

## Lab-6- Pesticides

**Pesticides:** any substance or mixture of substances intended for preventing, destroying, repelling or mitigating any pest.

**There are different pests that destroy crops in agriculture such as:**

1- Weeds or unwanted plants	2- Insects
3- Rodents	4- Fungi

### Types of pesticides

- A- Bactericides for the control of bacteria.
- B- Herbicides for the control of weeds.
- C- Fungicides for the control of fungi.
- D- Insecticides for the control of insects; these can be Ovicides, Larvicides or Adulticides.
- E- Miticides for the control of mites.
- F- Nematicides for the control of worms.
- G- Rodenticides for the control of rodents.
- H- Virucides for the control of viruses.

### The ecological effects of pesticides

- A- Death of the organism.
- B- Cancers, tumors and lesions on fish and animals.
- C- Reproductive inhibition or failure.
- D- Physiological effects such as egg shell thinning.
- E- Suppression of immune system.

### How pesticides enter the body

- 1- Through the skin.
- 2- Through the mouth by swallowing.
- 3- By breathing in fumes or vapors.
- 4- Through the eyes.

**Inorganic pesticides:** are those pesticides that do not contain carbon. They can contain elements or natural compounds, such as arsenic, copper, mercury, sulfur, zinc, borate, silica or other substances. Example: the borates (i.e. boric acid) that have a low acute toxicity to humans and animals, but are very toxic to certain insects.

**Organic pesticides:** are compounds used to control pests that contain carbon. Although organic pesticides can occur naturally, they are most often human-made (synthetic). Example: organophosphate pesticides contain phosphorus and carbamate pesticides and have a carbamic acid base.

## **Synthetic Organic Pesticides**

Synthetic organic pesticides do not naturally occur in the environment, but are synthesized by man. They are called organic compounds because they contain carbon and hydrogen atoms as the basis of their molecular structure.

### **Types of Synthetic Organic Pesticides**

**1- Chlorinated Hydrocarbons:** This large group of insecticides varies considerably in their toxicity to mammals. Examples to this group; DDT, chlordane, dieldrin.

**2- Organophosphates:** are a large group of pesticides containing about 39 active ingredients, which vary from being moderately to very toxic to mammals. Example on these group pyrethrins.

**3- Carbamates:** are another large group of insecticides, a few of which are commonly used in the structural pest control industry and around schools. Example on this group Propoxur.

**Biological pesticides:** this group differs from other pesticides groups in that they consist of a variety of chemicals of natural origin or synthetic versions of natural chemicals that target specific species and usually have little impact on non-targeted species.

**Heavy metals:** refers to any metallic chemical element that has a relatively high density and is toxic or poisonous at low concentrations. Examples of heavy metals include mercury (Hg), cadmium (Cd), arsenic (As), chromium (Cr), thallium (Tl) and lead (Pb).

Heavy metal has a high atomic weight with a specific gravity that exceeds the specific gravity of water by five or more times.

Heavy metals are natural components of the Earth's crust. They cannot be degraded or destroyed. To a small extent they enter our bodies via food, drinking water and air. As trace elements, some heavy metals (e.g. copper, selenium, zinc) are essential to maintain the metabolism of the human body. However, at higher concentrations they can lead to poisoning. Heavy metal poisoning could result, for instance, from drinking-water contamination (e.g. lead pipes), high ambient air concentrations near emission sources, or intake via the food chain. Heavy metals are dangerous because they tend to bioaccumulate.

Heavy metals can enter a water supply by industrial and consumer waste, or even from acidic rain breaking down soils and releasing heavy metals into streams, lakes, rivers, and groundwater.

### **Effects of some heavy metals**

\*Arsenic inhibits DNA repair.

- \* Cadmium toxicity isn't well known, but they think it causes single strand DNA damage.
- \* Chromium causes chromosomal abnormalities thought to be caused by oxidative damage.
- \* Lead prevents the body from interacting with Calcium which is a key element in many biological processes. It also competes with other metals for the active sites in different enzymes.
- \* Mercury depletes the body's antioxidants.

**Bioaccumulation:** means an increase in the concentration of a chemical in a biological organism over time, compared to the chemical's concentration in the environment.