens, slime molds, yeast, and green plants. Green plants are in kingdom Plantae, which includes green algae. Plants need calcium, iron, magnesium, potassium, phosphorus, sulfur, boron, copper, cobalt, manganese, and zinc, in importance order.

foliage
Areas can have plants {foliage}|.

frond
fern leaf, palm leaf, seaweed thallus, or lichen thallus {frond}|.

garland
flower wreath {garland}|.

ground cover
Plants {ground cover} can hold soil, retain water, and cover ground.

herbage
Areas can have plants {herbage}.

vegetation
Areas can have plants {vegetation}|.

BIOL>Botany>Classification

plant classification
Plants have kingdoms, divisions, and classes {plant, classification}.
kingdom
Kingdom Plantae is for plants. It has four divisions and one subkingdom.
division: green algae
Green Algae (Chlorophyta) include one-cell Chlorella, one-cell Chlamydomonas, Spirogyra filament colony, and Ulva multicellular sea lettuce.
division: liverworts
Liverworts (Hepaticophyta) have embryos.
division: mosses
Mosses (Bryophyta) have embryos and include granite moss (Andreaeopsida), peat moss (Sphagnopsida), and true moss (Bryopsida).
division: hornworts
Hornworts (Anthocerotophyta).
division: vascular plants subkingdom
Subkingdom Tracheobionta is vascular plants, which are larger and have true leaves, stems, and roots. Seedless plants are club mosses, ferns, and horsetails. Seed plants are gymnosperms or angiosperms.
division: club mosses
Club mosses (Lycopodiophyta) {lycopsids} (Lycopsida) have vascular systems.
division: horsetails
Horsetails (Equisetopsida or Sphenopsida) have chloroplast-DNA inversion.
division: whisk-ferns
Whisk-ferns (Psilophyta) have chloroplast-DNA inversion.
division: ferns
Ferns (Pteridophyta) (Filicopsida) (Pteridopsida) have chloroplast-DNA inversion.
division: seed plants
Seed plants (Spermatophyta or Spermatopsida) are gymnosperms or angiosperms.
seed plants: gymnosperm
Gymnosperms have cones, have no flowers, have seeds not enclosed in fruit, and are cycads, ginkgoes, gnetophytes, conifers, and extinct seed ferns.
seed plants: angiosperm

Angiosperms or flowering plants (Magnoliophyta) have flowers and have seeds enclosed in fruit. The first angiosperms had endosperm with equal numbers of genes from male and female. First, the amborellas (Amborellaceae) separated from other angiosperms. Then, the water lilies (Nymphaeales) separated. Then, the star anises (Austrabaileyales) separated. Later angiosperms had endosperm with genes from male and twice as many genes from female. First, the magnolias (Magnoliales) separated. Then, the monocots separated. Then, the poppies (Papaveraceae) and others separated from the core eudicots.

angiosperms: monocotyledon

Monocotyledons (Liliopsida) have leaves with parallel veins, have one seed leaf, and are Alismatidae or Helobiae, grasses (Commelinidae), palms (Arecidae), ginger (Zingiberidae), and lilies (Liliidae).

They include: bananas (Musaceae), grasses (Poaceae) (Gramineae), palms (Arecaceae), orchids (Orchidaceae), yams and sweet potatoes (Dioscoreaceae), and lilies, onions, and asparagus (Liliaceae).

angiosperms: dicotyledon

Dicotyledons (Magnoliopsida) have leaves with netted veins, have two seed leaves, and are magnoliids or Ranalian (Magnoliidae), wind-pollinated (Hamamelidae or Amentiferae), Caryophyllidae or Centrospermae, Dilleniidae, rose family (Rosidae), and aster family (Asteridae).

They include the following. poison ivy, cashews, and pistachios (Anacardiaceae). asters and all composite flowers (Asteraceae). cabbage and turnip (Arabidopsis). other mustards (Brassicaceae). cacti (Cactaceae). squashes (Cucurbitaceae). cassava or manioc (Euphorbiaceae). beans and all legumes (Fabaceae). oaks (Fagaceae). flax (Linaceae). cotton (Malvaceae). olives, ashes, and lilacs (Oleaceae). roses, apples, peaches, strawberries, and almonds (Rosaceae). coffee (Rubiaceae). oranges and citrus fruits (Rutaceae). potato, tomato, and tobacco (Solanaceae). tea (Theaceae). grapes (Vitaceae).

thallophyte

In earlier classifications, lower plants {thallophyte} included algae, bacteria, fungi, and lichens. Thallophytes have only bodies {thallus}, form no embryos, have no vascular tissues, and have no roots, stems, or leaves.

lower plant

Lower plants {lower plant} include algae, bacteria, fungi, and lichens.

metaphyte

Plants can be multicellular {metaphyte}|.

BIOL>Botany>Reproduction

reproduction of plants

Plants can reproduce by asexual or sexual reproduction {reproduction, plant}. Asexual reproduction uses fission, budding, or spores.

graft on plant

People can place twigs of same or other plants in twig cuts {graft, plant}.

BIOL>Botany>Reproduction>Sexual

zygote

Eggs and sperms can unite to make diploid cells {zygote}|.

sporangium

Plant cells can make organs {sporangium}| {sporangia}, which produce haploid spores by meiosis.

BIOL>Botany>Reproduction>Sexual>Generation Alternation

alternation of generations

Most plants have two-stage sexual reproduction {generation alternation} {alternation of generations}|. First is gametophyte stage and then sporophyte stage. Bacteria and blue-green algae do not have generation alternation.

gametophyte stage

In first stage {gametophyte stage}|, male sex organ makes haploid sperm, and female sex organ makes haploid eggs. Eggs and sperms unite to make zygotes. Zygotes divide to form diploid cells.

sporophyte stage
In second stage {sporophyte stage}|, plant cells make sporangia, which produce haploid spores by meiosis. Haploid spores undergo mitosis to make haploid sperm and eggs for gametophyte stage.

BIOL>Botany>Reproduction>Sexual>Sexes

diecious
Monogamous plants can have both sexes in two different plants {diecious}|.

monoecious
Heterogamous plants can have both sexes in same plant {monoecious}|.

BIOL>Botany>Tropism

tropism
Plants can turn toward stimulus direction {tropism}|.

chemotropism
chemicals {chemotropism}.

geotropism
gravity {geotropism}.

magnetotropism
magnetism {magnetotropism}.

phototropism
light {phototropism}.

thigmotropism
touch {thigmotropism}.

stereotropism
combinations {stereotropism}.

BIOL>Botany>Algae

alga
Seven lower-plant phyla {alga}| {algae} have chlorophyll, perform photosynthesis, and are autotrophs. Algae include blue-green algae or cyanobacteria, brown algae or kelp or seaweed, dinoflagellates, euglena, golden-brown algae, and red algae. Green algae are in kingdom Plantae.

leucosin
Some algae store food as fatty substance {leucosin}.

pleuston
Algae {pleuston} can float on fresh-water lakes.

BIOL>Botany>Algae>Pigment

fucoxanthin
Brown algae have brown pigment {fucoxanthin}.

phycobilin
Pigments {phycobilin} include phycocyanin, phycoerythium, and fucoxanthin.

phycocyanin
Unique starches have blue pigments {phycocyanin}.

phycoerythium
Red algae make red pigment {phycoerythium}, which can absorb light at 30 meters deep.

BIOL>Botany>Algae>Kinds

brown algae
Algae {brown algae} {kelp} {seaweed} can make fucoxanthin, have no chloroplasts, live in coastal waters, have sexual reproduction, have air bladders, and grow as tufts, ropy strands, or flat branches. Brown algae are multicellular and are largest algae. Kombu has grayish-black ribbons. Sea palm has greenish black twists. Wakame has greenish-black strips. Nori has thin purple sheets. Brown algae used phycobilins and chlorophylls to absorb visible light and make oxygen [-1200000000].

euglena
Algae {euglena}| can have one cell, chlorophyll, chloroplasts, nuclear membranes, no cell walls, one or two flagella, gullets, red spots, and asexual reproduction. Euglena can be autotrophs, saprophytes, or holozoic. They store carbohydrates that are not starches.

red algae
Algae {red algae} can make phycoerythium, have sexual reproduction using special sex organs, and live in ocean. Red algae are multicellular. Coral algae are red algae. Red algae used phycobilins and chlorophylls to absorb visible light and make oxygen [-1200000000].

cyanobacteria general
Algae {blue-green algae} {cyanobacteria}| can have blue phycocyanin pigment that builds unique starch, have no chloroplasts, have no nuclear membranes, live in water and damp places, and have asexual reproduction. Most cyanobacteria species are multicellular, with cells attached end-to-end by gelatin-like cell covering. Cyanobacteria used phycobilins, carotenoids, and chlorophylls to absorb visible light and make oxygen [-2700000000].
types
Prochlorococcus is one-celled and is smallest photosynthesizer at 0.6 microns diameter. It is the most-abundant genus and makes half of sea oxygen. They can live in low or high light. They do not relate to prochlorophytes. Synechococcus is similar, has 1700 genes, and has 1.7 million bases. Grypania spiralis was early blue-green alga, 0.5 meter wide. Nostoc is symbiotic with gunnera and cycads.

BIOL>Botany>Algae>Kinds>Dinoflagellate

dinoflagellate
Algae {dinoflagellate}| can make fucoxanthin, have no chloroplasts, live in ocean, have thick interlocking-plate cell walls, have two flagella, store food as oil or leucosin, and have one cell. Dinoflagellates photosynthesize high percentage of Earth oxygen.

red tide
Dinoflagellates {red tide}| can kill whales and other vertebrate plankton eaters.

BIOL>Botany>Algae>Kinds>Golden-Brown Algae

golden-brown algae
Algae {golden-brown algae} can make fucoxanthin, have cell walls with silica, move by cytoplasmic streaming, store food as oil or leucosin, live in water, have asexual or sexual reproduction, and have one cell. Silica makes cell-wall ridges, lines, and pores.

diatom
Most golden-brown algae {diatom}| are light colored. Diatoms photosynthesize high percentage of Earth oxygen and are high percentage of sediments.

yellow-green algae
Some golden-brown algae species {yellow-green algae} are greenish yellow.

BIOL>Botany>Algae>Kinds>Green Algae

green algae
Algae {green algae}| can have chlorophyll, have chloroplasts, have cell walls, have nuclear membranes, make starches, have sexual and asexual reproduction, and live in water or damp places. Green algae are single cell or multicellular. Green algae are in kingdom Plantae. Pond scum is green algae. Green algae used chlorophylls to absorb visible light in shallow water and make oxygen [-750000000].

volvox
Chlorophytes {volvox} (order Volvocaceae) (class Chlorophyceae) can be microscopic, be pale green, have spherical colonies, and have flagella. Volvox colonies have all flagella outward and have cell specializations.

BIOL>Botany>Fungus

fungus
Botany kingdoms {fungus}| {fungi} {true fungi} can have saprophyte or parasite organisms with no chlorophyll. Fungi have cellulose or chitin outer walls, live in dark moist places, and reproduce by fission, budding, spores, or sexual reproduction. Fungi include zygomycetes or mold, ascomycetes or sac fungus, basidiomycetes or club fungus, fungi imperfecti, and phycomycetes or algae-like fungi.

hyphae
Most fungi have branching tubular cell filaments {hyphae}|.

mycelium
Some fungi have multinucleate bodies {mycelium}|, which can aggregate with others.

lichen
Sac fungi can have close relations with green or blue-green algae {lichen}|, for photosynthesis and protection. Lichens can dissolve rocks to make soil.

BIOL>Botany>Fungus>Spore Formation

ascus
Sac fungi produce spores in sacs {ascus}| {asci}.

basidium
Club fungi have sexual reproduction, using enlarged cells {basidium}| at hyphum tips for spore formation.

BIOL>Botany>Fungus>Divisions

ascomycetes
Fungi {ascomycetes} {sac fungus} can have asci and can reproduce by budding. Sexual reproduction unites gametes to form fruiting bodies with asci. Ascomycetes are not poisonous and include yeasts, powdery mildew, cheese mold, fruit mold, jelly mold, and truffle.

basidiomycetes
Fungi {basidiomycetes} can have sexual reproduction using basidia. Basidiomycetes include mushroom, toadstool, puffball, rust, smut, ergot, and bracket fungus.

phycomycetes
Fungi {phycomycetes} {algae-like fungi} can have haploid cells, which make diploid cells by heterogamy or isogamy. One gamete must be + strain, and the other gamete must be - strain. Phycomycetes include bread mold, downy mildew, and white rust.

zygomycetes
Fungi {zygomycetes} can be molds, such as black bread mold. Pilobolus has eyespot and ejects spores in light direction.

fungi imperfecti
Other true fungi {fungi imperfecti} include ringworm, athlete's foot, and barber's itch.

BIOL>Botany>Fungus>Reproduction

heterogamy
Zygotes can form by fusing gametes {heterogamy}| from adjacent different-plant hyphae.

isogamy
Zygotes can form by fusing gametes {isogamy}| from adjacent same-plant hyphae.

BIOL>Botany>Fungus>Kinds

aspergillus
Soil molds {aspergillus} are fungi.

dry rot
Fungi {dry rot} can make trees brittle and dry.

endophyte
Fungi {endophyte} can be parasitic on grasses and toxic to grazing animals.

ergot
Rye plants can have poisonous Basidiomycetes fungi {ergot}.

fairy ring
Perennial mushrooms can make circles {fairy ring}.

mildew
White phycomycetes {mildew} can coat organic surfaces.

mold as fungus
Fungi can be molds {mold, fungus}.

mushroom
Basidiomycetes include mushrooms {mushroom, plant}. Poisonous and non-poisonous mushrooms look similar. Mushroom hyphae are below ground. Mushroom caps are fruiting bodies.

puffball
Fluffy fungi {puffball} are in family Lycoperdaceae.

rust
Basidiomycetes include rusts {rust, fungus}.

smut
Ustilaginales basidiomycetes fungi {smut} can make black patches on cereal grasses.

toadstool
Basidiomycetes fungi {toadstool} can have umbrella-shape. Toadstools can be poisonous and are never for eating.

truffle mushroom
Tuber sac fungi {truffle, fungus} can grow underground and/or in tree roots.

witches' broom
Basidiomycetes include rust {witches' broom}.

BIOL>Botany>Fungus>Kinds>Yeast

yeast as fungus
Sac fungi {yeast, fungus} can have one cell, as budding yeast and fission yeast.

budding yeast
Saccharomyces cerevisiae {budding yeast} {baker's yeast} {brewer's yeast} have buds that start DNA synthesis. Buds then grow through all stages.

fission yeast
Schizosaccharomyces pombe {fission yeast} have cell divisions that start DNA synthesis.

BIOL>Botany>Slime Mold

slime mold
Fungi-like organisms {slime mold}| {mycetozoa} can live in dead leaves or wood. Slime molds have asexual reproduction by fission or sporulation. Cellular slime molds include Dictyostelida (Dictyostelium) and Aerasida. At cycle beginning, cellular slime molds are single-cell flagellates. Then they become amoeboid-like cells. Then they come together to form plasmodia. Then plasmodia make fruiting bodies, which make spores. Spores leave to become flagellate cells. cAMP release promotes cellular aggregation, multicellular-colony formation, and spore production.
Plasmodial slime molds include Physarum. They have fused flagellated cells with many diploid nuclei. Slime nets (Labyrinthulomycota) relate to Chromista. Myxomycetes and Protostelida are slime molds.

plasmodium
Amoeboid-like cells come together to form multinucleated cytoplasmic masses {plasmodium}| {plasmodia}.

fruiting body
Plasmodia make stalks with spore producers {fruiting body}|, which make spores.

BIOL>Botany>Plant

plant
Plants {plant} {land plant}| {higher plant} (Plantae) include green algae, liverworts, bryophyte mosses, hornworts, and tracheophyte vascular plants. Spore-bearing seedless vascular sporophytes are club mosses, ferns, and horsetails. Seed-plant spermatophytes are gymnosperms or angiosperms. Gymnosperms include cycads, ginkgoes, gnetae, conifers, and extinct seed ferns. Angiosperms are flowering plants and are monocots or dicots.
Plants do not include other plant-like things, such as thallophyte fungi and non-green algae.
evolution
Plants came from Charophyta green algae.
coordination
Plants have physical interactions between plant parts.
immune system
RNA molecules can have coding sequences {immune system, plant} {plant, immune system}, at hairpin tips, that cleave messenger RNA from genes or viruses, such as wheat and barley yellow dwarf virus.
waste
Waste gases, such as oxygen, diffuse out leaves. Solid wastes remain in leaves, which eventually drop off {plant, excretion} {excretion, plant}.

potassium
Plants need potassium in intracellular water.

blight
Plant diseases can cause wilting and dying {blight}|.

irritability of plant
Touching plants slowly changes membrane permeability, electrical charge, and metabolism rate {irritability, plant}.

phyllotaxis
Plants can grow by adding two existing things, in self-repeating patterns, so part numbers follow Fibonacci series {phyllotaxis}, as in pinecone spirals and sunflower center spirals.

respiration in plants
Plants can use oxygen to make carbohydrates into ATP, while releasing carbon dioxide {respiration, plant}. Respiration requires gas diffusion to roots. Plant respiration rate is slower than photosynthesis rate.

virescence
Plants can become abnormally green {virescence}.

BIOL>Botany>Plant>Substrate

epiphyte
Plants {epiphyte, air plant}| can live on another plant but get food from air.

hydrophyte
Plants {hydrophyte} can live in water.

mesophyte
Plants {mesophyte} can live in soil.

xerophyte
Plants {xerophyte} can live in desert.

BIOL>Botany>Plant>Hormone

plant hormone
Plants have hormones {hormone, plant} {plant hormone} for stimulating cell growth lengthwise. They have hormones for making new roots and flowers. They have hormones for starting cell division in cambium. They have hormones for inhibiting lateral buds and losing leaves.

auxin hormone
In response to stimuli, plants make indoles {auxin} for plant growth.

gibberellin
Plants hormones {gibberellin} can elongate young shoots by cell division, leaf expansion, and flowering. Gibberellin does not affect mature plants. Fungi do not have gibberellin.

kinin
Plants make hormones {kinin} for cell division.

phytachione
Plant hormones {phytachione} determine flowering, as day length affects pigments.

BIOL>Botany>Plant>Non-Vascular Plants

non-vascular plants
Non-vascular plants {non-vascular plants} include mosses (Bryophyta), liverworts (Marchantiophyta), and hornworts (Anthocerotophyta). Non-vascular plants can include green algae (Chlorophyta or Charophyta). Non-vascular plants do not include plant-like thallophytes such as non-green algae or fungi.

BIOL>Botany>Plant>Non-Vascular Plants>Moss

moss
Lower plants {moss}| {bryophyte} can be multicellular and have protonema. Mosses reproduce sexually by generation alteration. Mosses include green moss. Club moss is not moss.

protonema
Mosses have green-filament bodies {protonema}| {protonemae}.

rhizoid
Protonemae can grow stems {rhizoid}|, with thin leaves at top and cellular projections for water absorption at bottom.

BIOL>Botany>Plant>Non-Vascular Plants>Moss>Kinds

beard moss
Mosses {beard moss} (Usnea) can trap water.

Spanish moss
Mosses {Spanish moss} {tillandsia} can trap water.

BIOL>Botany>Plant>Non-Vascular Plants>Wort

wort
Lower plants {wort}| can be liverworts {liverwort, plant} and hornworts {hornwort}. Worts are like simple mosses. Worts reproduce sexually by generation alteration. Main plant is gametophyte, and sporophyte depends on gametophyte. Quillworts are club mosses, not worts.

BIOL>Botany>Plant>Non-Vascular Plants>Wort>Kinds

St. John's wort
Worts can have yellow simple flowers in round clusters {St. John's wort} {hypericum} {rose-of-Sharon, flower} (Clusiaceae) (formerly Guttiferae).

BIOL>Botany>Plant>Vascular

vascular plant
Higher plants {vascular plant}| {tracheophyte} have xylem and phloem conductive tissue for conducting water.
types
Vascular plants include sporophyte plants that make spores and spermatophyte plants that make seeds.
Sporophytes are club mosses (Lycopodiophyta), whisk ferns (Psilotophyta), and horsetails and ferns (Pteridophyta). Club mosses include spike mosses and quillworts.
Spermatophytes are gymnosperms or angiosperms. Gymnosperms include cycads, gnetae, ginkgoes, conifers, and extinct seed ferns. Angiosperms are flowering plants (Magnoliophyta) and include monocots and dicots.
non-vascular plants
Vascular plants do not include non-vascular plants, such as mosses (Bryophyta), liverworts (Marchantiophyta), and hornworts (Anthocerotophyta). Vascular plants do not include green algae (Chlorophyta or Charophyta). Vascular plants do not include plant-like thallophytes, such as non-green algae or fungi.
parts
Vascular plants have roots in soil or another substrate, leaves for photosynthesis and chemical activities, and stems to connect roots to leaves.

reproduction
Main plant is sporophyte, and gametophyte is small plant or is in sporophyte.

sleep movement
In dark and light conditions, plants can change leaf and flower positions {sleep movement}.

BIOL>Botany>Plant>Vascular>Phyte

sporophyte
Vascular plants can be spore-bearing seedless plants {sporophyte}, such as club mosses, ferns, and horsetails.

spermatophyte
Vascular seed plants {embryophyte} {spermatophyte, plant} are gymnosperms or angiosperms. Gymnosperms include cycads, ginkgoes, gnetae, conifers, and extinct seed ferns. Angiosperms are flowering plants and are monocots or dicots.

BIOL>Botany>Plant>Vascular>Circulation

circulation in plants
Water and nutrients flow both up and down {circulation, plant} in xylem and phloem.

cohesion theory
Water-molecule attractions pull water from root through stem to leaf {cohesion theory}.

transpiration
Leaf-stomata water evaporation {transpiration}| pulls water up from roots. Transpiration depends on osmosis. Transpiration causes forests to be cool and humid.

translocation in plants
Phloem fluid goes from leaves to stems to roots {translocation, plant}. Low temperature, low oxygen, or poison can block translocation.

BIOL>Botany>Plant>Vascular>Circulation>Fluid

sap
Xylem and phloem fluid {plant sap} {sap}| contains latex, which aids circulation.

latex
Plant sap contains organic molecules {latex}| that aid circulation. Rubber, chicle, and opium are latexes.

BIOL>Botany>Plant>Vascular>Circulation>Pressure

root pressure
Salts and water absorbed by roots create water pressure {root pressure} that pushes water from roots through stem to leaves.

turgor pressure
Root cells actively transport minerals. Root cells absorb water by osmosis, to dilute minerals pumped into root cells. Water absorption causes pressure {turgor pressure} on cell walls. Turgor pressure provides cell support and shapes non-woody plants.

plasmolysis
Too-low cell water makes low turgidity, and cells can burst {plasmolysis}.

BIOL>Botany>Plant>Vascular>Tissue

plant tissue
Plant tissues {plant tissue} include conductive tissue, epidermis, fundamental tissue, and meristem.

BIOL>Botany>Plant>Vascular>Tissue>Conductive

conductive tissue
Plant tissue {conductive tissue} can be xylem or phloem.

xylem
Conductive plant tissue {xylem}| can conduct water and salts.

tracheid
Long thin xylem cells {tracheid} join end to end to make long open cellulose tubes, which can thicken by lignin secretion.

phloem
Conductive plant tissue {phloem}| can conduct organic nutrients.

sieve tube
Phloem cells join end-to-end using perforated plates, making tubes {sieve tube} outside cambium.

companion cell
Cells {companion cell} near sieve tubes regulate sieve tubes.

BIOL>Botany>Plant>Vascular>Tissue>Fundamental

fundamental plant tissue
In leaf and flower soft parts, stem pith, and root cortex, plant tissue {fundamental plant tissue} can produce and store food.

chlorenchyma
Fundamental tissue {chlorenchyma} can have cells with chloroplasts and large vacuoles.

collenchyma
Fundamental tissue {collenchyma} can have cells, under epidermis, with thick walls at corners for support.

sclerenchyma
Fundamental tissue {sclerenchyma} can have cells, under epidermis, with thick walls for support.

BIOL>Botany>Plant>Vascular>Tissue>Meristem

meristem
Plant tissue {meristem}| can have apical meristem and cambium.

apical meristem
Meristem {apical meristem} can be at root and stem tips.

cambium
Meristem {cambium, plant tissue}| can be in root and stem layers.

BIOL>Botany>Plant>Vascular>Tissue>Protective

protective tissue
Plant tissue {protective tissue} can have cells with thick cell walls.

BIOL>Botany>Plant>Vascular>Tissue>Protective>Parts

epidermis of plant
Protective tissue {epidermis, plant tissue} can be on upper and lower leaf surfaces.

cork tissue of plant
Protective tissue {cork, plant} can be in stems and roots.

BIOL>Botany>Plant>Vascular>Tissue>Protective>Chemicals

cutin
Epidermis secretes waxy substances {cutin}| that reduce water loss.

suberin
Cork secretes chemicals {suberin}, which prevent water from entering cells and cause cells to die, leaving cell walls to provide structure.

BIOL>Botany>Plant>Vascular>Parts

shoot of plant
Plants have budding leaves {shoot}|.

sprout
New plants {sprout}| leave germinating seeds.

straw of grass
Cut grasses {straw}| can dry.

BIOL>Botany>Plant>Vascular>Parts>Leaf

leaf
Vascular plant parts {leaf}| can originate from stems at buds. Dicot leaves have petiole and blade with veins. Monocot leaves have central veins.

anthocyanin in plant
Leaves change color in autumn, as chlorophyll decomposes and cell sap makes red and purple pigments {anthocyanin, leaf}. Carotenoids make leaves yellow and orange.

bud
Leaves originate from stems at plant structures {bud}|. Buds can be at stem ends {terminal bud} or on stem sides {lateral bud}.

mesophyll
Between upper and lower epidermis, leaf middle layers {mesophyll} have chloroplasts.

palisade cell in leaf
Layers near upper epidermis can have special cells {palisade cell, leaf}.

pedicel
Dicot flower bunches have small flower stalks {pedicel}.

stomata
For gas diffusion, leaf openings {stomata}| alter surrounding-cell turgor pressure, to open by day and close at night.

BIOL>Botany>Plant>Vascular>Parts>Leaf>Regions

petiole

Dicot leaves have stalks {petiole} and blades.

blade of leaf
Dicot leaves have flat parts {blade}|, with forked vascular bundles {vein, leaf}.

BIOL>Botany>Plant>Vascular>Parts>Leaf>Abscission

abscission layer
Leaves fall after cell layers {abscission layer} cover petiole bottoms.

scar of plant
After abscission layers cover petiole bottoms, cork {scar}| covers layers.

BIOL>Botany>Plant>Vascular>Parts>Root

root of plant
Vascular plant parts {root, plant}| can anchor plants to substrates, hold plants upright, absorb water and minerals, and store food. Roots have caps, elongation zones, root hairs, and mature root near stem.

bulb as root
Tulips, onions, and garlic have roots {bulb}.

cap of root
Roots have growing points {cap, root} at tips.

elongation zone
Roots have regions {elongation zone} {zone of elongation} in which cells lengthen by absorbing water.

root hair
Roots have mature cells with hairs {root hair}|, for water and mineral absorption.

maturation zone
Roots have regions {maturation zone} {zone of maturation} of mature cells with root hairs, for water and mineral absorption.

cortex of root
Root tissue layers are outer, middle {cortex, plant}, and inner {endodermis} {cambium, root}. Cortex is thickest.

pericycle
In old root parts, regions {pericycle} can develop into new side roots or into new xylem and phloem.

stele of root
Root centers {stele, root} have phloem, xylem, pericycle, and cambium.

BIOL>Botany>Plant>Vascular>Parts>Root>Type

adventitious root
Plants can have roots {adventitious root}| that grow from stem or leaves.

taproot
Plants can have many similar-size roots {diffuse root} or one large main root {taproot}|.

BIOL>Botany>Plant>Vascular>Parts>Stem

stem

Vascular plant parts {stem, plant}| can connect roots to leaves. Dicots have three stem layers: central pith, vascular-bundle ring, and outer cortex. Stem pith stores food. Stem vascular bundles have cambium to heal plant wounds. Stem cortex has dead-cell outer layer and live-cell inner layer. Monocots have epidermis, stomata, vascular bundles throughout stem, no pith, and surface cortex cells with thick cell-wall layers.

lenticel
Plants can have bark swellings {lenticel}, which allow air diffusion.

node
Stems have growing points {node, stem} for flowers and leaves.

pith
Central soft stem parts {pith}| have fundamental plant tissue.

thorn
Stems can have woody sharp points {thorn}|.

BIOL>Botany>Plant>Vascular>Parts>Stem>Kinds

corm
Underground stems can have bulb-like regions {corm}.

rhizome
Ferns and grasses have underground stems {rhizome}|.

stolon
Plants can have long horizontal ground stems {stolon}.

tuber stem
Some rhizomes {tuber, root}| store starch.

BIOL>Botany>Plant>Vascular>Parts>Stem>Herbaceous

herb and stem
Plants {herbaceous plant} {herb, stem}| can have soft, green, thin stems.

annual plant
Herbaceous plants {annual}| can live one season, from early spring to late autumn.

biennial plant
Herbaceous plants {biennial}| can live between twelve and twenty-four months.

BIOL>Botany>Plant>Vascular>Parts>Stem>Woody

woody plant
Plants {woody plant} can have tough, thick, hard stem. Stem is hard because it has lignin.

perennial
Woody plants {perennial} can live longer than one year.

monocarpic plant
Rare plants {monocarpic plant} flower only once and live from 2 to 100 years.

shrub
Some perennial plants {shrub}| have many similar woody stems.

tree and stem
Some perennial plants {tree, stem}| have one main woody stem.

annual ring
In perennials, stem xylem and phloem grow each summer and stop growing in winter, so years leave distinct rings {annual ring}| underneath cortex.

BIOL>Botany>Plant>Vascular>Parts>Stem>Woody>Xylem

sapwood
Outer xylem layers {sapwood}| conduct sap.

heartwood
Inner xylem layers {heartwood}| are for strength.

BIOL>Botany>Plant>Vascular>Parts>Seed

boll of cotton
Cotton and flax have balls {boll}| that hold seeds.

chaff
Cereals have outer husks {chaff}|, removed before eating.

cob
Corn has cylinders {cob}|, with outside seeds.

gourd
Pumpkin, squash, and cucumber have fruits with hard coverings {gourd}|.

BIOL>Botany>Plant>Vascular>Parts>Shrub

box shrub
shrub {box shrub}.

bramble in forest
brier {bramble, brier}|.

brier
Rose bushes and greenbrier {brier}| have thorns on branches.

maquis
Tight small-tree and shrub groups {maquis} can be on Mediterranean-Sea north side.

tendril
Grape and cucumber vine twining plant stems have curling pieces {tendril}| that hold base objects.

thicket
Small trees and/or shrubs can grow close together {thicket}|.

tumbleweed
Plants {tumbleweed}| with many intertwined branches can break at ground level and then roll with wind.

vine
Plants {vine}| can have pliable stems that twine around, climb, or run along surfaces.

BIOL>Botany>Plant>Vascular>Parts>Tree

bough
tree branch {bough}|.

copse
Small trees and/or shrubs can grow close together {copse}| {coppice}.

hardwood
dicot wood {hardwood}|.

rot of plant
Bacteria or fungi can make tree tissue lose structure {rot}|.

sapling
young tree {sapling}|.

seedling
sprouted tree {seedling}|.

sprig
shoot or twig {sprig}|.

BIOL>Botany>Plant>Vascular>Parts>Wood

driftwood
Tree parts fall into ocean and return to shore bleached and worn {driftwood}|.

fagot
branch bundle {fagot, branch}| {faggot}.

petrified wood
Dead wood can absorb mineral water and harden into stone {petrified wood}|.

pulpwood
Spruce, aspen, or pine wood {pulpwood}| can make paper.

BIOL>Botany>Plant>Vascular>Sporophyte

club moss
Sporophytes {club moss}| can have spaced, erect rhizome stems, roots, and leaves but have no cambium. Club mosses include quillworts {quillwort}. Sporangia at stem tips are specialized leaves.

horsetail
Sporophytes {horsetail}| can have spaced, erect rhizome stems with branches, branching roots, and small leaf whorls. Sporangia are at main stem tips. Horsetails are bushy with hard cell walls, because they contain silica.

psilopsida
Primitive sporophytes {psilopsida} can have spaced, erect rhizome stems, but not roots or leaves.

BIOL>Botany>Plant>Vascular>Sporophyte>Fern

fern
Lowest pteropsida {fern}| make no seeds or flowers. Ferns make haploid spores at specialized-leave bottoms. Spores drop to ground and grow into gametophytes, which make eggs that cross-pollinate to form new plants. Regular ferns have perennially erect stems, rhizomes with roots, and compound leaves in buds. Ferns have no xylem.

airplant
Ferns can get food and moisture from air {epiphyte, fern} {aerophyte} {airplant} (Tillandsia).

asparagus fern
Ferns {asparagus fern} can reproduce using spores and have fronds.

bracken
Ferns {bracken} {brake, plant} came from Southeast Asia.

platycerium
Ferns can look like green antlers {platycerium} {staghorn fern} {elkhorn fern} {moosehorn fern}.

BIOL>Botany>Plant>Vascular>Pteropsida

pteropsida
Highest vascular-plant phylum {pteropsida} contains ferns and seed plants. Seed plants are conifers and flowering plants.

BIOL>Botany>Plant>Vascular>Seed Plant

seed plant
Gymnosperms and angiosperms {seed plant} {spermatophyte, seeds} make seeds.

BIOL>Botany>Plant>Vascular>Seed Plant>Kinds

bed plant
Plants {bed plant} can be ground cover.

domesticated plant
Seeds can sprout soon after planting {domesticated plant}|, but wild-plant seeds sprout over longer periods. Domesticated plants make no seeds, self-reproduce, or reproduce near each other, to preserve mutations. Wild plants makes seeds and spread out. Domesticated plants have mutations specific to harvesting. Domesticated peas mutate the pea-pod-popping gene to keep peas in pods. Domesticated wheat mutates the wheat-stalk-breaking gene to keep wheat on stalks.

legume
Plants {legume}| {pulse, legume} can include alfalfa and white, red, crimson, and alsike clovers.
Legumes include bitter vetch in Mesopotamia, peas in Mesopotamia, chickpeas in Mesopotamia, cowpeas in Sahel, groundnuts in Sahel, peanuts in Andes and Amazon, lentils in Mesopotamia, lima beans in Andes, beans in Mesoamerica and Andes and Amazon, tepary beans in Mesoamerica, scarlet runner beans in Mesoamerica, soybeans in China, adzuki beans in China, mung beans in China, and hyacinth beans in India.
Legumes include black and green gram in India.

bacteria
Rhizobium bacteria are symbiotic with legumes and convert atmospheric nitrogen gas to nitrates and nitrites.

tree
Seed plants {tree, plant} can include angiosperms and conifers.

water plant
Reeds, papyrus, sedge, lotus, and water hyacinth {water plant} grow in water.

BIOL>Botany>Plant>Vascular>Gymnosperm

gymnosperm

Middle pteropsida {gymnosperm}| are seed plants, have no flowers, have no xylem, and have no woody fibers {softwood}. Gymnosperms use naked seeds, sometimes in cones. Gymnosperm classes include cycads, ginkgoes, gnetales, conifers, and extinct seed ferns.

sago palm
Gymnosperms {cycad} (Cycas) (Cycadophyta) can be small plants {sago palm}, have short trunks with feathery leaves out tops, and make cones.

gingko
Gymnosperms {gingko} {maiden hair tree} (Gingkophyta) can be from China, have fan-like leaves on short twigs, and have fruits with bad odors and edible kernels.

gnetophyte
Gymnosperms {gnetophyte} (Gnetophyta) {gnetae} {gnetales} include mormon tea.

BIOL>Botany>Plant>Vascular>Gymnosperm>Conifer

conifer
Gymnosperms {conifer}| (Coniferophyta) (Pinophyta) can have seeds in cones, which have two types. Conifers include pine, cedar, spruce, fir, and redwood.

arborvitae
Trees {arborvitae} can have small cones, have both sexes on same tree, and be moist, cool, and evergreen: American, giant cedar or Western red cedar or shinglewood, Oriental, and Sawara-cypress. Incense cedar relates to cypress and Sawara-cypress. Northern white cedar is eastern arborvitae.

aspidistra
Trees {aspidistra} can be evergreen, have perennial large leaves, and live in Asia.

bald cypress
Trees {bald cypress} can be in south United States swamps, be tall, have root "knees" {knee, tree}, have small cones, and have needles that fall in autumn.

cedar
Trees {cedar} can have two kinds. Coast cedar, Atlantic cedar, or southern white cedar is small to big, has small cones, is evergreen, and lives in swamps and wet areas. Western cedar is on both coasts, likes wet ground, has catkins, has red-brown small cones, has scale-like blue-green leaves, grows slowly, and has twigs that droop from branches. Cedars include Atlantic white cedar or swamp cedar, Port Orford white cedar or Oregon cedar or Lawson cypress, and Alaska yellow cedar or Alaska cypress or yellow cypress.

cypress
Trees {cypress} can grow in west and southwest USA, have small red-brown cones, like moist areas, grow in stands, and have both sexes on same tree: Monterey cypress and Arizona cypress.

fir
Trees {fir} can be aromatic, have short needles, be evergreen, live in Pacific Northwest, and have cones upright on branches. Firs include Alpine fir, noble fir, grand fir or yellow fir, gray fir, balsam or Canada balsam or Eastern fir, silver fir, red fir, Nordmann fir, and white fir or white balsam. Douglas firs are tall.

heath tree
Trees {heath, tree} can be evergreen, have orange branches and leathery dark green leaves, and have orange-red small drupes in clusters. Pacific madrone or madrona lives on USA west coast and relates to mountain laurel, rhododendron, azalea, and blueberry.

hemlock

Trees {hemlock} {spruce} {water hemlock} can have short needles, be dark green, have tiny cones, grow fast, be evergreen, and have cones that hang down. Hemlocks include Eastern hemlock or Canadian hemlock, Western hemlock or Pacific hemlock, black hemlock or Mountain hemlock, and Carolina hemlock. Spruces include Engelmann spruce or mountain spruce, Oriental spruce, weeping spruce, red spruce or Eastern spruce, black spruce or bog spruce, Norway spruce, Colorado spruce or blue spruce, white spruce, coast spruce or sitka spruce or yellow spruce, and Atlas cedar.

hornbeam

Trees {hornbeam} can have hop-like fruit clusters, have catkins, be deciduous, and live in east USA: Eastern hop hornbeam and American hop hornbeam.

ironwood

Trees {ironwood} {blue beech} {American hornbeam} (Carpinus) can have blue and gray smooth bark, be deciduous, have catkins, and live in east USA.

juniper

Trees {juniper} can be aromatic, have blue fleshy cones, have short needles, be evergreen, and have needles gray above and green below. Junipers include common juniper, Rocky Mountain juniper, Utah juniper, alligator juniper, creeping juniper, savin, Sierra juniper or western juniper, Lawson-cypress, and Eastern red cedar or red juniper.

larch

Trees {larch} {tamarack} can shed leaves in autumn, have needles in clumps on short side twigs, have small cones, have short needles, and live in north USA swamps: European larch, Western larch, and American larch or tamarack or Eastern larch or black larch.

pine tree

Trees {pine, tree} can have bundles of two to five long or short needles, have big cones, be evergreen, and have catkins. Pines include bristlecone pine, digger pine, jack pine, limber pine, loblolly pine, lodgepole pine, longleaf pine, mountain pine, pinyon pine, pond pine, slash pine, sugar pine, table-mountain pine, whitebark pine, and yellow pine or shortleaf pine. Other pines are Austrian pine or black pine, Coulter pine, Eastern white pine, Himalayan pine, Jeffrey pine, red pine or Norway pine, Ponderosa pine, Scotch pine, Southern pine or pitch pine, Swiss stone pine, Torrey pine, Virginia pine, and Western white pine. Pinyon pines {piñon pine} have edible seeds {pine nut, pine} {Indian nut}. Bristlecone pines can live 4000 years.

redwood

Trees {redwood} {sequoia} can be evergreen with small to medium cones and grow to 300 feet: coast redwoods and Sequoias or Big Trees.

yew tree

Trees {yew, tree} can have medium height, be evergreen, have little red drupes, be dark green, and have sexes on different trees: Pacific yew or Western yew, European yew, English yew, Japanese yew, torreya, podocarpus, and American yew or ground hemlock shrub.

BIOL>Botany>Plant>Vascular>Angiosperm

angiosperm

Flowering plants (Magnoliophyta) {flowering plant} {angiosperm}| have xylem, flowers with pistils, and fruits with enclosed seeds. Flowering plants are the highest pteropsida.

deciduous plant

Angiosperms can lose leaves each fall {deciduous}|.

photoperiodism

Day length {photoperiodism} affects flowering. Flowers can appear in winter, in summer, or all year. Photoperiodism can affect tubers and other plant characteristics.

vernalization

If VRN1 gene is present, 40-degree temperatures for several weeks trigger flowering {vernalization}.

BIOL>Botany>Plant>Vascular>Angiosperm>Flower

flower
Flowers {flower}| are modified stems. Flowers have receptacle, calyx, sepals, petals, stamen, and pistil.
flower types
Flowers can have stamen, pistils, petals, and sepals {complete flower} or lack something {incomplete flower}.
stamen and pistil types
Flowers can have functional stamen and pistil {perfect flower}, functioning pistil only {pistillate flower}, or functional stamen only {stamenate flower}.
imperfect flowers
Date palm, willow, and poplar have imperfect flowers. Plants can have separate staminate and pistillate plants {dioecious plant}, as in holly trees and pistachio trees. Plants {monoecious plant} can have separate male and female flowers on same plant, as in corn and pecan trees. Plants can have only male flowers at growing-season beginning but later have male and female flowers, as in cucumbers and squash.
temperature
Some flowers have cone-shaped top-surface cells that focus sunlight onto lower-cell petal pigments, making flowers warmer.

inflorescence
Plants can have one flower {solitary flower} per stem.
floret
Plants can have flower clusters {floret} on stems in racemose or cyme form {inflorescence}.
racemose
Florets can start from bottom and go up in spikes, racemes, corymbs, umbels, or heads {racemose inflorescence}. Many stemless florets can attach to long flower stems or peduncles {spike inflorescence}, as in gladiolus. Florets can be on small stems attached to peduncles {raceme inflorescence}, as in snapdragon. Florets can have random stalks and pedicels along peduncles {corymb inflorescence}, so florets make flat round tops, as in yarrow. Corymbs can have pedicels that all arise from one peduncle point {umbel inflorescence}, as in dill. Many stemless florets can arrange as in daisies {head inflorescence} {composite inflorescence}.
cyme
Top florets can open first and bloom downward along peduncles {cyme inflorescence}. Florets can be opposite along peduncles {dischasium cyme inflorescence}, as in baby's breath. Lower florets can be on the same peduncle side {helicoid cyme inflorescence}, as in freesia and statice. Florets can alternate along peduncles {scorpioid cyme inflorescence}, as in tomato and potato.

BIOL>Botany>Plant>Vascular>Angiosperm>Flower>Parts

receptacle of flower
Flowers can attach to stems at widened spots {receptacle}.

calyx
Flowers have sepal concentric circles {calyx}|.

sepal
Flowers have calyx of outside leaflets {sepal}|.

petal of flower
Flowers have flowery leaves {petal}|.

BIOL>Botany>Plant>Vascular>Angiosperm>Flower>Parts>Stamen

stamen
Flowers have anthers on structures {stamen}|.

BIOL>Botany>Plant>Vascular>Angiosperm>Flower>Parts>Stamen>Anther

anther
Flowers can have male sex organs {anther}| {antheridia} to make male sex cells, which make pollen sacs on stamens.

microsporangia
Anther sacs {microsporangia} develop male sex cells into microspores.

microspore
Microsporangia develop male sex cells into four spores {microspore}. Two microspores are tube nuclei. Two microspores are generative nuclei. One tube nucleus and one generative nucleus make one pollen grain, so process makes two pollen grains.

pollen
One tube nucleus and one generative nucleus make one grain {pollen grain} {pollen}|. Pollen grains leave stamens to try to land on stigmas.

BIOL>Botany>Plant>Vascular>Angiosperm>Flower>Parts>Pistil

pistil flower
Flowers have center structures {pistil, flower}|. Pistils have ovaries, styles, and stigmas.

stigma of flower
Pistils have top parts {stigma, flower}|.

style of flower
Pistils have middle parts {style, flower}.

carpel
Pistils have egg-making organs {carpel, flower}|, in which ovules develop.

ovule
Carpels have female sex cells {ovule}. Ovules develop to make eight nuclei, of which one becomes egg nucleus, two become polar nuclei, three are generative nuclei, and two form tube nuclei.

megasporangium
Ovules develop to make sacs {megasporangium}, with female spores {megaspore}.

archegonia
Flowers have female sex organs {archegonia}.

BIOL>Botany>Plant>Vascular>Angiosperm>Fertilization

pollination
Spermatophytes produce male microspores and female megaspores. Male pollen must transfer from anther to stigma, by wind {wind-pollinated flower} or by insect, animal, or bird pollinators {pollinator-pollinated flower}. Wind-pollinated flowers do not have fancy flowers or nectar. Spermatophytes transport pollen down pollen tubes to megaspores and unite gametes {pollination}|, to make fertilized embryos. Seeds have one embryo surrounded by endosperm, surrounded by epidermis. Seeds are transportable units.

tube nuclei
Female ovules develop to make eight nuclei, of which two {tube nuclei} form tubes. After pollen grains land on stigmas, ovule and pollen tube nuclei form tubes down through styles to ovules.

generative nucleus

Female ovules develop to make eight nuclei, of which three {generative nucleus} participate in fertilization. One generative nucleus divides. Second generative nucleus enters egg nucleus. Female-ovule polar nuclei and third generative nucleus fuse to make endosperm nucleus. Ovule and pollen generative nuclei make embryo {double fertilization}.

polar nucleus
Female ovules develop to make eight nuclei, of which two {polar nucleus} become pole markers. Polar nuclei and third generative nucleus fuse to make endosperm nucleus.

embryo of plant
Pollination makes fertilized gametes {embryo, plant}.

endosperm nucleus
Ovule polar nuclei and third generative nucleus combine to make a nucleus {endosperm nucleus}.

endosperm layer
Seeds have nutrient layers {endosperm} that surround embryos and have epidermis coverings. Endosperm nucleus makes endosperm.

BIOL>Botany>Plant>Vascular>Angiosperm>Fruit

fruit
After double fertilization, flowers fall off. Ovules thicken walls to form seeds. Ovaries enlarge to make new organs {fruit}|.

Fruits are mature-ovule seeds and ovary walls {pericarp}. Ovary walls can be fleshy, as in apple, or dry and hard, as in maple. Seeds can be in ovary, as in apples, peaches, oranges, squash, and cucumbers. Seeds can be on surface, as in corn and strawberry. Fleshy fruits can have one or more seeds and skin, as tomato, cranberry, banana, and grape. Compound inferior ovaries can have many seeds in thick flesh {pome}, as in pear and apple.

botanical fruit
Tomato, squash, cucumber, and eggplant {botanical fruit} develop from flowers and so are not like vegetables.

dehiscent
Some fruits do not split open to release seed {indehiscent} and are typically samaras. Dry fruits can have one seed that splits open {dehiscent}, as in walnut.

accessory fruit
Sepals, petals, or receptacles can be fruit parts {accessory fruit}, as in apple. Accessory fruits {aggregate-accessory fruit} can have edible enlarged receptacles, as in strawberry and blackberry.

aggregate fruit
Fruits {aggregate fruit} can have simple flowers, with one corolla, one calyx, one stem, and many ovaries. Aggregate fruits can be from flowers with several pistils, as in raspberry and blackberry.

berry fruit
Fleshy fruits {berry, fruit}| can have pulpy walls.

drupe
Fruits {drupe}| can have stones, as in peach and apricot. One-seed fleshy fruits can have fleshy outer pericarp and bony inner pericarp {endocarp}.

hilum
Seeds can join to stalks {hilum}.

multiple fruit
Fruit clusters can unite {multiple fruit}, as in pineapple. Multiple fruits have separate and independent flower clusters, with calyx and corolla, as in pineapple, fig, and beet.

nut plant
Dry fruits {nut}| have shells.

samara
Seeds {samara}| can have wings, as in ash, elm, and maple.

simple fruit
Fruits {simple fruit} can be from flowers with one pistil, such as cherry, date, and palm. Dry simple fruits have paper, leather, or hard ovary walls. Pods can split into two sides {valve, pod} with seeds attached to one edge, as in peanut, pea, bean, and other legumes. Dry thin-walled fruits or pods {capsule, fruit} can have more than one seed and several parts separated by grooved lines {carpel, fruit}, as in poppy.

BIOL>Botany>Plant>Vascular>Angiosperm>Seed

seed
Mature fertilized ovules {seed, plant}| have immature plants {embryo, seed}; protein, carbohydrate, or fat food supply {endosperm layer}, except in orchid; and soft inner linings {micropyle} or hard outer coverings {seed coat} to prevent water from entering seeds early. Seeds can remain dormant, if they have thick coats, low water, and starches for food.

BIOL>Botany>Plant>Vascular>Angiosperm>Seed>Leaves

monocot
Angiosperms {monocot}| {monocotyledon} can have one embryo seed leaf, one straight leaf vein, flower parts in threes, and xylem throughout.

dicot
Angiosperms {dicot}| {dicotyledon} can have two embryo seed leaves, branching leaf veins, flower parts in fours or fives, and xylem in rings or stem center.

BIOL>Botany>Plant>Vascular>Angiosperm>Seed>Germination

germination
Warmth, moisture, and oxygen start seed growth {germination}|.

suspensor
First, a filament {suspensor} of cells grows. At suspensor end, one cell divides to make embryo, as a round cell mass. Embryo then makes cotyledon.

cotyledon
Embryos make primary seed leaves {cotyledon}|, which have a central axis. Angiosperms are monocotyledons or dicotyledons. Seed leaves enclose embryo but are not like mature leaves.

epicotyl
Axis above seed leaves {epicotyl} becomes stem and leaves.

hypocotyl
Axes {hypocotyl} can be below seed leaves, be beside radicle, and have immature stems.

plumule
Immature leaves {plumule} can be beside hypocotyl.

radicle
After seeds absorb water, axis {radicle} below hypocotyl grows and emerges from seed to make primary root. Root grows down, pulling axis and cotyledon out of seed coat.

BIOL>Botany>Plant>Kinds

plant types
Plants {plant types} can be flowers, herbs, grasses, trees, weeds, and crops.

BIOL>Botany>Plant>Kinds>Flower

flower kinds
Flowers have different colors and shapes {flower kinds}.

BIOL>Botany>Plant>Kinds>Flower>Acanthus

acanthus
perennial herb or small shrub {acanthus} {bear's breeches}.

petunia
Perennial {petunia} smell can depend on methylbenzoate.

BIOL>Botany>Plant>Kinds>Flower>Aizoaceae

ice plant
yellow or purple flowers, creeping, mat-forming, succulent {mesembryanthemum} {ice plant} (Carpobrotus edulis).

stone plant
creeping, mat-forming, succulent {stone plant}.

BIOL>Botany>Plant>Kinds>Flower>Amaranthaceae

amaranthus
red or green flowers, tall {hypochondriacus} {cat's tail} {amaranthus}.

cockscomb
red flowers, tall {cockscomb}.

BIOL>Botany>Plant>Kinds>Flower>Amaryllidaceae

amaryllis
large various color flowers, perennial {amaryllis} {hippeastrum} (Amaryllidaceae).

BIOL>Botany>Plant>Kinds>Flower>Anacardiaceae

poison ivy
white flowers in long clusters {poison ivy} {cashew, flower}.

poison oak
green-white flowers {poison oak}.

poison sumac
green flowers with unique shape {poison sumac}.

BIOL>Botany>Plant>Kinds>Flower>Apiaceae

celery family
carrots and celeries {carrot family} {celery family} (formerly Umbelliferae).

queen anne's lace

white flowers in round clusters {queen anne's lace} {wild carrot}.

BIOL>Botany>Plant>Kinds>Flower>Apocynaceae

asclepiad
{asclepiad}.

foxglove
purple flowers {digitalis, plant} {foxglove}.

frangipani
{frangipani}.

milkweed
pink or blue-purple or red or pink flowers in round clusters, digitalis-like chemical {milkweed}. Butterflies that eat it become poisonous, too.

oleander
poisonous, narrow evergreen leaves, sweet smell, white or pink or red flowers in clusters, East Indies {oleander} {dogbane}.

periwinkle flower
blue-purple flowers, simple opposite leaves, perennial, evergreen {periwinkle}.

vinca
blue-purple flowers {vinca} {bigleaf periwinkle}.

BIOL>Botany>Plant>Kinds>Flower>Araceae

arum
green flowers with unique shape {arum} {aroid}.

anthurium
white or red or pink heart shape flowers, waxy {anthurium}.

jack in the pulpit
green or brown flowers with unique shape {jack in the pulpit} (Arisaema triphyllum).

philodendron
Green flowers contain oxalate crystals and histamine releasers {philodendron}.

skunk cabbage
brown flowers with unique shape {skunk cabbage}.

zantedeschia
white flowers {zantedeschia}.

BIOL>Botany>Plant>Kinds>Flower>Araliaceae

ivy
blue-purple flowers, shrub {ivy} {hedera}.

ginseng as plant
green or white flowers in round clusters {ginseng, flower}.

BIOL>Botany>Plant>Kinds>Flower>Armeria

thrift as shrub
shrubs with dense tufts {thrift}.

BIOL>Botany>Plant>Kinds>Flower>Asteracea

aster
white or blue-purple flowers with rays, composite {aster}.

achillea
white or blue-purple flowers with rays {achillea}.

black-eyed susan
yellow flowers with rays {black-eyed susan} {thunbergia}.

callistephus
white or blue-purple flowers with rays {callistephus} {annual aster}.

chicory as plant
milky sap, alternate or basal leaves, strap-shape {ligulate} flowers with no bracts {involucre} surrounding flower clusters {volucre} {chicory, flower}.

chrysanthemum
white, yellow, lavender, purple, bronze and light pink flowers {chrysanthemum}.

cockleburr
purple flowers {cockleburr}.

coltsfoot
Eurasia, perennial, herb {coltsfoot} (Tussilago farfara).

cornflower
small, annual {centaurea} {cornflower} {centaury}.

cosmos
yellow {cosmos} {cosmea}.

dahlia
tuberous root, various color flowers with rays {dahlia}.

figwort
Asters {figwort} (Scrophularia) (Scrophulariaceae) can have square stems, opposite leaves, and open flowers with two lips. Figworts {mullein} {aaron's rod} can be in Europe and Asia, have coumarin and rotenone, and have yellow flowers in long clusters.

goldenrod
yellow flowers in long clusters {goldenrod} {solidago}.

mum
chrysanthemum {mum}.

ragwort
yellow flowers with rays {ragwort} {golden ragwort}.

safflower
red or orange flowers, thistle-like, annual, Asia and Africa {safflower} (Carthamus tinctorius).

sagebrush
shrubs {sagebrush} (Artemisia).

thistle
blue-purple or yellow flowers with unique shape {thistle}.

zinnia
large various color flowers {zinnia}.

BIOL>Botany>Plant>Kinds>Flower>Asteracea>Daisy

daisy flower
white flowers {daisy} {marguerite} {white daisy} (formerly Compositae).

arctotis
herbs and small shrubs {arctotis} {African daisy}.

bellis
white flowers {bellis} {double daisy}.

dandelion flower
yellow flowers with rays {dandelion} (Taraxacum).

eidelweiss
small white flowers, perennial {leontopodium} {eidelweiss}.

felicia
blue flowers {felicia} {blue marguerite}.

magnolia flower
large white flowers {magnolia, flower}.

senecio
blue flowers {senecio} (Jacobaea) {stinking willie}.

BIOL>Botany>Plant>Kinds>Flower>Asteracea>Marigold

marigold
yellow flowers {marigold} {tagetes}.

calerdula
yellow-orange flowers {calerdula} {pot marigold}.

caltha
yellow-orange flowers {caltha} {marsh marigold} {cowslip, caltha}.

BIOL>Botany>Plant>Kinds>Flower>Asteracea>Sunflower

sunflower flower
yellow flowers {sunflower, plant} {helianthus}.

yarrow
white flowers in round clusters {yarrow} {milfoil}.

BIOL>Botany>Plant>Kinds>Flower>Asteracea>Lamiaceae

lamial
Asters {lamial} can include lavender, lilac, olive, jasmine, ash trees, teak, snapdragon, psyllium, mint, basil, and rosemary.

mimulus
Lamials {mimulus} {muskflower} {monkey flower} (Mimulus moschatus) (Phrymaceae) can have yellow or red flowers.

mint as plant
pink flowers {mint, plant} {beebalm} {peppermint} {spearmint} (formerly Labiatae).

bee-balm
red or pink or white flowers in round clusters {bee-balm} (Melissa officinalis) (Monarda didyma).

bugle as plant
blue flowers in bugle shapes {ajuga} {bugle, flower}.

hyssop
blue-purple flowers {hyssop}.

lavender flower
purple flowers {lavandula} {lavender, plant}.

molucella
blue flowers {molucella} {bells of Ireland} {shell flower}.

prunella flower
purple flowers {prunella, plant}.

tacamahac
shrub, deciduous, dioecious {tacamahac} {balm of Gilead} (Populus balsamifeya).

BIOL>Botany>Plant>Kinds>Flower>Asteracea>Lamiaceae>Castilleja

paintbrush
red or pink flowers in round clusters or unique shapes {paintbrush}.

snapdragon
Large white or yellow flower {antirrhinum} {snapdragon} smell depends on methylbenzoate.

toadflax
various color flowers {linaria} {toadflax} {baby snapdragon}.

BIOL>Botany>Plant>Kinds>Flower>Asteracea>Lamiaceae>Oleaceae

olive as plant
deciduous, Old World, shrubs or small trees {olive, plant}.

forsythia
yellow flowers {forsythia} {golden bell}.

jasmine
small white flowers, sweet smell {jasminium} {jasmine}.

lilac

blue flowers, deciduous, Old World, shrubs or small trees {syringa, lilac} {lilac}.

syringa
purple flowers {philadelphus} {mock orange} {syringa, philadelphus} {common lilac} (Syringa vulgaris).

BIOL>Botany>Plant>Kinds>Flower>Balsaminaceae

impatiens
pink, purple, red, rose, or white flowers {impatiens} {balsam}.

BIOL>Botany>Plant>Kinds>Flower>Begoniaceae

begonia flower
various color flowers, glossy leaves {begonia}.

BIOL>Botany>Plant>Kinds>Flower>Berberidaceae

barberry
small yellow flowers, red berries, shrubs {berberis} {barberry}.

mayapple
white flowers {mayapple}. Sap has emetic {ipecac} (Podophyllum peltatum).

BIOL>Botany>Plant>Kinds>Flower>Boraginaceae

forget-me-not flower
blue flowers {forget-me-not} {myosotis} {borage}.

heliotrope flower
White to blue tiny flowers in long curved sprays, sweet smell {heliotropium} {heliotrope, plant}.

BIOL>Botany>Plant>Kinds>Flower>Brassicaceae

cabbage family
cabbages {cabbage family} (formerly Cruciferae).

BIOL>Botany>Plant>Kinds>Flower>Brassicaceae>Mustard

alyssum
yellow flowers {alyssum} {sweet alyssum} {yellow alyssum}.

arabis
annual to perennial, woody, herbs {arabis} {rock cress}.

mustard plant
yellow flowers {mustard plant}.

stock as plant
cream white flowers {matthiola} {stock, plant}.

wallflower flower
yellow flowers {cheiranthus} {wallflower, plant}.

BIOL>Botany>Plant>Kinds>Flower>Calceolaria

calceolaria

large red or yellow or bronze flowers in slipper or pouch shapes {calceolaria} {pouch} {pocketbook flower} {slipper flower}.

BIOL>Botany>Plant>Kinds>Flower>Campanulaceae

bellflower flower
blue flowers in long clusters {bellflower}.

bluebell
blue-purple flowers {bluebell} {endymion}.

rampion
violet or dark blue flowers {rampion}.

BIOL>Botany>Plant>Kinds>Flower>Caryophyllaceae

pink as plant
small pink flowers {pink} (Caryophyllaceae).

baby's breath
small white flowers {baby's breath} (Gypsophila).

sweet William
small flowers {dianthus} {sweet William}.

BIOL>Botany>Plant>Kinds>Flower>Caryophyllaceae>Plumbaginaceae

leadwort
limoniums {leadwort} {plumbago} (Plumbaginaceae).

limonium
blue flower {limonium} {statice} {sea lavender} {marsh rosemary}.

BIOL>Botany>Plant>Kinds>Flower>Convolvulaceae

morning glory
blue or purple flowers {morning glory} {convolvulus} {ipomoea}.

bindweed
white or pink flowers {bindweed}.

sweet potato as flower
sweet potato {sweet potato, flower}.

BIOL>Botany>Plant>Kinds>Flower>Dionaea

Venus' fly trap
carnivorous, high humidity {Venus' fly trap}.

BIOL>Botany>Plant>Kinds>Flower>Ericaceae

heath family
heath {heath, flower}.

azalea
white and other color flowers in round clusters {azalea}.

cranberry as plant
white simple flowers, shrubs {cranberry, flower}.

heather
pink or white flowers {heather} {erica} {ling}.

rhododendron
various color flowers in round clusters {rhododendron} {azalea rhododendron}.

teaberry
perennial, shrubs {teaberry}.

vaccinium
shrubs {vaccinium} {cranberry, shrub} {blueberry, shrub} {bilberry} {huckleberry, shrub} {whortleberry} {cowberry} {mountain cranberry}.

BIOL>Botany>Plant>Kinds>Flower>Erythroxylaceae

coca plant
shrubs {coca}.

BIOL>Botany>Plant>Kinds>Flower>Euphorbiaceae

carnation
white or red flowers {carnation} (Euphorbia).

castor oil plant
shrubs {castor oil plant}.

manioc as plant
shrubs {manioc, plant} (Manihot esculenta).

poinsettia
large red or white flowers {euphorbia} {poinsettia}.

rubber plant spurge
large green thick leaves {rubber plant, spurge}.

spurge
brown flowers {spurge}.

BIOL>Botany>Plant>Kinds>Flower>Fabaceae

pea as plant
blue-purple flowers {pea, flower}.

pulse as plant
Peas, beans, and legumes {pulse, plant} have small white or yellow flowers.

acacia
small white or yellow flowers {acacia} {mimosa, plant}.

astragalus
Pulse herb has gum tragacanth {astragalus, herb} {milk vetch} (Astragalus gummifer).

broom as plant
yellow flowers {cytisus} {broom, cytisus}.

genista
yellow flowers {genista} {broom, genista}.

gorse
Spiny European shrubs {furze} {whin} {gorse} (Ulex) have sweet-smelling yellow flowers and black pods.

haricot as plant
white flowers {haricot, bean}.

jumping bean
Female Jumping Bean moths (Laspeyresia saltitans) lay eggs inside jumping-bean {jumping bean} ovary capsules.

kudzu
red or pink flowers in long clusters {kudzu}.

lupine
blue-purple flowers {lupin} {lupine}.

sweet pea
various color flowers {sweet pea} (Lathyrus odoratus).

vetch
white or pink or blue-purple flowers {vetch}.

wisteria
blue flowers in clusters {wisteria}.

BIOL>Botany>Plant>Kinds>Flower>Gentianaceae

gentian
blue-purple flowers with unique shape {gentiana} {gentian} {fringed gentian} {closed gentian} {bottle gentian}.

BIOL>Botany>Plant>Kinds>Flower>Geraniaceae

geranium flower
blue-purple or red or pink simple flowers {geranium} {cranesbill} {pelargonium} (Geraniaceae).

BIOL>Botany>Plant>Kinds>Flower>Gesneriaceae

African violet flower
purple flowers {saintpaulia} {African violet}.

gloxinia
African-violet related {gloxinia}.

BIOL>Botany>Plant>Kinds>Flower>Grossulariaceae

currant as plant
shrubs {currant, flower} (Grossulariaceae).

BIOL>Botany>Plant>Kinds>Flower>Gunneraceae

gunnera

Plants {gunnera} {giant rhubarb} can have four or five large round indented leaves on tall stalks, with small red flowers. They date from 93,000,000 years ago in Gondwana. They are symbiotic with Nostoc cyanobacteria.

BIOL>Botany>Plant>Kinds>Flower>Hamamelidaceae

witch hazel
yellow flowers with unique shape, shrubs {witch hazel} {hamamelis}.

BIOL>Botany>Plant>Kinds>Flower>Hydrangeaceae

hydrangea
white flowers in round clusters {hydrangea}.

BIOL>Botany>Plant>Kinds>Flower>Hydrophyllaceae

waterleaf family
{waterleaf family}.

BIOL>Botany>Plant>Kinds>Flower>Iridaceae

iris flower
blue-purple flowers with unique shape {iris, plant}.

crocus
short, hairy, perennial, blue-violet flowers {crocus}.

gladiolus flower
various color flowers {gladiolus, flower}.

BIOL>Botany>Plant>Kinds>Flower>Lauraceae

laurel
red or pink or white flowers in round cluster {laurel, flower}.

BIOL>Botany>Plant>Kinds>Flower>Leguminosae

bean family
beans (Caesalpiniaceae) (Fabaceae) (Mimosaceae) (Papilionaceae) {bean family}.

BIOL>Botany>Plant>Kinds>Flower>Lilicaea

lily flower
white or yellow or red-orange flowers {lilium} {lily} {wood lily} {yellow lily} {Canada lily} {mariposa lily} {sego lily}.

African lily
large blue or white round flowers with star blossoms {agapanthus} {African lily}.

calla lily
white flowers in cone shapes {calla lily}.

convallaria
white flowers in lily shapes {convallaria} {lily of the valley}.

daffodil
yellow flowers {daffodil}.

Easter lily
large white flowers {Easter lily}.

hyacinth
pink to purple flowers {hyacinthus} {hyacinth, flower}.

jonquil
yellow flowers {jonquil}.

mayflower flower
white flowers in long clusters {mayflower} {trailing arbutus}.

muscari
purple flowers {muscari} {grape hyacinth}.

narcissus flower
white flowers in clusters {narcissus}.

snowdrop
white flowers {galanthus} {snowdrop}.

snowflake
white flowers {leucojan} {snowflake}.

Soloman's seal
green flowers with unique shape {Soloman's seal} {polygonatum}.

spider plant
white flowers, Africa {spider plant} (Chlorophytum).

torch lily
orange flowers {kniphofia} {red-hot poker} {torch lily}.

tulip flower
red or yellow flowers {tulipa} {tulip}.

wood hyacinth
blue flowers {wood hyacinth} {Spanish bluebells} (Scilla) (Hyacinthoides).

BIOL>Botany>Plant>Kinds>Flower>Lilicaea>Agavaceae

agave
cactus-like, long spiny leaves, yellow flowers {agave} {mescal}.

century plant
long spiny leaves {century plant} {maguey}.

peyote plant
red-pink flowers {peyote plant} (Lophophora williamsii).

tuberose
white flowers {polianthes} {tuberose}.

BIOL>Botany>Plant>Kinds>Flower>Lobeliaceae

lobelia
blue-purple flowers in long clusters {lobelia} {great blue lobelia} {Indian tobacco}.

BIOL>Botany>Plant>Kinds>Flower>Lonicera

elderberry as plant
shrubs {elderberry}.

honeysuckle
pink or yellow flowers in round cluster {honeysuckle} {woodbine}.

viburnum
red flowers {viburnum} {Guelder rose} {snowball tree}.

weigela
red flowers {weigela} {diervilla}.

BIOL>Botany>Plant>Kinds>Flower>Loranthaceae

mistletoe
shrubs {mistletoe}.

BIOL>Botany>Plant>Kinds>Flower>Lythraceae

crape myrtle
shrubs {crape myrtle} {loosestrife family}.

BIOL>Botany>Plant>Kinds>Flower>Malvaceae

mallow flower
various color flowers {lavatera} {mallow}.

hibiscus
various color flowers {hibiscus} {rose mallow} {marsh mallow} {kenaf}.

hollyhock
perennial, purple flowers, wild mallow {althea} {hollyhock}.

BIOL>Botany>Plant>Kinds>Flower>Musaceae

banana family
bananas (Musaceae) {banana family}.

bird of paradise
large bird shape flowers {strelitzia} {bird of paradise}.

plantain as plant
green flowers with unique shape {plantain, flower}.

BIOL>Botany>Plant>Kinds>Flower>Myricaceae

myrtle
shrubs {myrtle}.

bayberry

deciduous, east North America, shrubs {bayberry} {wax myrtle} (Myrica pennsylvanica). Root bark contains drugs. Jamaica bayberry root bark makes bay rum.

BIOL>Botany>Plant>Kinds>Flower>Nyctaginaceae

bougainvillea
red flowers {bougainvillea} {four o'clock family}.

BIOL>Botany>Plant>Kinds>Flower>Nymphaeaceae

water lily
white or yellow flowers, water {water lily} {pond lily} {nymphaea}.

lily pad
white flowers, water {lily pad}.

lotus flower
white water flowers {lotus, flower}. Lotus leaves have surface cells with micron-size bumps and nanometer-size wax crystals, to repel water and so stay clean {lotus effect}.

BIOL>Botany>Plant>Kinds>Flower>Opuntia

cactus
succulent stems {saguaro} {nopal} {cactus}.

aloe as plant
Africa, succulent leaves, analgesic sap {aloe} (Aloe vera).

cholla
Cactus {cholla} can have cylindrical water-filled stems. It relates to prickly pear.

Christmas cactus
oval, top flowers {zygocactus} {Christmas cactus}.

Joshua tree
Large yucca trees {Joshua tree} can grow in Mojave desert and have spiky leaves.

prickly pear
Cactus {prickly pear} can have flat water-filled pads. It relates to cholla.

yucca
long pointed leaves {yucca} {Adam's needle} {Spanish bayonet}.

BIOL>Botany>Plant>Kinds>Flower>Orchidaceae

orchid
various color flowers with unique shape {orchid}.

cattleya
various color flowers with unique shape {cattleya}.

lady's slipper
yellow flowers with unique shape {lady's slipper} {cypripedium}.

BIOL>Botany>Plant>Kinds>Flower>Oxalidaceae

oxalis
pink or white flowers {oxalis} {wood sorrel}.

sorrel flower
yellow or red or pink simple flowers {sorrel, flower}.

wood sorrel family
{wood sorrel family}.

BIOL>Botany>Plant>Kinds>Flower>Paeoniaceae

peony
large flowers {peony} {paeonia}.

BIOL>Botany>Plant>Kinds>Flower>Papaveraceae

poppy flower
orange flowers {poppy, flower} {papaver} {field poppy}.

meconopsis
blue flowers {meconopsis} {blue poppy} {Himalayan poppy} {Welsh poppy}.

opium poppy
white flowers {opium poppy}.

BIOL>Botany>Plant>Kinds>Flower>Passifloraceae

passion flower
red flowers {passiflora} {passion flower}.

BIOL>Botany>Plant>Kinds>Flower>Piperaceae

pepper as plant
red berries then black pepper {piper} {pepper, plant}.

BIOL>Botany>Plant>Kinds>Flower>Polemoniaceae

phlox flower
pink or blue-purple flowers in round clusters {phlox} (Polemoniaceae).

Jacob's ladder
white flowers {polemonium} {Jacob's ladder}.

BIOL>Botany>Plant>Kinds>Flower>Primulaceae

primrose flower
yellow flowers in round clusters {primula} {cowslip, primrose} {primrose, flower} {polyanthus} {auricula}.

cyclamen
pink, red, lavender, or white flowers {cyclamen}.

evening primrose
yellow flowers {oenothera} {evening primrose} {sundrop}.

fuchsia flower
white and red flowers {fuchsia, plant}.

scarlet pimpernel
red small flowers, low-growing {scarlet pimpernel} {anagallis} (Anagallis arvensis) {pimpernel}.

BIOL>Botany>Plant>Kinds>Flower>Rafflesiaceae

Rafflesia
up to one-meter red flowers, rotten flesh smell, parasite, no roots, no stems, no leaves, no photosynthesis, pollinated by flies {Rafflesia}.

BIOL>Botany>Plant>Kinds>Flower>Ranunculaceae

buttercup
yellow simple flowers {buttercup}.

anemone as plant
white or pink simple flowers {anemone, plant} {windflower} {wood anemone} {poppy anemone} {flame anemone}.

clematis
yellow flowers {clematis}.

columbine flower
red-orange flowers with unique shape {columbine, flower} {aquilegia}.

helleborus
green flowers in long clusters {helleborus} {hellebore} {Christmas camelliarose} {beaten rose}.

hepatica
blue-purple flowers {hepatica} {liverwort, flower}.

larkspur
purple or yellow flowers in long clusters, perennial, palmate lobe or palmate divided {larkspur} {delphinium}.

trollius
yellow flowers {trollius} {globe flower}.

BIOL>Botany>Plant>Kinds>Flower>Rosaceae

rose flower
Roses {rosa} {rose, flower} {American Beauty rose} (Rosaceae) are at least 40 million years old. Egyptian rose is cabbage rose. European roses have strong smell and are hardy. Chinese tea roses have tea smell and are delicate. Hybrids are mixture and have various colors.

blackberry plant
white simple flowers, shrubs, thorns {blackberry, flower}.

bramble as rose
white or pink flowers, shrubs, thorns {bramble, plant} (Rubus).

cinquefoil
yellow flowers {cinquefoil} (Potentilla).

raspberry as plant
white simple flowers, shrubs {raspberry, flower}.

spiraea
white or pink flowers {spiraea}.

strawberry as plant
white simple flowers {strawberry, flower}.

sweetbriar
shrubs {sweetbriar}.

BIOL>Botany>Plant>Kinds>Flower>Rubiaceae

bedstraw flower
white or yellow flowers {bedstraw}.

woodruff
white or yellow flowers {woodruff}.

BIOL>Botany>Plant>Kinds>Flower>Rubiaceae>Madder

gardenia
white flowers {gardenia} {cape jasmine}.

madder
white flowers {madder}.

BIOL>Botany>Plant>Kinds>Flower>Rutaceae

rue flower
woody shrubs, temperate and tropical, includes citrus {rue, flower}.

burning bush
yellow-green flowers, leaves turn red in autumn {dictamnus} {burning bush}.

BIOL>Botany>Plant>Kinds>Flower>Salicaceae

willow flower
white oval flowers with fuzz {willow, flower}.

pussy willow
white or yellow oval flowers with fuzz {pussy willow}.

BIOL>Botany>Plant>Kinds>Flower>Sarraceniaceae

pitcher plant
brown-maroon flowers with unique shape, eats insects {pitcher plant} {nepenthus}.

BIOL>Botany>Plant>Kinds>Flower>Saxifragaceae

saxifrage flower
white flowers in long or round clusters {saxifraga} {saxifrage}.

BIOL>Botany>Plant>Kinds>Flower>Simmondsiaceae

jojoba
oil {jojoba} (Simmondsiaceae).

BIOL>Botany>Plant>Kinds>Flower>Solanaceae

tomato family
dicot {tomato, plant} {aubergine, potato family}.

nightshade plant
blue-purple flowers {bittersweet plant} {Belladonna, flower} {deadly nightshade} {henbane} {nightshade} {thornapple}.

physalis
green-yellow flowers with brown-purple centers {physalis} {Chinese lantern, plant}.

potato as plant
various color flowers {potato, plant}.

tobacco as plant
yellow flowers, tall, leafy, annual {nicotiana} {tobacco plant} (Nicotiana tobaccum).

BIOL>Botany>Plant>Kinds>Flower>Styracaceae

storax
white flowers {storax}.

BIOL>Botany>Plant>Kinds>Flower>Tamaricaceae

tamarisk
white or pale pink flowers {tamarix} {tamarisk}.

BIOL>Botany>Plant>Kinds>Flower>Taxaceae

yew flower
green or yellow flowers {yew, flower}.

BIOL>Botany>Plant>Kinds>Flower>Theaceae

camellia
white flowers {camellia} (Theaceae).

BIOL>Botany>Plant>Kinds>Flower>Trifolium

trefoil flower
yellow flowers {trefoil, flower}.

clover
white or red-orange flowers with unique shape, three-part leaves {clover} {red clover}.

shamrock
three-part leaves {shamrock}.

BIOL>Botany>Plant>Kinds>Flower>Trilliaceae

trillium
white or brown or red or pink simple flowers {trillium}.

BIOL>Botany>Plant>Kinds>Flower>Tropaeolaceae

nasturtium
white flowers {tropaeolum} {nasturtium} (Tropaeolum).

BIOL>Botany>Plant>Kinds>Flower>Typhaceae

cattail
perennial, marsh, creeping rootstock, long linear leaves {cattail}.

BIOL>Botany>Plant>Kinds>Flower>Urticaceae

nettle
green flowers with unique shape {nettle}.

BIOL>Botany>Plant>Kinds>Flower>Valerianaceae

valerian
small pink or lavender or white flowers {valerian}. It makes medicinal.

BIOL>Botany>Plant>Kinds>Flower>Veronica

veronica
light blue and white flowers {hebe} {veronica}.

BIOL>Botany>Plant>Kinds>Flower>Violaceae

violet
blue-purple simple flowers {viola} {violet, flower} (Violaceae).

pansy
yellow or violet flowers {pansy}.

BIOL>Botany>Plant>Kinds>Flower>Vitaceae

grape as plant
vine {grape, plant}.

creeper
vine {creeper}.

Virginia creeper
vine {Virginia creeper}.

BIOL>Botany>Plant>Kinds>Flower>Xerophyta

resurrection plant
Plants {resurrection plant} can come back after 95% dehydration (Xerophyta).

BIOL>Botany>Plant>Kinds>Flower>Zingiberaceae

ginger as plant
brown-maroon flowers with unique shape {ginger, flower}.

BIOL>Botany>Plant>Kinds>Herb

herb leaf
Herbs {herb, flower} have aromatic or flavorful flowers or leaves.

catnip
square stems, opposite leaves, flower clusters along stems {catnip} (mint family of Lamiaceae family).

chinchona
Bark {chinchona} can have quinine.

glycerrhiza glabra
Rhizomes {glycerrhiza glabra} can be licorice sticks.

rosemary as plant
pale blue flowers in clusters {rosmarinus} {rosemary, flower} (family Lamiaceae).

sage as plant
purple or yellow flowers in long clusters {salvia} {sage, plant} {clary}.

thyme as plant
purple flowers {thymus, plant} {thyme, plant}.

wild rose
Wild roses {wild rose} can make rosehips as fruits.

wintergreen as plant
heath {checkerberry} {wintergreen, flower} {gaywings wintergreen}.

wolfsbane
Poisonous herbs {aconitum} {monkshood} {wolf's bane} {wolfsbane} (Ranunculaceae) (Aconitus napelclus) can be aconite sources.

wormwood
Wormwoods {wormwood} {sagebrush wormwood} are stimulants and central-nervous-system poisons. They are in absinthe drinks.

BIOL>Botany>Plant>Kinds>Grass

grass
Grasses {grass} are short or tall. Grasses include aregrana, fescue, ryegrass, bluegrass, timothy, Bermuda, rice, wheat, sugarcane, corn, sorghum, millet, oats, rye, and barley. Grasses began 66,000,000 years ago.

bamboo
Woody grasses {bamboo} can have jointed, mostly hollow, stems.

blue grama grass
Bouteloua gracilis {blue grama grass} is cold-and-drought tolerant, for north North America plains.

buffalo grass
Buchloe dactyloides {buffalo grass} is drought tolerant for North-American short-grass prairie.

bulrush
tall grass-like sedge or marsh grass {bulrush}.

cheat grass
short grass {cheat grass}.

crabgrass
short coarse grass {crabgrass}.

flax and flower
white-flower grass {linum} {flax, grass} (Linaceae).

Indian corn
Dry medium-size cylinders {ear, corn} can have white, purple, red, and yellow kernels {Indian corn}.

pampas grass and flower
pink-flower grass {cortaderia} {pampas grass}.

reed
Swamp or marsh grasses {reed, plant}| can be tall with hollow stems.

sedge
wetland grass {sedge}|.

BIOL>Botany>Plant>Kinds>Grass>Lawn

bahia grass
Paspalum notatum {bahia grass} is tough, coarse, and drought-and-shade tolerant, for southeast USA.

bent grass
Creeping Agrostis stolonifera {bent grass} is short, soft, fine, and perennial, for northern putting greens.

Bermuda grass
Cynodon dactylon {Bermuda grass} {devil grass} is short, soft, and heat-and-drought tolerant, for Sun Belt and sport fields.

bluegrass
Poa pratensis {bluegrass, lawn} {Kentucky bluegrass} is cold-tolerant, short, and soft and is the most-popular lawn grass in northeast and north-central USA.

centipede grass
Eremochloa ophiuroides {centipede grass} is acid tolerant, for southeast USA and Hawaii.

fescue fine
Grasses {fescue, fine} can be short, soft, and fine-leaved or needle-leaved. Chewings fescue is Festuca rubra commutata and is sand and acid tolerant. Creeping red fescue is Festuca rubra. Hard fescue is Festuca longifolia and is short and cold tolerant.

fescue tall
Festuca arundinacea {fescue, tall} is tall or broad-leaved, is heat and drought tolerant, and used in tough and coarse pasture grass.

ryegrass annual
Lolium multiflorum {ryegrass, annual} is annual used in southern regions but is not heat tolerant.

ryegrass perennial
Lolium perenne {ryegrass, perennial} is fine and soft.

seashore paspalum
Paspalum vaginatum {seashore paspalum} is from South-African sand dunes, is like Bermuda grass, and is for salty soil.

St. Augustine grass
Stenotaphrum secundatum {St. Augustine grass} grows fast and is coarse, for south and west USA.

zoysia grass
Grasses {zoysia grass} can be stiff Japanese lawn grass (Zoysia japonica), stiff and flat Manila grass (Zoysia matrella), and wiry fine Korean grass (Zoysia tenuifolia).

BIOL>Botany>Plant>Kinds>Tree

ailanthus
Trees {ailanthus} {tree of heaven} {stinkweed} can live in Asia, have pinnate compound leaves, have yellow and crimson samaras in masses, have yellow-green flower clusters, and have sexes on different trees.

alder
Trees {alder} can have catkins and strobiles, live in wet areas, and be deciduous: red alder or Oregon alder or western alder, black alder, and common alder.

ash tree
Trees {ash tree} can be tall, have compound pinnate leaves, have samara clusters, and have sexes on different trees: European ash, white ash, flowering ash, blue ash, green ash or red ash or swamp ash or river ash or water ash, black ash, and Oregon ash.

birch
Trees {birch} can have little upright seed filled cones {strobile}, have catkins, have white or other-colored bark, be deciduous, and relate to alders. Birches include gray birch or poplar, paper birch or white birch, yellow birch or silver birch or swamp birch, Japanese birch, weeping cut-leaf European birch, red birch or river birch or water birch, and black birch or sweet birch or cherry birch. Sweet birch has wintergreen aroma.

buttonbush
Trees {buttonbush} can be shrubs, like wet ground, have curving crooked branches and shiny leaves, and have tiny cream-colored flowers on stalks in round two-centimeter clusters, which turn into brown spherical seed clusters.

catalpa
Trees {catalpa} can be medium height, have big broad leaves, have white or pale-blue bell-shaped flower clusters, and have long thin seedpods with many winged seeds: common catalpa or Indian bean, catawba-tree or northern catalpa or hardy catalpa, yellow catalpa, western catalpa, and related princess-tree or Paulownia.

chaste-tree
Trees {chaste-tree} can be vitex agnus-castus and vitex negando incisa.

cork plant
Mediterranean evergreen oak trees {cork plant} {cork oak} can have thick bark.

dogwood
Trees {cornus} {dogwood} can have four-petal white flowers and red drupes: flowering dogwood, red-osier dogwood, Pacific dogwood, rough dogwood, and blue-fruited dogwood.

elder tree
Trees {elder tree} can have compound leaves and white flower clusters that turn into red berries: common elder, red-berried elder, and elderberry.

elm
Trees {elm} can have seed wafers and hairs on upper leaf surfaces. They are susceptible to Dutch elm disease. Elms include Scotch elm, English elm, slippery elm or red elm or gray elm, American elm or white elm, rock elm, and Chinese elm. Oaks, elms, and maples have simple leaves and not many leaflets on one stalk. Cherries, elms, lindens, and many other trees have leaves all along twig {compound leaf}.

eucalyptus

Trees {eucalyptus} {blue gum} can have willow-like leaves, be evergreen, have bark that peels, come from Australasia, and live in south and west USA.

golden-chain

Trees {golden-chain} {laburnum} can be like fragrant sumac.

hickory

Trees {hickory} can have edible nuts, have compound leaves {pinnate leaf, hickory}, have both sexes on same tree, and live in east USA: shagbark hickory, shellbark hickory, bitternut or swamp hickory, pignut or red hickory, mockernut or whiteheart or bullnut, and pecan.

holly

Trees {holly} can have red berries, have dark green leaves, be usually shrubs, be evergreen, and like moist areas in east USA: American holly, European holly, and black alder or winterberry.

jatropha

Shrubs {jatropha} can have large seeds that have up to 40% poisonous oil and grow in dry conditions in Tanzania and Mali.

linden

Trees {linden} {basswood} can have yellow or cream flower clusters, hanging from narrow, leaf-like structures {bract}, which turn to fragrant nutlets, and often have red twigs and buds: European linden, heart-leaved linden, broad-leaved linden, white linden, American basswood, and white basswood. Lindens live in Europe and basswoods in USA. Cherries, elms, lindens, and many other trees have leaves all along twig.

locust tree

Trees {locust, tree} can have flat leathery mahogany-colored or red-brown various-length seedpods, be tall, have doubly compound or compound leaves, and have white flowers. Locusts include black locust or common locust or yellow locust, honey locust or honey shuck, pagoda tree, yellowwood or virgilia, and Kentucky-coffee-tree. Honey locust has honey-like pulp, in pods, and compound thorns. Locusts are legumes.

magnolia tree

Trees {magnolia, tree} can live in southeast USA, have leathery shiny green leaves that stay on all year, have large white flowers, have red fruiting cones, and like wet areas. Magnolias include true magnolia or Southern magnolia or great-flowered magnolia, saucer magnolia, sweet bay or white bay {laurel, tree} {bay laurel} {bay tree} or swamp magnolia, cucumber-tree, and umbrella-tree.

maple tree

Trees {maple tree} can have leaves with three or five lobes opposite each other on branchlets, have double samaras, and have greenish yellow or red flowers.

types

Maples include hard maple {sugar maple}, red maple or swamp maple, silver maple or white maple or soft maple, sycamore, mountain maple, hedge maple, big-leaf maple, Norway maple, striped maple, black maple, and box-elder or ash-leaved maple.

Sugar maple makes maple syrup juice.

elder

Maples {box elder} {ash-leaved maple} can have compound leaves and sexes on different trees.

leaves

Oaks, elms, and maples have simple leaves and not many leaflets on one stalk. Maple, ash, and viburnum leaves always grow in pairs.

mesquite

Small desert trees {mesquite} of Fabaceae or legume family make beans. Mesquite bean meal {pinole} can be food.

mountain ash

Trees {mountain ash} can have compound leaves, have white flower sprays in round clusters, have red berry clusters, be shrubs or small trees, and live in northeast North America: American mountain ash or rowan-tree or mountain sumac, and European mountain ash. Maple, ash, and viburnum leaves always grow in pairs.

mountain laurel

Trees {mountain laurel} {California laurel} {Oregon myrtle} can have medium height, live on USA west coast, be evergreen, have green yellow plum-like drupes, and have camphor-like odor. Laurels are usually tropical.

oak

Trees {oak} can include white oak or Oregon oak or Garry oak or California oak or swamp oak, English oak, chinquapin oak, swamp chestnut or basket oak, chestnut or rock oak, bur oak or mossy-cup, post oak or iron oak, live oak, blackjack, and overcup.

types

White oaks have acorns that mature every season, have many-lobed leaves with no bristles, are tall, are broad, and have catkins.

Live oaks have leaves that have no lobes and fall off in spring: emory oak, canyon live oak, coast live oak, and live oak.

Black or red oaks have acorns that mature in second year and have many-lobed leaves with bristles: black oak or yellow oak, red oak or Northern oak or swamp oak or Southern oak, pin oak, Shumerd oak, scarlet oak, cork oak, willow, laurel, shingle oak, and water oak.

Tanoaks or tanbark oaks are evergreen, grow slowly, make tannin, have both sexes on same tree, come from southeast Asia, and relate to oaks and chestnuts.

Willow oaks and shingle oaks are rare.

leaves

Oaks, elms, maples have simple leaves and not many leaflets on one stalk. Oaks and some magnolias and dogwoods have leaves at twig tips.

palmetto

Trees {palmetto} can have one trunk, have top fronds, and live on USA southeast coast.

plane tree

Trees {plane tree} can have bark with brown, cream-white, and pale-green spots on trunk and white spots on small branches. Plane trees are tall and large, like moist areas, have leaves like large maple leaves, have two-centimeter spherical brown seed clusters, and live in east and middle USA. Plane trees include American sycamore or plane tree or buttonwood, California sycamore {sycamore}, and London plane tree.

poplar

Trees {poplar} can grow fast, have broad leaves with flat petioles that allow shimmering, and have catkins: silver poplar, simon poplar, white poplar, Lombardy poplar, California poplar or black cottonwood, Eastern poplar or Eastern cottonwood. Lombardy poplar is most common. Poplars {aspen} can be American aspen, quaking aspen or golden aspen, large-toothed or big tooth aspen, and cottonwood or balsam poplar or tacamahac poplar or balm-of-Gilead.

redbud

Trees {redbud} {Judas tree} can be legumes, have red buds, have rose or purple flowers, have seedpods with eight-centimeter beans, and be shrubs.

rosewood

Trees {rosewood} can have red wood.

sassafras tree

Trees {sassafras tree} can have mitten-like leaves, small yellow flowers, blue fruits, red stems, and sassafras aroma. Sexes are on different trees.

service-tree

Trees {service-tree} {serviceberry} {shadbush} can have white flowers with five petals, have purple berries, be usually shrub, and live in east USA.

sourwood
Trees {sourwood} {sorrel-tree} can live in southeast USA, have lily-of-the-valley-like flowers, have lustrous long leaves, and belong to heath family.

spicebush
Trees {spicebush} can have waxy little yellow flowers, be shrubs, have red drupes, have citronella odor, and be in clumps.

sumac tree
Trees {sumac} can have compound leaves and milky sap. Varieties with shiny leaves and drupe clusters can irritate skin. Sumacs include shiny sumac, staghorn, smooth sumac, dwarf sumac or wiry-rib, and poison sumac, poison ivy, and poison oak.

sweet-gum
Trees {sweet-gum} {bilsted} can be tall, live in southeast USA, have star-shaped leaves, have sticky ooze, have smooth bark, have many pointed two-centimeter seed-capsule spheres on thin stalks, and have both sexes on same tree.

tulip tree
Tall, big, and straight trees {tulip tree} {yellow poplar} can have large flowers with green petals with orange inner parts with yellow rings, have samara clusters, and have leaves that turn gold in late summer.

tupelo
Trees {tupelo} {black tupelo} {sourgum} {sour gum} {black gum} {hornpipe tree} can be medium height, live in east USA, like wet ground, have lustrous green leaves, have oval blue-black small drupes, and have sexes on different trees. Tupelos relate to cotton gum, water tupelo, or south-USA swamp gum.

wafer ash
Trees {wafer ash} {hoptree} can be shrubs or small trees with circular-samara clusters and three compound leaves.

western soapberry
Trees {western soapberry} can live in southwest USA, have yellowish drupes in clusters, have compound leaves, and have white flowers.

willow tree
Trees {willow, tree} can have cylindrical pollen holders {catkin}, have long narrow leaves, and like moist ground. Willows include fast-growing weeping willow from China, purple willow, black willow or swamp willow, sandbar, glaucous willow, shiny willow, heart-leaf willow, goat willow or pussy willow, and peach-leaf willow.

witch-hazel tree
Trees {witch-hazel tree} can be slanting shrubs or small trees, live in east USA, have four yellow ribbon-petal flowers, have nutlets, and make witch hazel.

BIOL>Botany>Plant>Kinds>Tree>Fruit

apple tree
white flowers {apple, flower}.

banyan
Fig trees {banyan} grow in India.

baobab
African and Australian trees {baobab} can have trunks that store water and hanging fruits like gourds.

breadfruit tree
Malaysian evergreens {breadfruit} can have large yellow fruits.

china berry
Trees {china berry} {Pride-of-India tree} can have double compound leaves and purple or lilac drupes in clusters.

crabapple tree
Trees {malus} {crabapple tree} include wild crabapple and Iowa crabapple, with pink and white flowers. Hawthorns and crabapples are similar.

fig tree
white, pink, purple, or crimson flowers {ficus} {fig, tree} (Adenium).

guava tree
Small evergreen trees {guava} produce ovoid fruits.

hackberry tree
Trees {hackberry} {sugarberry} can have purple drupes when ripe.

mulberry tree
Trees {mulberry} can have mulberries and have milky juice. Mulberries include white mulberry in China, paper mulberry, and red mulberry. Osage-orange or bowdeck has orange bark, thorns, sexes on different trees, and green-yellow seven-centimeter to twelve-centimeter spherical fruit masses.

orchard tree
Trees {orchard tree} can include apple, quince, pear, peach, cherry, apricot, and almond. Bud growing strength, prevailing winds, and nearby tree positions affect tree shape.

persimmon tree
Trees {persimmon, tree} can be smooth, have round orange-colored fruits with red seeds, have shiny leaves, have corrugated bark, have medium height, and live in south, middle, and west USA. Red seeds are edible just after cold weather starts.

prunus tree
Prune-related trees {prunus} include almond, cherry, peach, and plum.

wild berry tree
Cherry trees {cherry tree} include wild cherry or black cherry or rum cherry, choke cherry, bird cherry or fire cherry or pin cherry, sour cherry, Mahaleb cherry, and Cornelian-cherry. Cherry trees have red or black cherries, are short trees or shrubs, and have white flowers.

leaves
Cherries, elms, lindens, and many other trees have leaves all along twig.

berries
Other berry trees {wild berry tree} are wild plum, dwarf cornel or bunchberry, silky cornel or kinnikinnick, sweet haw or black haw, sweet viburnum, nannyberry, southern arrowwood, and maple-leaved viburnum. Viburnum is usually shrub, has opposite leaves, has cap-like five-petal white-flower clusters on eight stalks on one twig, and has small blue drupes. Maple, ash, and viburnum leaves always grow in pairs. Arrowwoods like wet ground.

BIOL>Botany>Plant>Kinds>Tree>Nut

beech
Trees {beech} can have smooth tight light gray bark, be tall, have small beechnuts, have both sexes on one tree, have fluffy staminate-flower clusters, and live in east USA: American beech and European beech. Chestnuts and beeches are similar.

bladdernut
Trees {bladdernut} can be small east-USA trees or shrubs, with three compound leaves and three-lobed seedpods.

buckeye
Trees {buckeye} can have palmate compound leaves, upright flower clusters, and spherical pods with one nut: Ohio buckeye, sweet buckeye or yellow buckeye or large buckeye, and southwest-Asia horse-chestnut.

buckthorn
Trees {buckthorn} {wahoo} {cascara} {bearberry} {bearwood} {coffee tree} can have medium height, like moisture, have small black drupes, and live on USA west coast.

chestnut tree
Trees {chestnut, tree} can have large chestnuts and pointed staminate-flower clusters: European chestnut or copper chestnut, American chestnut, and Japanese chestnut. Chestnuts and beeches are similar. They have almost died out from imported fungus.

Chinese buckeye
Trees {Chinese buckeye} can include golden-rain-tree and Chinese buckeye.

European hazelnut
Trees {European hazelnut} {filbert, tree} can be rare.

haw
Trees {haw} {hawthorn} (Crataegus) can have thorns, be shrubs or small trees, have twisted branches, have white or pink five-petal flowers, have fruits like rosehips, and live in east North America. Rosehips can be red, orange, or yellow. Haws include dotted-thorn, English hawthorn, cockspur-thorn, Washington-thorn, common red haw or hawthorn or haw, pear haw, and mush haw. Hawthorns and crabapples are similar.

hazel
Australia {hazel}.

horse chestnut
Large trees {horse chestnut} can make white flowers in spring in candle shapes and make green fruit in fall that contain seeds {conker}.

jujube shrub
Date trees {jujube tree} {red date} {Chinese date} can have drupe fruits (Ziziphus).

kola
Trees {kola} can have kola nuts.

litchi nut
Soapberry plants produce red fruits {litchi nut} with sweet white insides.

pawpaw
Trees {pawpaw, tree} can be shrubs or small trees, live in east USA, and have purple flowers and crumpled pouches with green, then brown, edible fruit.

pignut hickory
East-USA trees {pignut hickory} {sweet pignut} {coast pignut} {smoothbark hickory} {swamp hickory} {broom hickory} can make pear-shaped nuts.

walnut tree
Trees {walnut, tree} can have hard edible nuts, oblong for butternut and round for walnut, and compound leaves {pinnate leaf, walnut}: black walnut, English walnut or Persian walnut, and butternut or white walnut.

BIOL>Botany>Plant>Kinds>Tree>Rare

Amur cork tree

rare {Amur cork tree}.

European smoke tree
rare {European smoke tree}.

fringe-tree
rare {fringe-tree}.

groundsel-tree
rare {groundsel-tree}.

hardy-mahogany
rare {hardy-mahogany}.

hercules-club
rare {hercules-club}.

katsura tree
rare {katsura tree}.

prickly ash
rare {prickly ash}.

rose-of-Sharon
rare {rose-of-Sharon, tree}.

silver-bell-tree
rare {silver-bell-tree}.

silverberry
rare {silverberry}.

zelkova
rare {zelkova}.

BIOL>Botany>Plant>Kinds>Tree>Tropical

balsa
American tropics have trees {balsa} with light soft wood {corkwood}.

brazilwood
Tropical pea trees {brazilwood} can have red wood.

mahogany
Tropical trees {mahogany} can make reddish hard wood.

mangrove
Small trees {mangrove} can grow on coasts {mangal} in shallow water.

rubber plant tree
Mulberry-family trees {rubber plant, tree} can be from Asia and North Africa.

sandalwood
Southeast Asian trees {sandalwood} can make sweet smelling wood.

teak

Spurge trees {teak} {African teak} {African oak} (Verbenaceae) can make heavy wood.

BIOL>Botany>Plant>Kinds>Tree>Tropical>Palm

areca palm
palms {areca palm}.

assai palm
palms {assai palm}.

coconut palm
Smooth-barked tropical trees {coconut palm} can grow 20 to 30 meters high, have one trunk, have ring scars where leaves fell off, and have large drupes.

date palm
Palm trees {date palm} {palm tree} can have bark covered with leaf sheaths, grow 20 to 30 meters high, have one trunk, and have date clusters.

BIOL>Botany>Plant>Kinds>Weed

weed
Weeds {weed} are fast growing flowers.

chick weed
white simple flowers {chick weed}.

hopweed
yellow flowers {hopweed} {cow parsley} {keck}.

ironweed
red or pink flowers in round clusters {ironweed}.

joe-pye weed
pink flowers {joe-pye weed}.

locoweed
Weeds {locoweed} can be poisonous to animals.

pokeweed
white flowers in long clusters, monocot {pokeweed} (Phytolaccaceae).

ragweed
green flowers {ragweed}.

sargasso
Ocean plants {sargasso} can be kelp-like.

BIOL>Botany>Plant>Kinds>Crop

crop
Crops {crop} are typically grasses. Rye, oats, turnips, radish, beets, leeks, and lettuce started as weeds.

alfalfa
grass {alfalfa}.

burley

tobacco {burley}.

cabbage plant
Ancient cabbage {cabbage} became cabbage, kale, kohlrabi, Brussels sprouts, cauliflower, and broccoli.

cacao plant
Seeds make chocolate, cocoa, and cocoa butter {cacao, chocolate}.

cotton plant
Plants {cotton} (Malvaceae) can have seeds surrounded by soft white fibers.

cover crop
Plants {cover crop} that hold soil and retain water can cover farmland.

fiber plants
Fiber plants {fiber, plants} include flax in Mesopotamia. Flax seeds have linseed oil. Hemp is in China. Cotton is in Mesoamerica, Andes, Sahel, and India. Yucca is in Mesoamerica. Agave is in Mesoamerica.

fodder
Hay and cereals are food {fodder} for farm animals.

goober
peanut {goober}.

hemp plant
Tall plants {hemp} can make fibers.

kale plant
Cabbages {kale, plant} can have loose leaves.

melon plant
Melons {melon} include muskmelon in Mesopotamia; squash in Mesoamerica, Andes, Amazon, and east USA [-2000]; watermelon in Sahel; bottle gourd in Sahel; and cucumber in India.

rick
hay or straw stack {rick}.

sisal
Plant leaves can make fibers {sisal}.

tamarind plant
Pods can have acidic pulp {tamarind}.

BIOL>Botany>Plant>Kinds>Crop>Cereal

cereal crop
Cereals {cereal crop} {grain crop} {crop, grass} are grasses.
wheat
Emmer wheat was in Mesopotamia. Einkorn wheat was in Mesopotamia. Wheat was in Mesopotamia.
barley
Barley was in Mesopotamia. Little barley was in east USA [-500].
rice
African rice was in Sahel. Rice was in China.
millet
Pearl millet was in Sahel. Foxtail millet was in China. Broomcorn millet was in China. Finger millet was in Ethiopia.
corn

Corn was in Mesoamerica. Corn and wheat have phytate, which binds iron and calcium. Corn has low niacin. Different corn strains lack an essential amino acid.

other

Cereals include sorghum in Sahel, teff in Ethiopia, maygrass in east USA [-500], knotweed in east USA [-500], sumpweed in east USA [-2000], goosefoot in east USA [-2000], sunflower in east USA [-2000], and sugar cane in New Guinea. Sumpweed relates to daisy. Goosefoot relates to spinach.

seed

Quinoa from Andes mountains is not cereal, It has seeds with all eight essential amino acids.

grist

Mills can grind cereal grains {grist}.

groats

hulled and crushed oats {groats}.

sheaves

Workers bundle and tie cut grain stalks {sheaves}.

wild rice

Water grass makes brown seeds {wild rice}.

BIOL>Botany>Plant>Kinds>Crop>Root

cassava plant

Roots {cassava, root crop} can make tapioca.

root vegetable

Root vegetables {root vegetable} include jicama in Mesoamerica, manioc or cassava in Andes and Amazon, sweet potato in Andes and Amazon, potato in Andes and Amazon, oca in Andes and Amazon, African yam in Sahel, Jerusalem artichoke in east USA, yam in New Guinea, and taro in New Guinea.

taro plant

Starchy roots {taro} (Araceae) can be edible.

BIOL>Botany>Plant>Kinds>Crop>Forage

forage crop

Crops {forage, crop}| can feed ruminants. They are typically herbaceous perennials that are dormant in cold, hot, or dry seasons. Forage crops can be annuals, such as Sudan grass, millet, corn, sorghum, and other legumes and grasses. Ruminants can digest forage cellulose, hemicellulose, and lignin. Forage crops occupy five times more land than human grain crops.

green chop

Forage can be fresh and chopped {green chop}.

hay

Forage can be dry {hay}|.

haylage

Forage can be dry silage {haylage}.

silage

Forage can be finely chopped and stored in silos to ferment {silage}|.

BIOL>Biology>History>Botany

Luther Burbank [Burbank, Luther]
biologist
USA
1871 to 1921
Burbank potato [1871]; Shasta daisy [1901]; July Elberta peach [1905 to 1910]; Santa Rosa plum [1905 to 1910]; Flaming Gold nectarine [1905 to 1910]; How Plants Are Treated to Work for Man [1921]
He lived 1849 to 1926 and developed new plant varieties.

George Washington Carver [Carver, George Washington]
biologist/inventor
USA
1896 to 1923
peanut products [1897 to 1930]; crop rotation [1897 to 1930]
He lived 1864 to 1943 and developed soil improvements and new peanut, soybean, and cotton uses. He rotated peanuts with cotton.