

SCIENCE 1206

PESTS AND PESTICIDES



WHAT EXACTLY IS A PEST?

- PESTICIDES

- 1 • First-Generation
- 2 • Second Generation



- ~~• BIOAMPLIFICATION~~

AKA Biomagnification

INTEGRATED PEST MANAGEMENT

- 1 Chemical Control
- 2 Biological Control
- 3 Pesticide Resistance

What are some examples of pests?

But really though, pests can't just be organisms we think are gross, . . . or can they?

DEFINITION:

Living organisms that fall into **one of three categories:**

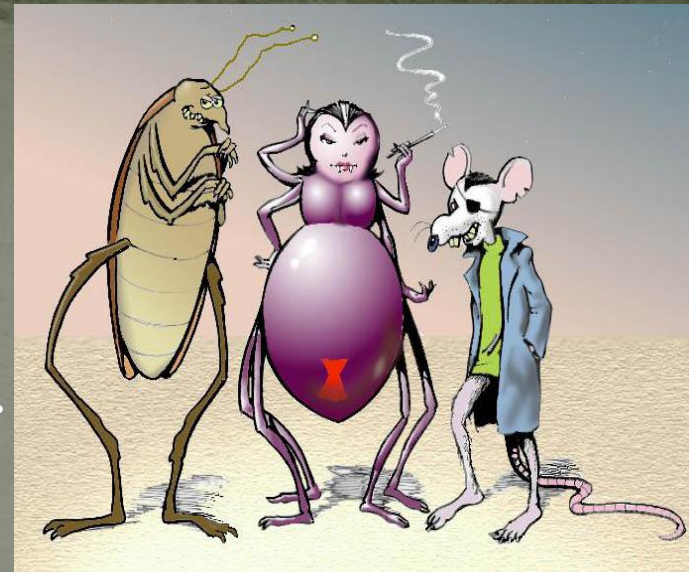
1. Humans believe it to be **UNDESIRABLE** (ahem, gross).
2. It has a **NEGATIVE** impact on the human environment.
3. It is in **COMPETITION** with a **HUMAN USE** for a resource.



Pesticides

DEFINITION:

- Chemicals used to kill various pests.



TWO MAIN CATEGORIES, based on ORIGIN:

- FIRST GENERATION PESTICIDES
- SECOND GENERATION PESTICIDES

1. FIRST-GENERATION pesticides

*ORIGIN: NATURAL

- Examples: Arsenic, lead, mercury, nicotine

2. SECOND-GENERATION pesticides

• ORIGIN: HUMAN-MADE/SYNTHETIC

- Examples: DDT, penicillin

4 SUBCATEGORIES:

1. INSECTICIDE: kills INSECTS

2. HERBICIDE: kills plants

3. FUNGICIDE: kills mould/fungi

4. BACTERICIDE: kills bacteria



Pesticides Over Time

Pesticide types have changed over time.

Older pesticides

• **FAT-SOLUBLE**

- When ingested by an organism, these pesticides attach to fat cells.

- This was highly effective as they **PERMANENTLY** remain in the organism.

Newer pesticides

• WATER-SOLUBLE

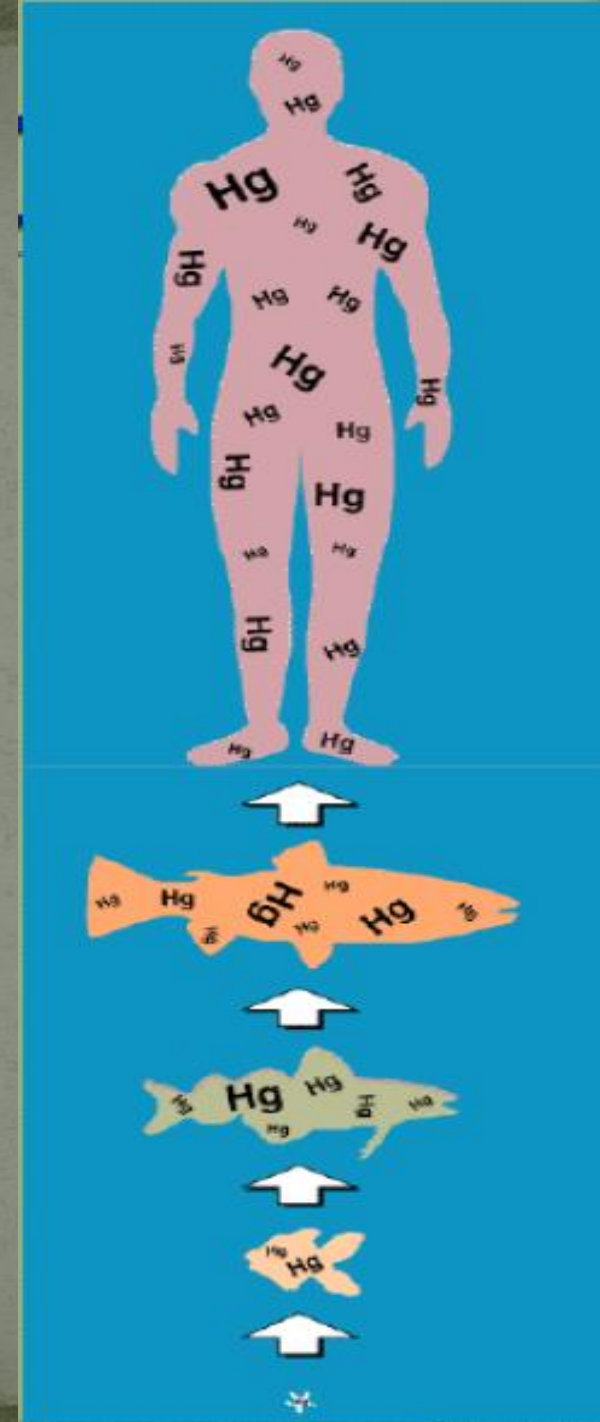
- When ingested, they are effective in the target pest, but **do not accumulate in fat cells.**
- This type dissolves in water and **can be flushed out of an organism's system.**

* no build up if next trophic level eats an infected organism.

Bioaccumulation

Also known as
BIOAMPLIFICATION or
BIOMAGNIFICATION

A phenomenon in food chains whereby **FAT-SOLUBLE PESTICIDES** build up in the fat cells of consumers at higher trophic levels.



Bioaccumulation and DDT

DDT stands for:

- *Dichlorodiphenyltrichloroethane*
- Yeah, with a name like that, its second-generation, as in human-made.

Introduced as a **FAT-SOLUBLE** insecticide to control insects that:

- *Feed on agricultural crops*
- *Damage forests (ex: spruce budworm)*
- *Carry diseases (ex: malaria)*



- It was **VERY EFFECTIVE** at killing pests
- But there was an unknown effect ,*it stayed in the bodies of other organisms . . .*



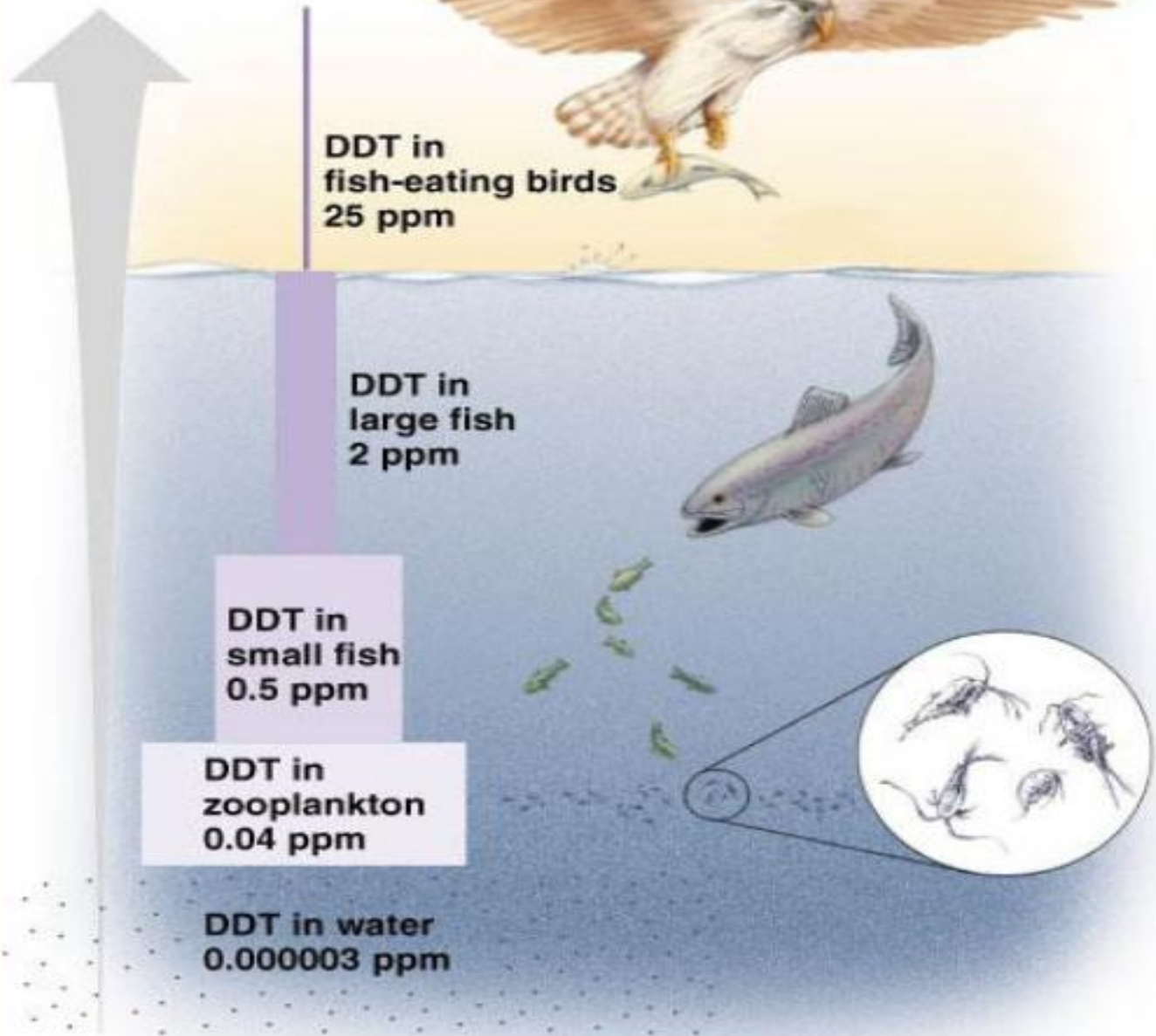
DDT... FOR CONTROL OF HOUSEHOLD PESTS



Prepared by the
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Agricultural Research Administration
United States Department of Agriculture, and
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Federal Security Agency
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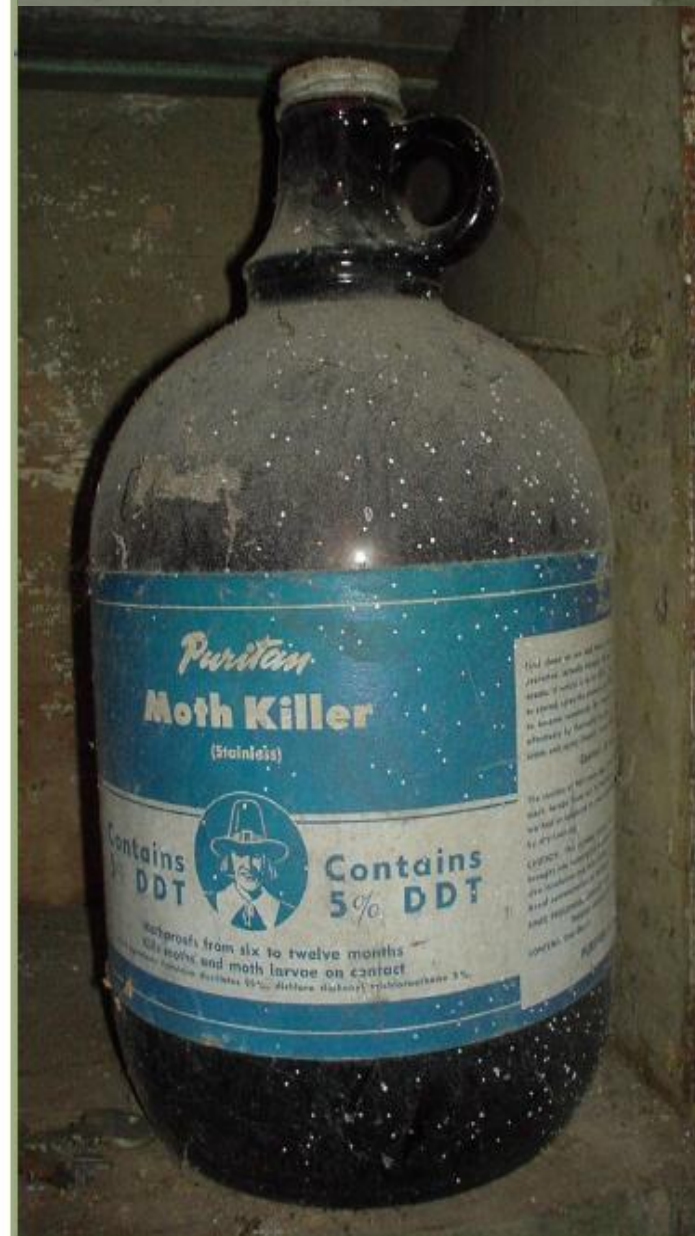
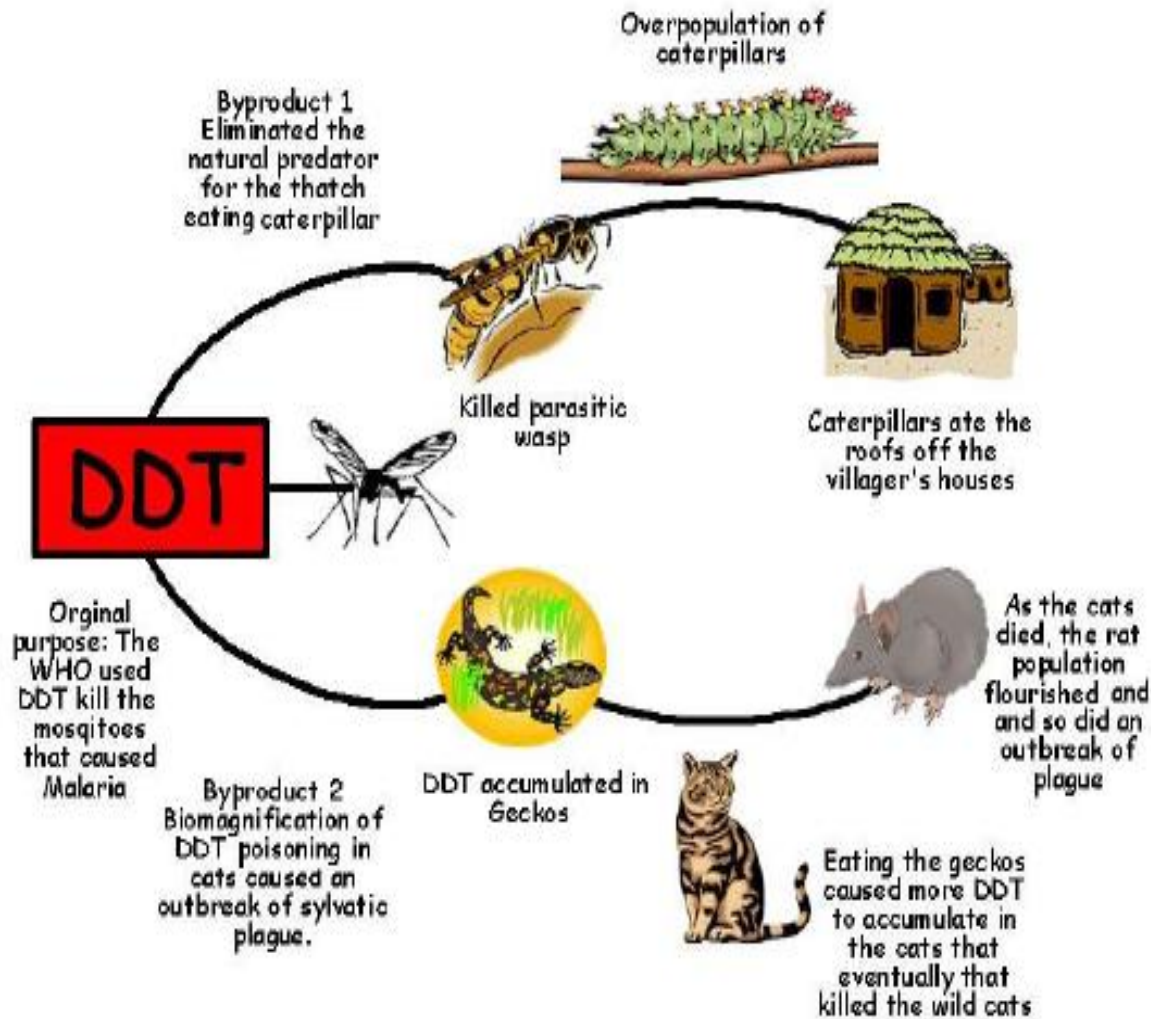


**DDT concentration:
increase of
10 million times**



Effect of DDT Use in Borneo

In the early 1950's the people in Borneo, suffered from Malaria the World Health Organization had a solution, kill the mosquitoes with DDT. This is what happened.



FIRST NOTICED EFFECTS:

- Egg shell thinning in top carnivore birds, such as Bald Eagle
- Thin shells meant HIGH RATES of chick mortality

It takes about 15y for DDT to break down in the environment.



What do we do?

- Ban DDT and other fat-soluble pesticides.

It is now banned in CANADA and many parts of the world, BUT SOME COUNTRIES are still using it.

- Use water-soluble pesticides instead.
- Use sustainable alternatives to pesticides.

INTEGRATED PEST MANAGEMENT

IPM for short

A sustainable approach to managing pests that involves:

- PREVENTION
- AVOIDANCE
- MONITORING
- SUPPRESSION



2 MAIN TYPES OF PEST MANAGEMENT

- CHEMICAL CONTROL
- BIOLOGICAL CONTROL



Chemical Control

Although chemicals are highly effective, there are several **DISADVANTAGES** to using them, including:

- *BIOACCUMULATION*
- *Not TARGET-SPECIFIC*
- *Not 100 % EFFECTIVE (some pests will not be killed)*
- *Could lead to PESTICIDE RESISTANCE*

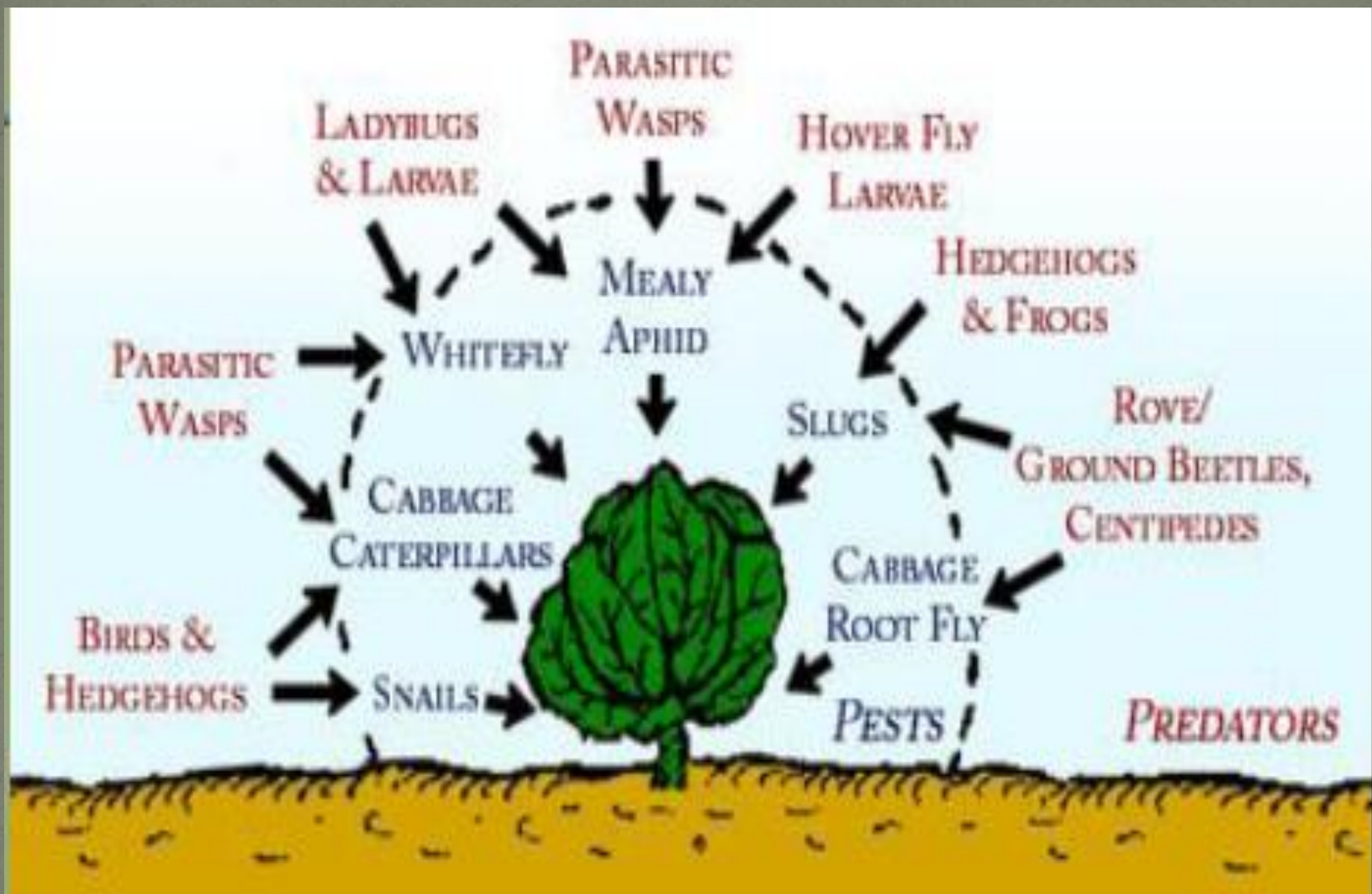
Biological Controls

Although they are more **TARGET-SPECIFIC**, there are several **DISADVANTAGES** including:

- *Expensive*
- *Short-Term Effectiveness*
- *Organisms simply move to another area*

Methods include using:

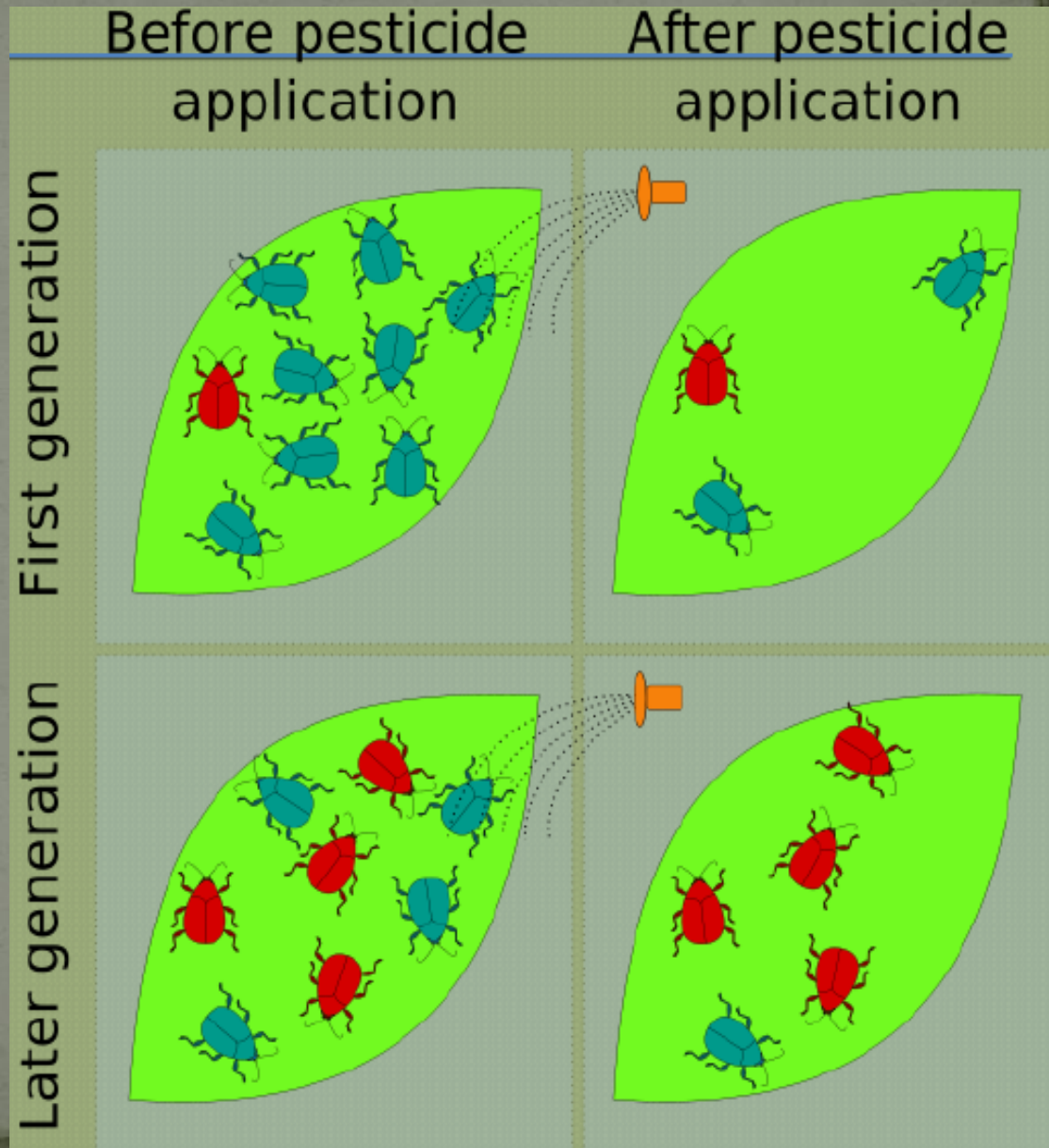
- **NATURAL PREDATORS**
- **DISEASE ORGANISMS**
- **COMPETITORS**
- **PHEROMONES**



Pesticide Resistance

Some pests are naturally immune to pesticides.

Once non-immune pests are killed off, the immune PESTS are left to reproduce a new generation of PESTICIDE RESISTANT PESTS.



How pesticide resistance develops

