Recognition of Pests and Pest Damage

Definition of a Pest

- A pest is any living organism that is present where it is not wanted.
- Keep in mind that pests are not pests because of what they are (bed bugs, ants) but because of what they do (bite, transmit disease) or where they are found (homes, lawns, hospitals).
- According to the Federal Insecticide, Fungicide and Rodenticide Act, a pest can be any insect, rodent, fungus or weed as well as any other living organism.

Pest Nomenclature

- Pests are given a scientific name by scientists in the same manner as any other living organism.
- The scientific name of a pest organism consists of two parts - the genus name and species name.
- The genus name is always capitalized and the species name is always in lower case.
- Finally, the scientific name of an organism (Genus + species) is always underlined or in italics.
- As an example, the scientific name of pharaoh ant is written as Monomorium pharoanis or as *Monomorium pharoanis*.

How Scientists Have Categorized the Living World

- Scientists have divided the living world into different groupings. The largest of these being the kingdom.
- There are five kingdoms. These are the Plant Kingdom, Animal Kingdom, Fungi Kingdom, Protista Kingdom, and Monera Kingdom.
- The Animal Kingdom is the largest and the Plant Kingdom is the second largest. The three other kingdoms are mainly microorganisms. Strangely, viruses do not fit into any of the five kingdoms.

Arthropods

- The largest phylum within the animal kingdom is Arthropoda.
- The Arthropoda kingdom is composed of invertebrate - animals lacking a vertebrate.
- Arthropods have jointed limbs and an exoskeleton made of chitin.
- The phylum arthropoda consists of insects, arachnids (spiders), centipedes and crustaceans.

General Characteristics of Arthropods

- Circulatory system

The circulatory system of an arthropod is very different from our own. It is not enclosed in veins and arteries but rather, is open with the blood being free within the body cavity.

- Skeleton

The skeleton of an arthropod is on the outside and is referred to as the exoskeleton. This exoskeleton is made of chitin - a strong, flexible polymer.

General Characteristics of Arthropods

- Segmented Bodies

The bodies of arthropods are divided into different regions. This dividing of the body into different sections is referred to as tagmosis by entomologists.

- Jointed Appendages

The name arthropod means "jointed foot". Jointed appendages are attached to the bodies of arthropods. This includes parts such as antennae, legs and mouthparts.

Insects

- Insects outnumber all other animals.
- Less than 1% of all insect species are pests.
- Many insects such as butterflies are attractive in appearance.
- Insects serve an important function in our world. They pollinate plants and serve as food for birds, fish, mammals, reptiles and even other insects.

Insects

- Insects that are considered to be pests feed on, transmit disease to or injure humans, animals, plants, food, fiber and structures.
- Mosquitoes, fleas, termites, aphids, mealybugs, scale and whiteflies are all examples of insects that are pests.

Insect Body Characteristics

Adult insects are made up of three basic body parts - head, thorax and abdomen - and have six legs.

- Head

  Antennae, eyes and mouthparts are attached to the head of an insect. Differences in the size and shape of these parts can help in identifying the insect species.

- Thorax

  Three pairs of legs and sometimes one or two pairs of wings are attached to the thorax of an insect. Legs come in different shapes and sizes and are useful in identifying the species of an insect. Wings vary in shape, size and texture and are useful in identifying a species of insect. Vein pattern within a wing is often times used to identify an insect.

Insect Body Characteristics

Abdomen

- The abdomen of an insect consists of segments. Along these segments are openings called spiracles that an insect uses to breathe.
- Parts of the abdomen such as an ovipositor, male genitalia and cerci are commonly used to identify a species of insect.

Insect Reproduction

- The process by which an insect typically reproduces begins when a male fertilizes the eggs of a female. However, this is not the only way in which insects reproduce.
- Some insects give birth to live young and some species of wasps reproduce without ever mating.

Insect Metamorphosis

- As an insect matures it goes through a series of changes. This process is referred to as metamorphosis.
- There are four basic types of metamorphosis that occur. These are: no metamorphosis, simple/gradual metamorphosis and complete metamorphosis.
- Understanding the process by which an insect matures can help in identifying the different life stages of an insect species. For example, May and June beetles undergo complete metamorphosis and the larval form of these insects is a white grub. If one did not know the process (complete metamorphosis) by which May and June beetles mature, one would never suspect that they had any relation to a white grub.

Insect Metamorphosis

A brief summary of the four basic kinds of insect metamorphosis is presented below.

No Metamorphosis

- The insect changes very little as it grows.
- The food habits of the nymphs are similar to the adults.
- Both nymphs and adults are wingless.
- Silverfish are an example of an insect that undergoes no metamorphosis.

Insect Metamorphosis

Simple or Gradual Metamorphosis

- The insect passes through through three distinct stages - egg, nymph and adult.
- The nymphs can not reproduce.
- The wings and reproductive organs are fully developed in the adult stage only.
- Grasshoppers undergo simple/gradual metamorphosis.

Insect Metamorphosis

Incomplete Metamorphosis

- The insect passes three life stages. These are egg, naiad and adult.
- The naiad stage lives in water and breathes through gills.
- Dragonflies undergo incomplete metamorphosis.

Insect Metamorphosis

Complete Metamorphosis

- The insect passes through four life stages. These are egg, larva, pupa and adult.
- The larval stage differs greatly from the adult stage and usually eats different food and lives in a different habitat.
- An example would be caterpillars which pupate into a moth or butterfly.

Centipedes and Millipedes

- Centipedes and millipedes are not insects. They have more than three body segments and more than six legs.
- Centipedes have one pair of legs per body segment.
- Millipedes have two pair of legs per body segment.
- Millipedes and centipedes undergo no metamorphosis and change only in size as they mature.

Crustaceans

- This group includes lobsters and shrimp. These, however, are not pests.
- Sowbugs are a member of this group and can be a household pest.
- Sowbugs are frequently found in damp basements and garages.

Slugs and Snails

- Slugs and snails are members of the phylum Mollusca.
- Snails and slugs sometimes damage plants by (1) feeding on the foliage, (2) being in the harvested crop, (3) making slime trails across plant foliage.

Plant Pathogens

Diseases are frequently caused by plant pathogens. This would include bacteria, fungi, viruses and nematodes.

Bacteria

- Several leaf spot and rot diseases are caused by bacteria.
- Bacteria are one-celled organisms that reproduce under warm, humid conditions.
- Bacteria can be seen with the aid of a microscope.

Fungi

- Fungi are the most common type of plant pathogen.
- They reproduce through spores that act like seeds.
- High humidity is required for a spore to germinate.
- Mildew and smut are both caused by fungi.

Viruses

- Viruses are very small and can not be seen with an ordinary microscope.
- Viruses can enter a plant through a wound or during pollination.
- Nematodes sometimes spread viruses.
- Viruses are usually identified by the symptoms they cause.

Nematodes

- Nematodes are microscopic, worm-like organisms.
- Some nematode species feed on plant roots which can stunt a plant by reducing a plant's ability to take in water and nutrients.

Weeds

The simple definition of a weed is a plant out of place.

Weeds can:

- cause harm to man, desirable plants, or grazing animals;
- hinder fish growth and reproduction;
- increase mosquito reproduction;
- clog waterways or irrigation ditches;
- block a driver's vision.

Major Classes of Weeds

The major classes of weeds are grasses, sedges and broadleaves.

Grasses

- Grasses are monocots.
- A monocot seedling has a single leaf.
- The leaves in grasses have parallel veins.

Sedges

- Like grasses, sedges are monocots.
- Unlike grasses, sedges have three rows of leaves and have triangular stems.
- Yellow and purple nutsedge are perennial weeds.

Broadleaves

- Broadleaf weeds are dicots.
- The seedlings of dicots have two leaves.
- Broadleaf weeds have a net shaped venation.
- There are different kinds of broadleaf weeds - annuals, biennials and perennials.

Vertebrate Pests

- Vertebrate animals have a jointed backbone.
- Most vertebrate animals are not pests.
- There are some situations, however, where rodents, birds and other vertebrate animals can be pests.
- Rodents, birds and mammals sometimes transmit diseases to humans and domestic animals. This would include rabies, tularemia and other diseases.

Conclusion

A pest is any living organism that is present where it is not wanted. A pest can be a rodent, weed, pathogen, insect or an insect-like creature.