CROP PRODUCTION

Crop Plant Classification and Identification

Scientific Classification

- Carl Linnaeus – A Swedish botanist developed this system
- Latin was written language of science, so it is now used to name species
- All crops are part of the plant kingdom and *Magnoliophyta* division
- The “class” divides plants into *Lilliopsida* (monocot) and *Magniopsida* (dicot)

Important Crop Families

- **Bean/legume family:** *Fabaceae*—15,000 species

  (alfalfa, soybeans, clover, pea, peanut)

- **Grass family:** *Poaceae*—8,000 species

  (wheat, rice, barley, maize, sorghum)

Other Important Plant Families

- **Mustard:** ***Brassicaceae*** **– cabbage, mustard, rape**
- **Potato:** ***Solanaceae*** **– tobacco, tomato**
- **Sunflower:** ***Asteraceae*** **– safflower**
- **Mallow:** ***Malvaceae*** **– cotton, kenaf**
- **Lily:** ***Liliaceae*** **– garlic, onion**





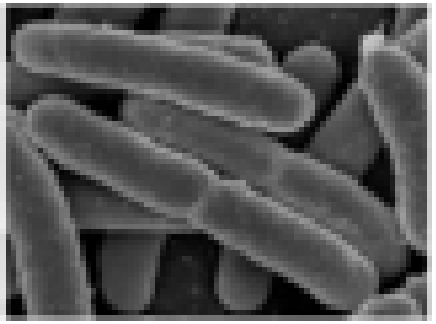
Binomial Nomenclature

- **Bi** = two (2) **-nomial** = names
- First name is genus and second name is species ; such as *Triticum*
- Know binomial names for the following plants *Triticum durum…. ---* look→

Some Binomial Nomenclature Examples :

- Barley: *Hordeum vulgare*
- Oats: *Avena sativa*
- Rye: *Secale cereale*
- Wheat: *Triticum aestivum*
- Peanut: *Arachis hypogaea*
- Potato: *Solanum tuberosum*
- Cotton: *Gossypium hirsutum*
- Alfalfa: *Medicago sativa*
- Smooth Bromegrass: *Bromus inermis*
- Maize: *Zea mays*
- Rice: *Oryza sativa*
- Sorghum: *Sorghum bicolor*
- Bean: *Phaseolus vulgaris*
- Soybean: *Glycine max*
- Sugarcane: *Saccharum officinarum*
- Tobacco: *Nicotiana tabacum*
- Red Clover: *Trifolium pratense*
- Kentucky Bluegrass: *Poa pratensis …*

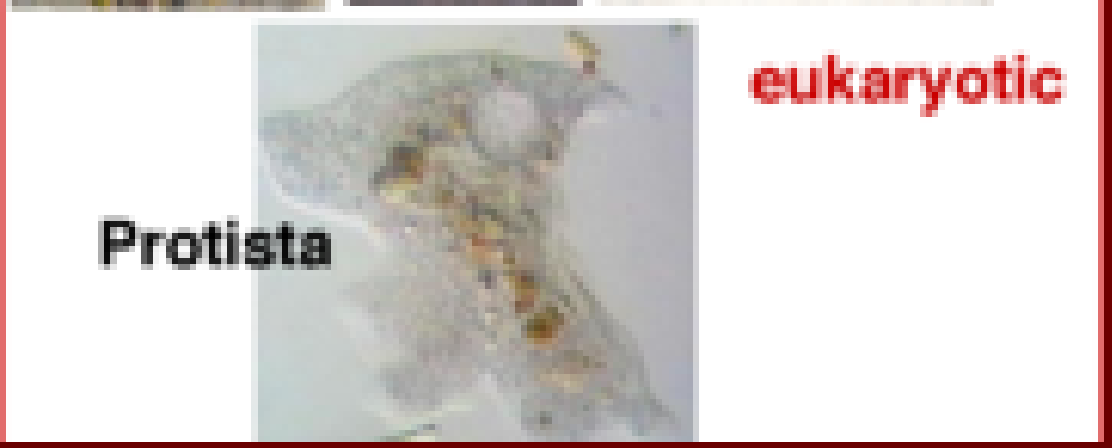
Other Categories of Life….



prokaryotic

Monera

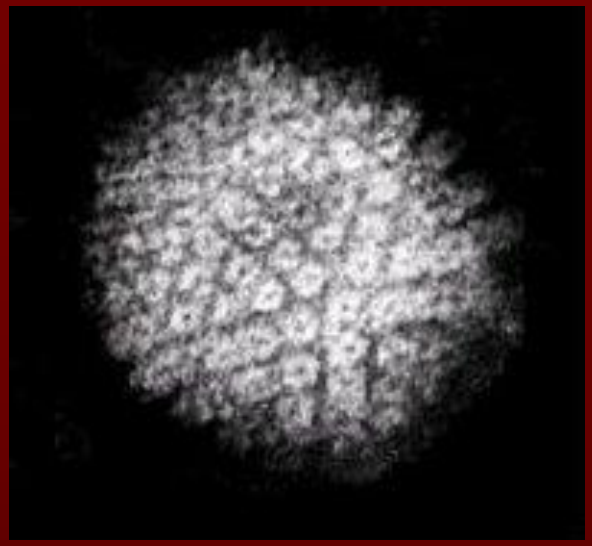
- Bacteria – simple interior organization, lack compartmentalization and membrane bound organelles, and reproduce by binary fission – simple cell division
  - Nutrient recycling and breakdown of residues, pesticides, and wastes
  - Causative agent for diseases
  - Improvement of soil structure through OM decomposition
  - Nitrogen fixation
  - Disease organisms of weeds and insects, acting as natural control



- Algae and other organisms– unicellular and multicellular organisms; some can conduct photosynthesis (not all)
  - Basis of aquatic foodchains
  - Contribute to overall health of aquatic systems

No photosynthesis, saprophytic or parasitic feeding, and reproduce by one of three ways (fission, budding, spores)

- Ecological recycling
- Causative agents for disease
- Improvement of soil structure through OM decomposition
- Natural control of insects and weeds
- Food utilization in positive (flavor enhancement) and negative (spoilage) ways
- Help with mineral uptake by plants (mycorrhizal association)



Viruses

Not always regarded as “living” but have importance to ag in two ways:

- Causative agents of disease
- Natural control of insects, weeds, and diseases

Place of Origin

- Eight centers of origin; know crops originating from following places
  - China: soybean
  - India: rice
  - Central Asia: wheat
  - Middle East: alfalfa & small grains
  - Mediterranean: white clover
  - Ethiopia: sorghum
  - Central America: maize
  - South America: potato

Plants are known as indigenous (being native to an area) or exotic (being introduced to an area)

Crops Native to the Western Hemisphere

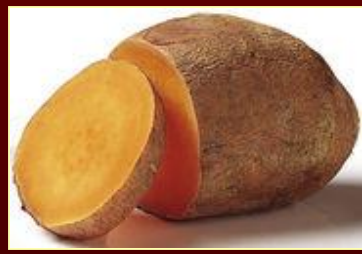
- Grasses
- Maize
- Cotton
- Peanut
- Pumpkin
- Tomato
- Sunflower
- Potato
- Sweet potato
- Tobacco












Classification by Use

- **Grain:** cereal, small grains, and pulse
- **Forage:** hay, silage, and greenchop

Classification by Use (cont.)

- Specific Use:
  - **Companion:** "nurse"—help with erosion control and weed growth—seed w/other crop
  - **Cover:** protect soil and wildlife habitat
  - **Green manure:** incorporated into soil to improve fertility
  - **Seed:** produce seed for planting
  - **Trap:** attract insects/parasites
  - **Oil:** high oil content/properties
  - **Fiber:** paper/textile industries
  - **Root and tuber:** desirable food products
  - **Sugar:** juice w/high sucrose
  - **Drug/medicinal/stimulant:** extracts for purposes
  - **Biofuel:** direct combustion or converted to liquid

Classification by Use (cont.)

- Classifications and terms used in cropping systems
  - Crop selection across years
    - Crop rotation—yearly planned succession over years
    - Fallow—uncropped, free of weeds to conserve moisture and fertility
    - Monoculture—repeat crop on the same field
  - Pertaining to arrangement
    - Single cropping—one crop per field
    - Multiple cropping—sequential and intercropping

Life Cycle

- Annuals—one year
  - Spring—utilize spring months for growth/maturation; harvest early summer
  - Summer—utilize summer months for growth/maturation; harvest in fall
  - Winter—utilize parts of two growing seasons; plant fall, winter vernalization, summer harvest
- Biennials—two growing seasons
- Perennials—indefinite life period

Identification

- Vegetative plant ID characteristics—broadleaves:
  - Simple or compound leaves
  - Blade/leaflet shape
  - Blades or margins
  - Leaf attachments—sessile, petioled, amplexical (clasping), or decurrent
  - Leaf arrangements—alternate, opposite, (also whorled)

Identification (cont.)

- Vegetative plant ID characteristics—grasses
  - Vernation—folded or rolled
  - Sheath—split, overlapping margins or closed
  - Ligule—absent, membranous, or fringed (hairs)
  - Auricles—large, small, and absent

Identification (cont.)

- Common flower types
  - Grass
  - Composite
  - Simple
  - Leguminous

Identification (cont.)

- Inflorescence types
  - Spike
  - Raceme
  - Panicle
  - Umbel
  - Head

Identification (cont.)

- Common field crops—be able to ID plants and seeds as indicated by the instructor
  - Field Crops—divide list among class and complete the table
  - Forages—divide list among class and complete the table

Identification (cont.)

- Common forage grasses—useful seed ID characteristics
  - Glumes
  - Lemma—size, shape, texture, color, number of nerves and others
  - Palea
  - Rachilla—length, shape, pubescence, and nature of abcission or fracture

Identification (cont.)

- Common forage grasses—seed ID
  - Timothy
  - Sorghum
  - Orchard grass
  - Tall fescue
  - Smooth bromegrass
  - Reed canary grass
  - Kentucky bluegrass
  - Ryegrass

Identification (cont.)

- Common forage legumes—flowering plant ID
  - Inflorescence—raceme, head, or umbel; irregular flowers and may require insect pollination
    - Standard 5 petals and 10 stamens
  - Serrated leaflet—notches or slits in the leaflet margin
  - Petiolule—attaches leaflets to petiole
  - Pubescence—hair-like projections

Identification (cont.)

- Common forage legumes—flowering plant ID
  - Glabrous—no pubescence
  - Raceme—flowers attached to a pedicel (attached to rachis)
  - Head—individual flowers fastened close together to give continuous appearance
  - Umbel—inflorescence in which pedicels arise from same level

Identification (cont.)

Common forage legumes—flowering plant ID

- Forage legumes—divide list among the class and complete the table

Identification (cont.)

- Common forage legumes—useful seed identification characteristics
  - Color
  - Size
  - Texture
  - Shape

Identification (cont.)

- Common forage legumes—seed ID
  - Alfalfa
  - Red clover
  - White (ladino) clover
  - Birdsfoot trefoil
  - Sweet clover
  - Alsike clover
  - Korean Lespedeza