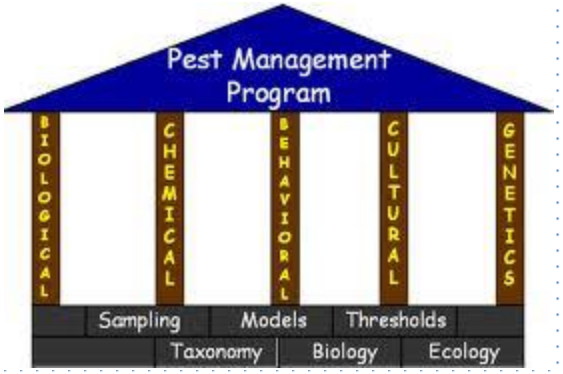


INSECT PEST MANAGEMENT

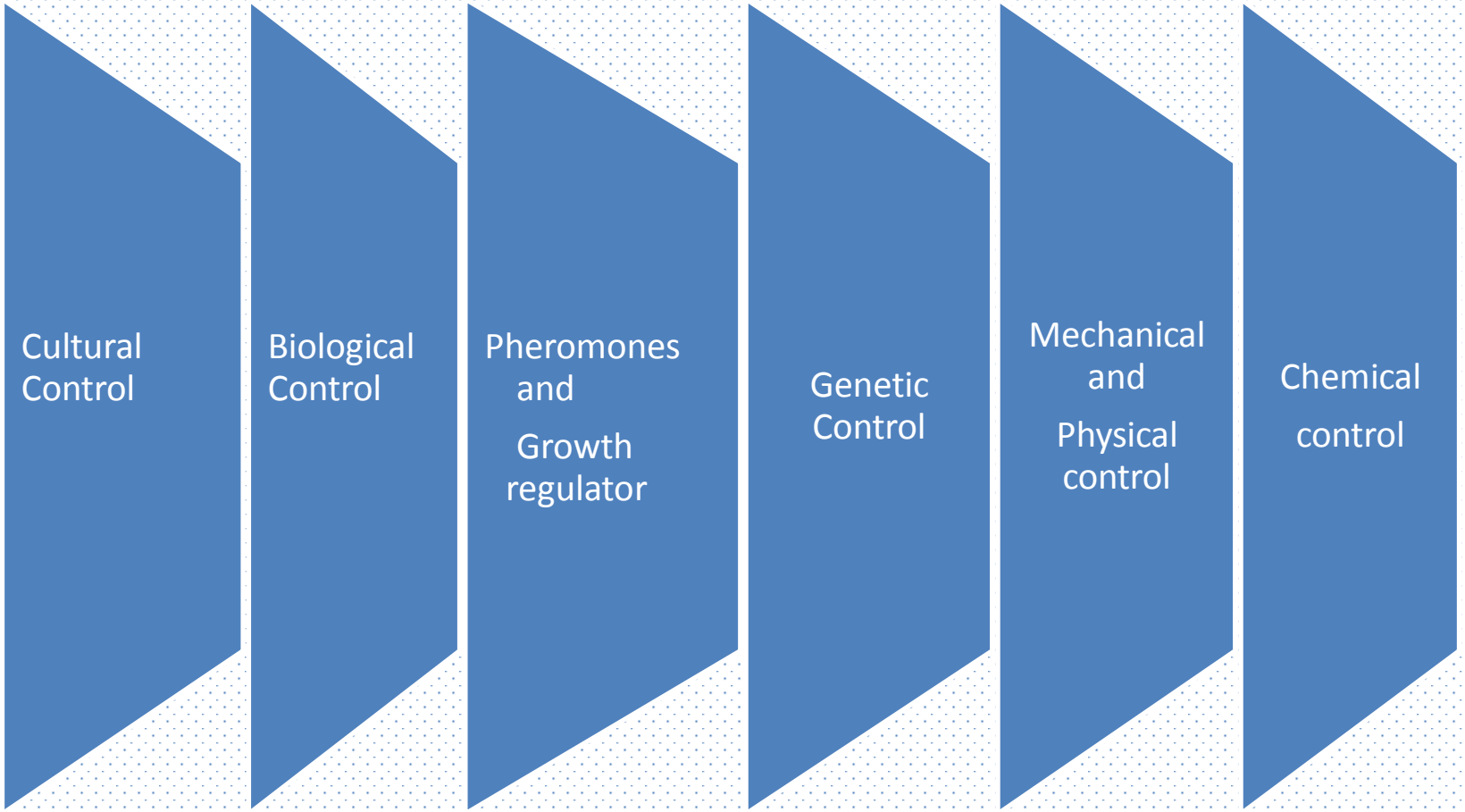
511 Zoo

Dr. Reem Alajmi

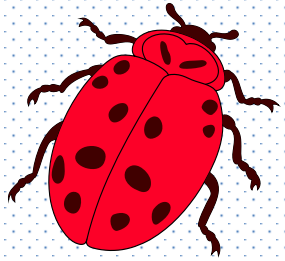
Insect pests

- Pests, by definition, are organisms that come into conflict with humans. Technically, any organism (bacteria, fungi, plant, animal) that has a negative effect on human health or economics (food).
- Transportation results in pests becoming translocate into new area. About 40% of major insect pests in North America are not native.
- In order to protect our self from biting and disease carrying insects, we have devised methods to alter normal population growth of many insect pests by reducing their chance for survival.

- The current philosophy of contending with insect pests is to minimize damage using as many different techniques as possible without injuring the environment.



Biological Control



- Plant pests are controlled by natural agents.

Examples include:

1. predators (Kill many preys)such as lady beetles.
2. parasites (very specialized)such as digger wasps.
3. pathogens (usually very specific, may kill or reduce reproduction or reduce insect health)such as bacteria to kill larvae.

Advantages

- These agents are selective.
- Insect resistance is less evident.
- Ecosystem is less affected.
- Parasites and predators are less dangerous than insecticides to humans.

Disadvantages

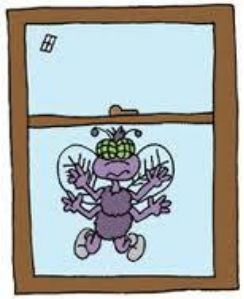
- Difficulty in achieving requirements for effectiveness.
- Difficulty in meeting government regulations for viruses, fungi, and bacteria.
- Viral and bacterial pathogen must normally be ingested by target insect.
- Timing of spraying pathogens is often critical.
- It could affect native and pest insects.

Mechanical and Physical controls

- **Mechanically**: Pests are controlled by non-chemical direct measures.

Examples include:

1. Hand picking to remove insects.
2. Tilling to remove weeds.
3. Trapping.



- **Physically**: Pests are controlled by habitat modification

Examples include:

1- Exclusion.

2- Sealing.

3- Putting up screens.

4- Air doors.

5- Microwaves and other radio-frequency energy devices have been used experimentally to kill some pests, but their cost for large-scale operations is currently prohibitive.

6- Freezing also has been used to control certain pests; for example, a few libraries have large walk-through freezers into which they rotate their old classic books to periodically expose the guild of book pests to lethal temperature

Cultural Control

- Cultural control **involves the manipulation of the environment to make it less favorable for the pest populations.**

Examples are:

1- Crop rotation is a common means of minimizing damage by pests.

2- The timing of plantings to the period when the insect pest is least abundant or absent has proven successful.

3- Several types of odorous plants can be grown together with the main crop to repel insect.

4- Irrigation and fertilization schedules to develop healthy soil

5- Sanitation practices

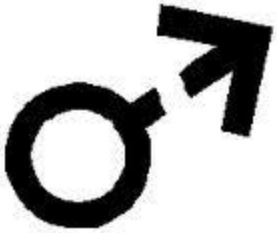
- This type of control is important in controlling pests of livestock and their impact on humans.

- For example, the house fly breeds in manure; therefore, proper farm management and disposal of these wasted prevent flies from reproducing and migrating to nearby urban areas.

Genetic control

- The goal of genetic control is to convert a pest insect to the non-pest status.

Examples are:



1- Sterilizing native pest population through chemosterilants.

2- Mass sterilizing males and then releasing them.

3- Mass released engineered male insects homozygous for a dominant sex-specific lethality gene would mate with wild females and all female progeny would die, reducing the size and reproductive potential of the pest population

Pheromones and Growth regulator

- Pheromones **are chemicals released by an organism into its environment enabling it to communicate with other members of its own species**.

- Pheromones have a means of selectively controlling insects when combined with insecticide and traps.

- The strategy is either to confuse the mating behavior or to use different concentrations of pheromones to attract specific pests to a centralized area, thereby reducing the need to spray areas and kill other insects, including predators and parasites.

Insect Growth Regulator (IGR)

- An **insect growth regulator (IGR)** is a substance (chemical) that inhibits the life cycle of an insect.

- IGRs affect certain hormones in insects, hormones that humans don't have. They don't kill insects immediately, but they can stop a pest population from reproducing until all of the pests have died.

- IGRs prevent an insect from reaching maturity by interfering with the molting process. They disrupt how insects grow and reproduce.

- IGRs are typically used as insecticides to control populations of harmful insect including fleas, cockroaches and mosquitoes.

Chemical Control

- Pests are controlled by using chemical pesticides.

Examples include:

1. Insecticides to control insects.
2. Fungicides to control fungus diseases.
3. Miticides to control mites.
4. Herbicides to control weeds.
5. Rodenticides to control rodents.
6. Molluscicides to control mollusks.

Chemical Technology Problems

- Development of resistance by pests
- Resurgences (pest comes back stronger)
- Secondary pest outbreaks (different pest)
- Adverse human health effects
- Adverse environmental health effects

Insecticides

- Insecticides are chemicals used to kill insects with no apparent or at least only minimal effect on animals at the recommended dosage levels and conditions of use.
- These chemicals are proven to be extremely effective in controlling many pests.
- Each insecticide must be registered for specific use, and label must state detailed instructions for use, including the pest, habitat or substrate, and any restrictions.

- Most insecticides have a varying effect on other animals especially when

  1- The concentration are increased by improper formulation of spays.

  2- Carelessness cause continual exposure.

  3- The insecticides are used in prophylactic regimens

  4- Build ups occur in the soil because of poor drainage.

  5- There are runoffs from sprayed areas into streams

  6- Insecticides concentrate in some food chains.

Types of insecticides

Botanicals

both nicotine and pyrethrines are contact poisons and are available on the market today

Microbial

Microbes can produce insecticides. These microbes can be applied directly to crops in similar manner as other insecticides

Inorganics

more toxic, but they must be ingested to kill. For example, Paris green, arsenates, fluorides, sulfur. These inorganic poisons have been banned from use

Synthetic organic

DDT, the first of the new synthetic organic insecticide, where introduced extensively at the end of the World War 2. It was very effective for killing insects

Different mode of entry of insecticides into insects

Some act after being ingested with food. These poisons are often used on insects that have chewing mouthparts. A few insects that have piercing-sucking mouthparts take in toxins carried within the plant sap.

Enter the body through the tracheal system, but this often requires environment to be enclosed as in fumigation.

Direct contact between insect and insecticides, so it can enter the body through the integument and often affect the nervous system. This is often used with insects that have piercing-sucking mouthparts.


thank you