CH12 - Food, Soil, and Pest Management

Soil

- Mature soils are arranged in a series of zones called soil horizons. A cross-sectional view of the horizons is called a profile.
  - _____ horizon, surface litter
  - A horizon, topsoil
  - B horizon, subsoil
  - C horizon, _____ material
- The soil triangle is a graphical representation of the different soil texture, which in turn helps determine soil _____ and permeability. The three main soil types are clay, sand, and silt. An equal measure of clay, sand, silt and humus results in a _____.

Soil Conservation

- Soil conservation involves reducing soil erosion and restoring soil fertility. Various methods may be used:
  - minimum-_____ farming - use of special tillers that break up and loosen the subsurface soil without turning over the topsoil
  - no-till farming - use of special planting machines that inject seeds, fertilizers, and herbicides into slits made in the unplowed soil
  - _____ - creation of broad, nearly level terraces on steep slopes
  - contour farming - plowing and planting of crops across, rather than up and down, a gentle slope
  - strip cropping (intercropping) - alternating rows of one crop with another
  - alley cropping (agroforestry) - alternating rows of crops with trees or shrubs
  - _____ reclamation - planting quick-growing plants in gullies that form at the bottom of slopes to catch and hold sediment
  - windbreaks or shelterbelts - plant trees along cultivated land to block wind

Restoring Soil Fertility

- Fertilizers partially restore plant nutrients lost.
  - organic fertilizers - three types of plant and animal material: animal manure - _____!, green manure - fresh vegetables, and compost - created by layers of nitrogen wastes, carbon wastes, and topsoil
  - commercial inorganic fertilizers - manmade fertilizer with forms of nitrogen, _____ and potassium

Effects of Agriculture

- Agriculture has a greater harmful impact on air, soil, water, and biodiversity resources than any other human activity. Impacts include biodiversity loss (loss and degradation of habitat and _____ runoff), soil loss (erosion, salinization, desertification), air pollution (fossil fuel use, pesticide sprays) and water loss & depletion (aquifer depletion, _____, runoff)

Types of Food Production

- There are two major types of agricultural systems, industrialized and traditional.
  - Industrialized, or high-input, agriculture uses large amounts of fossil fuel energy, water, commercial fertilizers, and pesticides to grow huge quantities of monocultures
    - _____ agriculture is industrialized agriculture practiced primarily in tropical developing countries (ex. bananas, coffee)
  - Traditional agriculture consists of two main types:
    - traditional _____ agriculture produces only enough crops or livestock for a farm family's survival
    - traditional intensive agriculture produces enough to feed their families and to sell for income

The Green Revolution

- The green revolution refers to the introduction of scientifically bred or selected varieties of grain that, with high enough inputs of fertilizer and water, can greatly increase crop yields. The process involves three steps:
  - developing and planting _____
  - lavishing fertilizer, pesticides, and water on crops to produce high _____
  - increasing the intensity and frequency of cropping

Livestock

- Concentrated Animal Feeding Operations (CAFOs) quickly get livestock to slaughter, but generate large amounts of waste and _____.
- Free Range Grazing allows animals to graze on _____ during their entire lifecycle. Contrary to CAFOs, free range animals tend to be free from antibiotics and don't use large amounts of inorganic fertilizers and pesticides. Free range grazing does require a large area of land and the meat produced is more _____.

Downsides of Livestock

- About 14% of U.S. topsoil loss is directly associated with livestock grazing.

- Cattle belch out 12-15% of all the _____, a greenhouse gas, released into the atmosphere.
- Livestock in the U.S. produce 21 more times waste than the country's human population.
- The hog population in _____ is second largest in the country (Iowa is #1), but has the greatest density. The majority of hog farms are in the coastal plain, which is prone to flooding.

Nutritional Problems

- While there is enough food grown to properly feed all people of the world, it is not distributed equally, leading to several problems:
    - undernutrition occurs when people receive less than 90% of their minimum daily calorie intake of food on a long-term basis.
    - _____ occurs when people do not receive the proper amounts of protein.
- Humans have reached the point where there are more obese people than hungry people in the world. People in the developing world are adopting the Western lifestyles that contribute to obesity. No country in modern times has successfully reduced its number of overweight citizens. This shift from undernutrition to overnutrition has occurred in less than a generation, and has led to much greater instances of _____, heart disease, and high blood pressure.

Pests & Pesticides

- A pest is any organism competes with us where we don't want it or in sufficient numbers to cause damage
- Pesticides (or _____) are chemicals developed to kill organisms we consider undesirable
- Common types of pesticides include: Insecticides, Herbicides, _____ , Nematocides and Rodenticides
- The first generation of pesticides included _____, lead and mercury
- The second generation of pesticides included _____, chlordane and methyl bromide

Benefits of Pesticides

- save human lives from insect-transmitted diseases like _____, bubonic plague and typhus
- increase food supplies and lower food costs
- increase _____ for farmers and work faster and better than alternatives

The Ideal Pesticide

- The ideal pesticide, which does not yet exist, would
    - Kill only the target pest
    - Disappear or break down into something harmless
    - Be cheaper than doing nothing
    - Harm no other species
    - Not cause _____ resistance in target organisms

Pesticide Problems

- Problems with pesticides include
    - arrival of new pests that fill the _____ of the killed pests
    - at least 95% of pesticides do not reach target pests and end up polluting the environment
    - killing of natural predators and parasites with broad-spectrum insecticides
    - threats to wildlife and human health
    - _____ is the number one problem with pesticides

Bhopal, India

- On December 3, 1984, one of the worst pesticide disasters in history occurred in Bhopal, India. The Union Carbide pesticide plant (Dow Chemical) released 43 tons of _____ _____ gas, killing up to 5,000 people. Contamination damage persists today.

Pesticide Regulation

- Pesticides are regulated by the _____, FDA, and _____
- Most regulations are set around tolerance levels of pesticide residue on foods, with little effort focused on the effect on the environment
- The _____ Clause of the Food, Drug and Cosmetic Act (1958) says that if a substance is found to cause cancer in humans or animals, then it could not be used as a food additive.

Pesticide Alternatives

- Genetically Modified Organisms (GMOs)
- Crop rotation (to minimize loss)
- Insect birth control
- Biological pest control (use of _____ predators)
- Biopesticides (use of plant _____)
- Integrated Pest Management is an approach in which each crop and its pests are evaluated as parts of an ecosystem. Then a control program is developed that includes a _____ of cultivation and biological and chemical methods applied in proper sequence and with the proper timing to minimize disruption to the environment.