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Greenhouse Pest Control
With An Emphasis On Beneficial Insects

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Greenhouse Pest Control brief overview

1890's

Biological control documented in Europe and the Mediterranean region.

1900's – 1940's

Biologicals continue to be found, reared and used in agriculture.

Farm sizes were growing and there was more of a demand for pest control.

1940's -1990's

Chemicals such as DDT and other broad-spectrum pesticides.

Biologicals took a backseat.

1990's-2015

Pest resistance, lack of tools, farmers were looking for better options. Biologicals were in the spotlight again.

Changing mindsets, giving up the hope of a silver bullet.

2015 – current

A more holistic approach where biologicals are introduced first.

Embracing biologicals and how they fit into IPM. Becoming more innovative.

Greenhouse Pest Control brief overview

1990-2015

- Shifts in mindset
- Mass rearing of beneficials
- Targeted pesticides with modes of action
- Relying on other methods of pest control
- Social and commercial demand to use less pesticides
- Farm practices began to change to accommodate beneficial insects

All of these contributed to the dependability and adaptability of beneficial insects today.

Greenhouse Pest Control brief overview

2015 – current

- Holistic approach – thoughtfulness and consideration at every step
- Prevention
- Early monitoring and identification
- Using all the tools

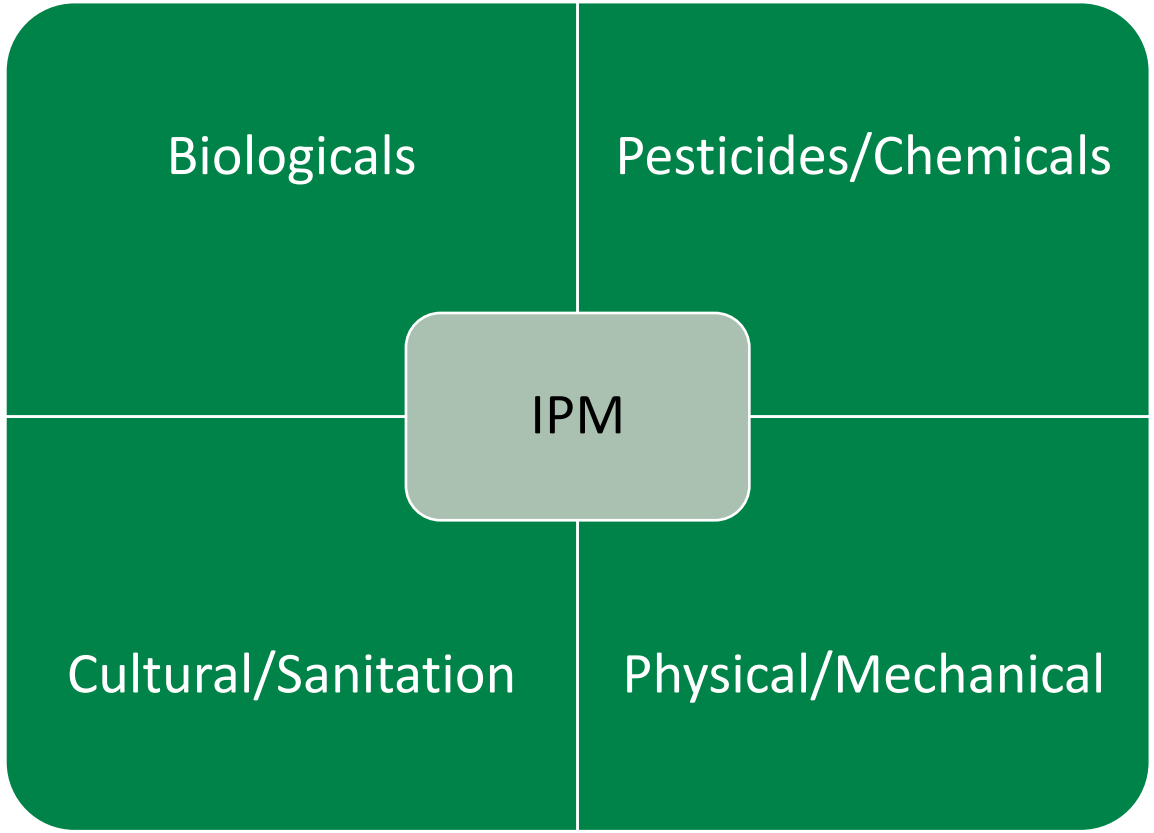
What is IPM?

The term "Integrated Pest Management" (IPM) was first used by President Richard Nixon in 1972. He asked federal agencies to develop and promote the concept of IPM, which was intended to protect environmental quality in agriculture and forest management.

What is IPM?
Four main components

IPM is made up of four components

- Biologicals
- Pesticides/Chemicals
- Cultural/Sanitation
- Physical/Mechanical



What is IPM?
Four main components

Chemical / Pesticides

- Targeted/specific modes of action
- Categories
  - Insecticides
  - Miticides
  - Fungicides
  - Nematicides
  - Bio-pesticides

What is IPM?
Four main components

Cultural / Sanitation

- Planting pest-resistant crop varieties
- Physical removal – pruning vegetation that harbors pests
- Managing surrounding areas – cutting grass and weeds
- Enforcing best practices for workers and visitors
- Sanitation
  - Disinfecting greenhouse before planting
  - Cleaning off equipment regularly

What is IPM?
Four main components

Cultural / Sanitation

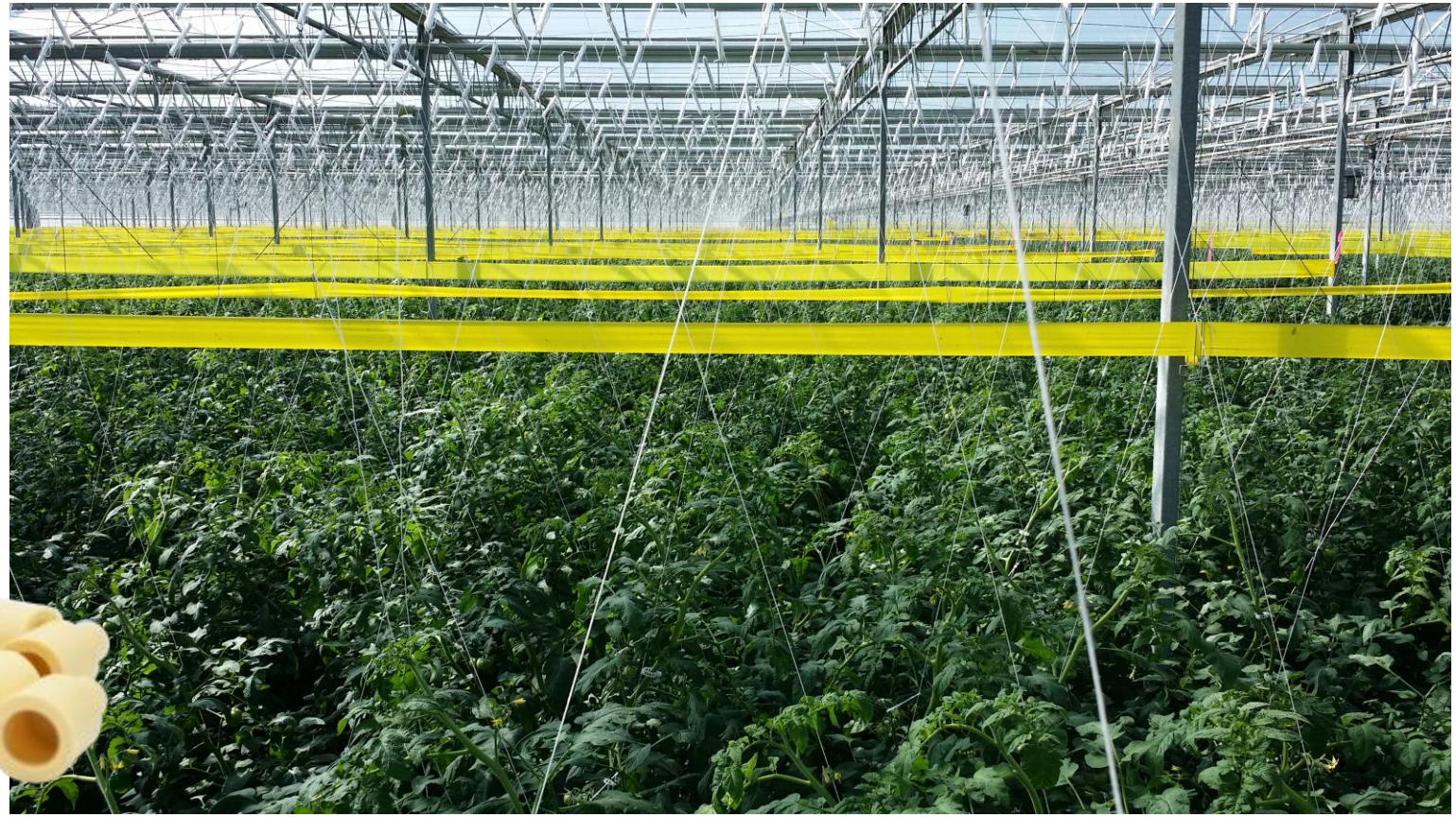
What is IPM?
Four main components

Physical / Mechanical

- Sticky tape and cards (pheromones)
- Screened vents
- Trap lights
- Floor covering

What is IPM?
Four main components

Physical / Mechanical



What is IPM?
Four main components

Biologicals

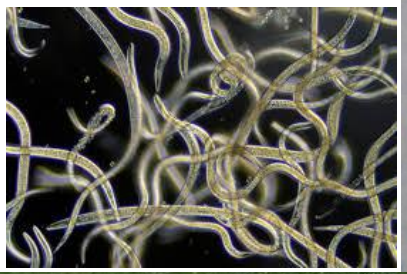
- Nematodes
- Predatory mites, predatory beetles and predatory “bugs”
- Parasitoids

Typically divided into

- soil dwellers
- canopy dwellers

What is IPM?
Four main components

Biologicals



Technical Application

How do we distribute or apply beneficial insects to the crops?

- Carrier
  - Sawdust, vermiculite, peatmoss, bran, paper, cards.
  - Proper handling
  - Food supply?
- Rates
  - Meter squared, or foot squared
- Type of application
  - Blanket vs spot treatment

Technical Application

How do we distribute or apply beneficial insects to the crops?

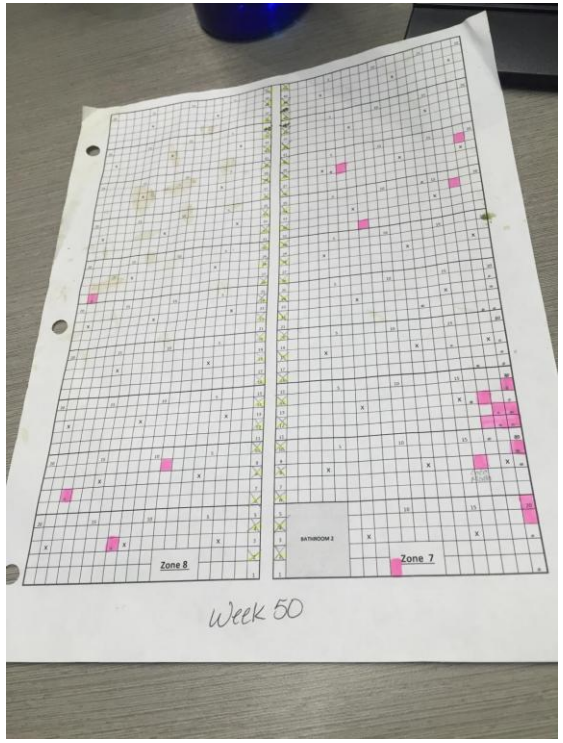
Monitoring

Weekly Monitoring

- Keeping to a schedule of every 7 days
- Observing the population of each pest and beneficial insect
- Adding more beneficial insects if needed or other methods of control
- Proper identification
- Simple flagging systems

Monitoring

Weekly Monitoring



Where are we going?

- Electronic monitoring
- AI sticky card counting
  - Electronic pest identification
- Drones that chase down moths and shred them (but not before they’re identified !)
- Beneficial insect applicators
- More interest from outdoor crops
- Drone applications

For more information, please visit www.plantproducts.com

Thank you!