The underworld of Plants.

The loiterer's, thieves and murderer's.

By Marina Alonso.

* PhD candidate in soil microbiology.
*Graduate Diploma, Plant protection.
*Bachelor of Applied Science in production Horticulture.

Introduction.

The disease triangle.

The loiterer's.
Opportunistic microbes

The thieves.
Insect pests.

The murderer's.
Microbial pathogens.

Correctional services.

The plant disease triangle.

The loiterer's.

Black sooty mold : A Classic example of loiterer activity.

Aphids, scale, mealy bugs and white flies (thieves) produce honeydew (black market produce).

Honeydew provides plenty of food/energy for sooty mold and ants (encouraging loiterer growth) .

Making things worse, the ants (jacked up on honeydew) farm the thieves and launch violent attacks on natures law enforcement (beneficial insects).

The Verdict.
Guilty! As charged.

Thieves charged with aiding and abetting sooty mold (Loiterer).

The loiterer's.

How to prevent serious loitering.

Sooty mold – Avoid the presence of thieves, use anti-thief barriers. Gently scrub leaves with a 2 drops of mild dish washing detergent/soap and water solution.

Remember, honeydew is a hot black market commodity for sooty mold and ants.

Be aware of environmental changes and if a plant has a wound or compromised immunity system.

The thieves.

The thieving insects.

Plant thieves in general, cause havoc in plants by transmitting diseases (enabling murderers), producing plant toxins and sucking nutrients out of plants (compromising plant immunity).

The thieves.

The thieving insects – Aphids.

Life cycle. Aphids love the subtropics!. 1 generation up to 16 days.

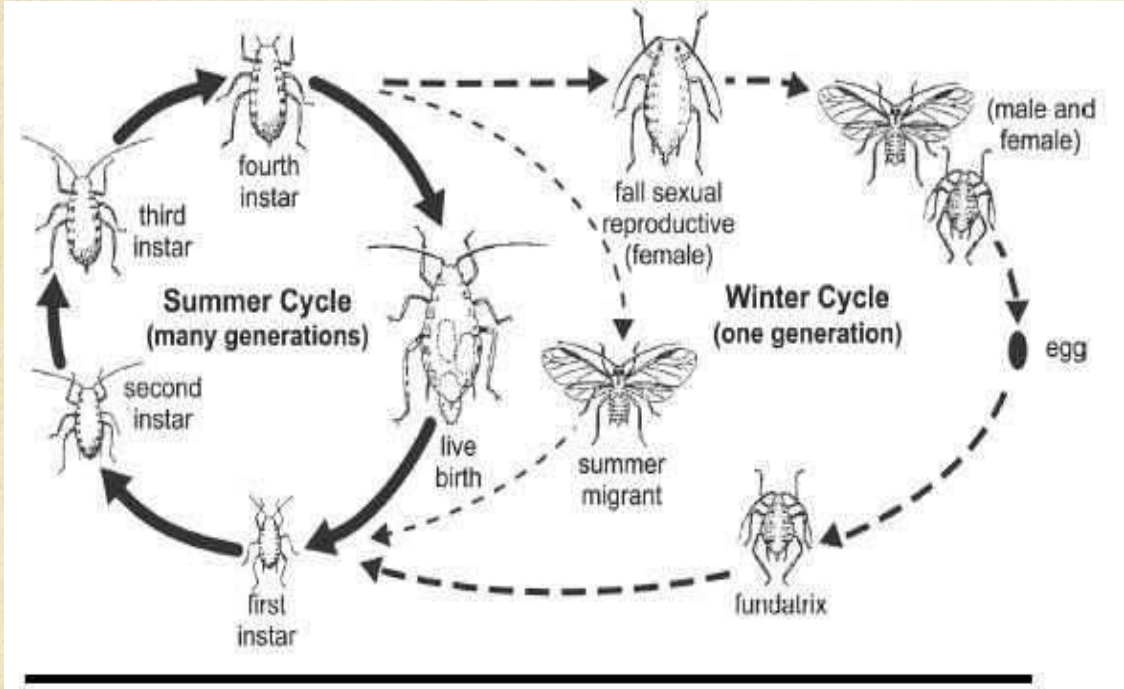


Figure 2. General life cycle of aphids. Asexual reproduction occurs during most of the year (summer cycle). Some aphid species produce a generation of sexual individuals that produce overwintering eggs as shown in the winter cycle.

The thieves.

The thieving insects – Heliothis/Helicoverpa/budworm

Crimes committed by Heliothis;

Real ‘grubs’ that pillage our food!

Cause severe ‘bodily damage’ to plants, mainly on flowering and emerging fruit parts.

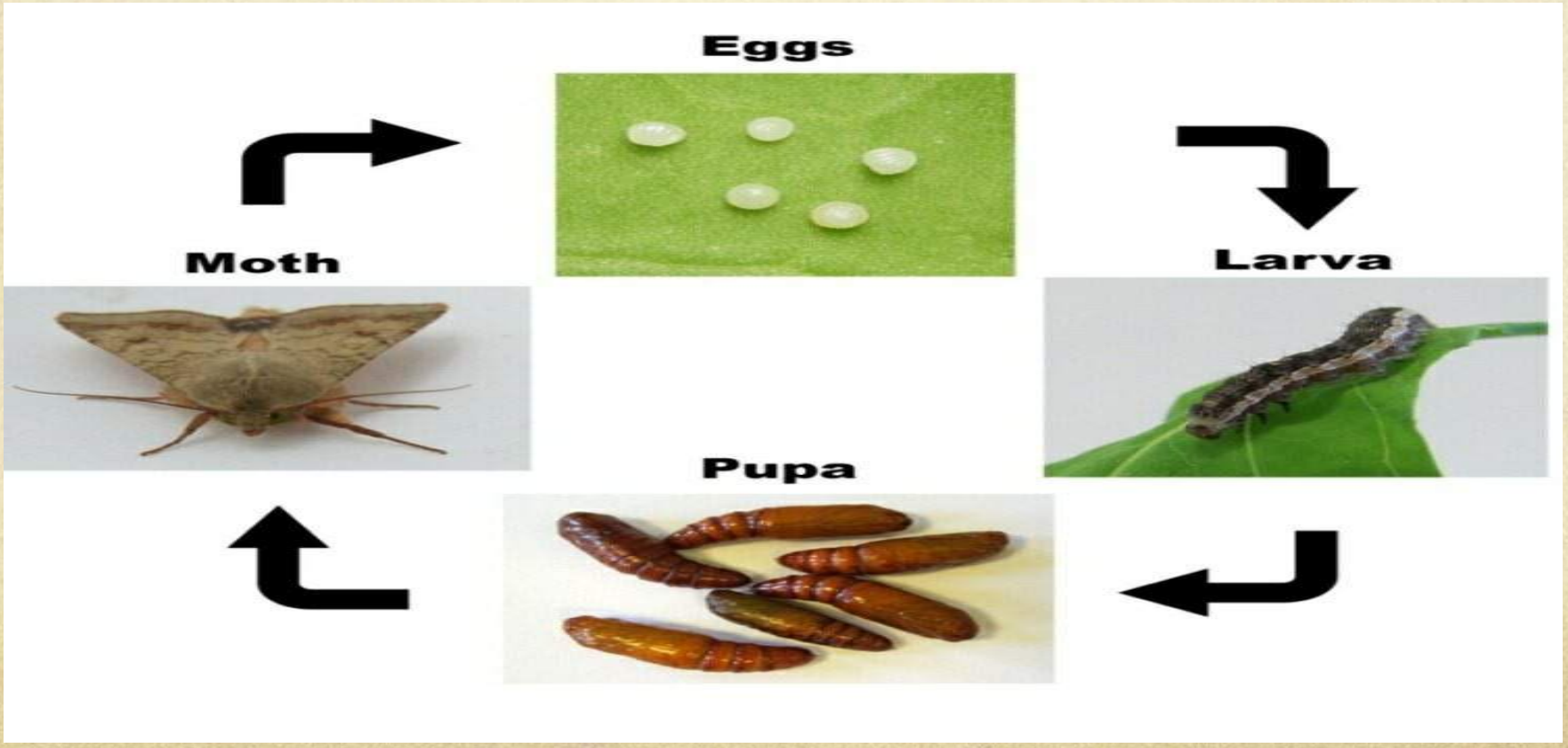
Wide range of host plants.

Super resistant to deadly pesticides including the biological control Bt (*Bacillus thuringiensis)*. The ‘Schwarzenegger terminator’ of plant insect pests.

The thieves.

The thieving insects – Heliothis/Helicoverpa/budworm

Life cycle. One female can lay up to 2,500 eggs in a lifetime! Life span in summer only 6 weeks, winter 12wks. Most of their time spent as caterpillars.



The thieves.

The thieving insects – Heliothis mug shots. /budworm

The thieves.

The thieving insects – white cabbage moth.

Lifecycle / Mugshots.

The thieves.

The thieving insects – whitefly

Mugshots.

The thieves.

The thieving insects – the leaf miner.

Signs leaf miners have moved in ;

The thieves.

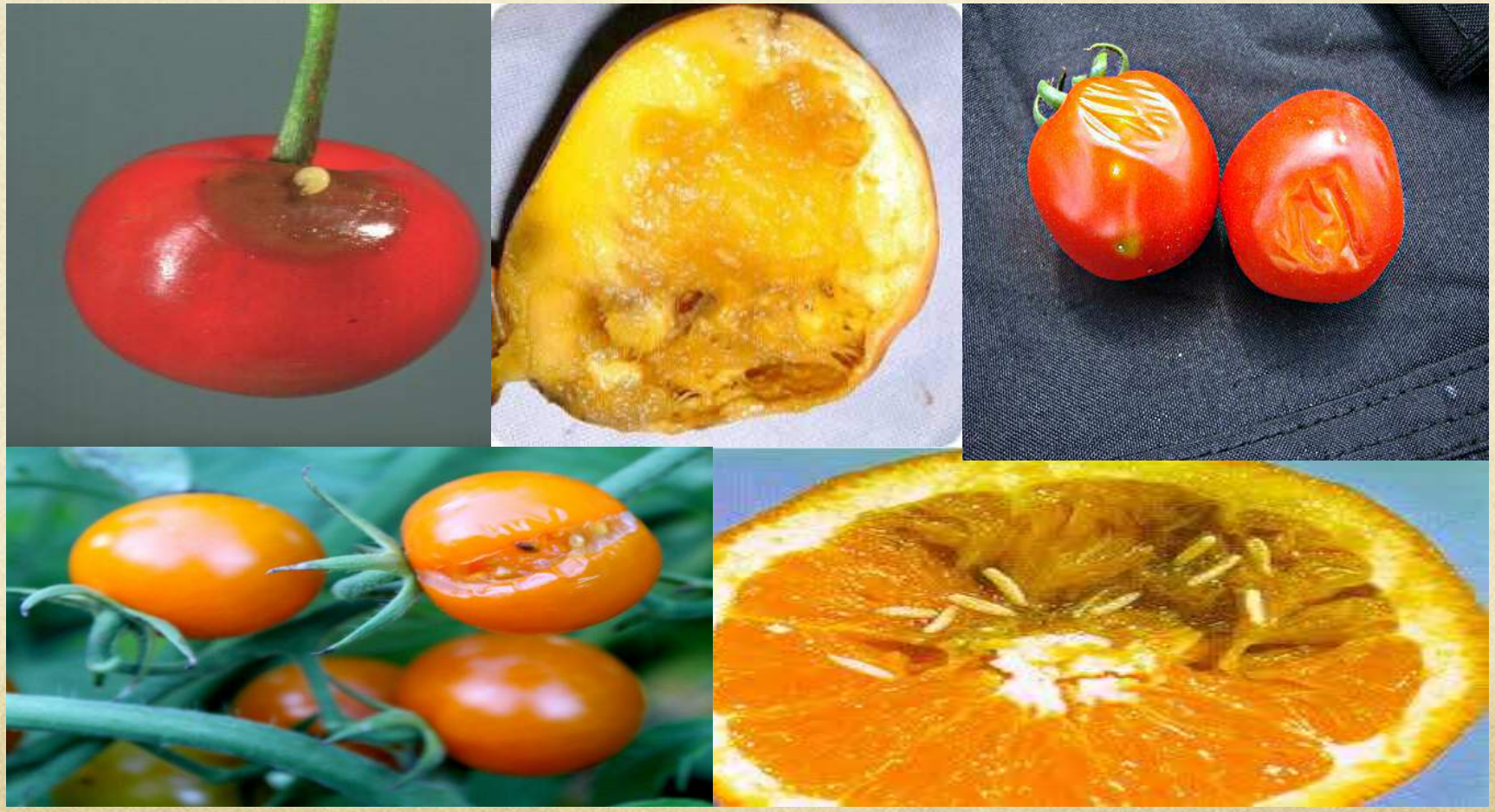
The thieving insects – the leaf miner.

Mugshots

The thieves.

The thieving insects – fruit fly.

Signs fruit fly have moved in ;



The thieves.

The thieving insects – fruit fly.

Mugshots.

The thieves.

Correctional services.

Environmental and human safe sentencing. Beneficial insects.

Trichogramma carverae female (right) male (left) on light-brown apple moth eggs

Trichogramma pretiosum parasitising a heliothis egg

Helicoverpa eggs—top shows silver grey of a parasitised egg (J. Bentley)

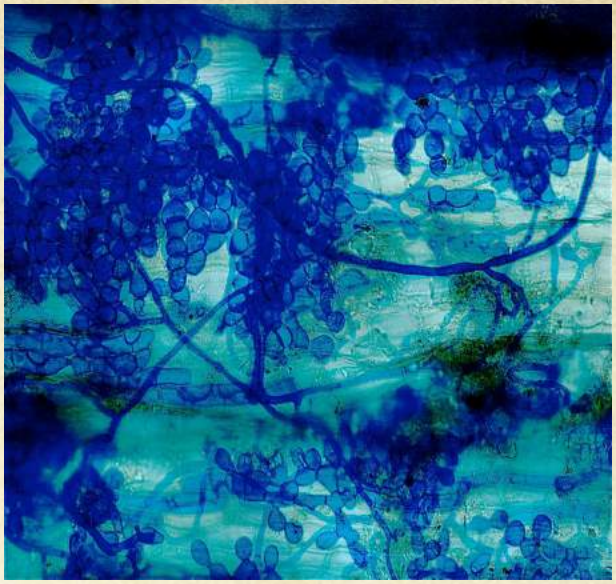
Telenomus sp. parasitising heliothis eggs (B. Scholz)

The thieves.

Correctional services.

The murderer’s.

The 3 Mafia groups.



Evidence murderer’s are at work ;

Bacteria. Produce necrotic or water soaked specks, spots, cankers and wilt. Systemic ooze.

Fungi. Produce necrotic lesions, rusts, wilt and mildews. No systemic ooze.

Viruses. Produce Streaks, leaf curls and mosaic.

Murderer’s are identified by the type of plant symptoms produced on their plant victims.

The murderer's.

The Bacteria mafia. Localized infections.

Bacterial spots, specks and blight.

Caused by Pseudomonas . Alternaria. and Xanthomonas.

– various strains, very wide host range and are casual loiterer's.

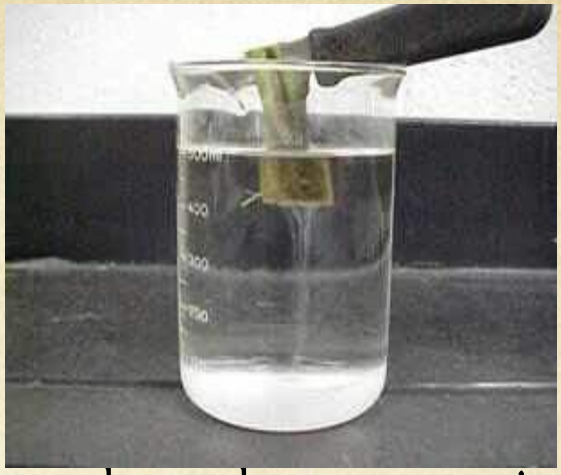
The murderer's.

The Bacteria mafia. Localized infections.

Specks and spots.

The murderer's.

The Bacteria mafia. Systemic infections.



Bacterial canker and wilt migrates among foliage and can be present in seeds. Bacterial Wilt migrates into plants mainly through roots. Both of these are devastating as these bacteria are transported through the vascular system.

The murderer’s.

The Bacteria mafia. Systemic infections. Canker.




The murderer's.

The fungi mafia. Fungal (*Fusarium.*& *Verticillium.)* wilt.

Lower leaves yellow and young leaves wilt. Spores enter roots.

The murderer's.

The fungi mafia. Systemic infections.

Unlike bacterial wilt there is no "ooze' when stem is cut.

The murderer’s.

The fungi mafia. Localized infections.

The murderer’s.

The fungi mafia. Localized infections.

Infamous cases ;

Powdery mildew, grapes.

Downy mildew on lettuce.

The murderer’s.

The fungi mafia. Rots. White mold.

The murderer’s.

The fungi mafia. Rots. Grey mold.

Botrytis rot

Anthracnose

Leather rot

The murderer's.

The fungi mafia. Rots.

Water molds.

The most infamous of all the water molds : the Irish Famine, potato blight.

Over 1 million starved and another million migrated to countries in the 'new world'.

Plant murderers don't just kill our food production, they can also cause endanger our own existence.

The murderer's.

The Virus Mafia.

Crimes committed by Viruses ;

Severe bodily harm as viruses easily travel through the vascular system infecting the whole plant in a matter of days.

Resulting in severe stunted growth, plant deformations, lack of fruit/vegetables and death.

Viruses are easily spread by many insects or through plant wounds. Some viruses can lay dormant in soil for up to 50 years.

This mafia group is extremely hard to eradicate.

The murderer's.

The Virus Mafia.

Leaf curls and rolls.

The murderer’s.

The Virus Mafia.

Mosaic.

The murderer's.

The Virus Mafia.

Current escapee wanted : Cucumber green mottle mosaic virus.

Attacking Australian melons, pumpkins and cucumbers.
Break out via imported seeds.

The murderer’s

The Virus Mafia. Cucumber green mottle mosaic virus.

The murderer's.

Companion planting case study.

The three sisters – an ancient north American practice.

Corn – Beans – Squash.

Corn provides structure for beans to trellis.

Beans are nitrogen fixers improving plant nutrition.

Squash serves as a ground cover mulch, preserving soil moisture.

Look at the plants you want to grow and what their strengths and weaknesses are.

The murderer's.

Plant diversity, compost and worm juice.

Monitoring – get to know your plants and keep a count on the loiterers, thieves and murderers.

Compost, its tea and worm juice. Yes, there is scientific proof in this practice. Numerous results have been published on a range of crops with significant results.

The murderer's.

Plant diversity, compost and worm juice.

Plant Growth Promoting Bacteria (PGPB). A powerful component to the effectiveness of compost and worm juice. A new emerging tool. Aids in nutrient uptake and boosts plant immunity.

Euthanize infected plants. The microbial mafia love working together and share a common goal – world domination of plants!

Crime Identification summary.

Loiter, Thief or Murderer?

Loiterer's are always hanging around, if there's been a weather change, keep a close eye on your plants for symptoms. E.g. Sooty mold.

Thieves (insects) eat leaves, fruits and vegetables. Check for their presence and you will usually catch them in the 'act', leaving evidence of bodily harm and fecal matter.

Murderers leave particular 'footprints' on their plant victims including spots, specks, wilts, rots, rusts, streaks and deformations.