

# Integrated Pest Management

is a strategy that focuses on the long-term prevention of pests through a combination of techniques such as biological control, change of cultural practices and/or mechanical control. Whenever possible, these techniques should be used on pests when they are at their most susceptible, to maximise effectiveness. Benefits of an Integrated Pest Management programme:

- Less harmful to the ecosystem
- Does not affect non-targeted animals, unlike most pesticides
- Environmentally friendly and affordable

## Methods that can be incorporated into an Integrated Pest Management programme:

### Cultural Control

Altering the environment, the condition of the host plant, or the behavior of the pest to prevent or suppress an infestation or infection. This includes:

- Checking for and removing pests regularly
- Growing plants in clean soil
- Providing optimal amounts of water and sunlight for plants
- Applying fertilisers appropriately
- Ensuring good air circulation around plants (frequent pruning to thin out dense shrubs)
- Removing infected plant parts promptly and properly by placing them in bags and disposing of them away from the garden

### Biological Control

The use of natural chemicals and existing predators in the garden to control pest populations

This includes:

- Neem oil and other horticultural oils
- DIY non-chemical pesticides such as chilli, garlic and onion spray
- Attracting natural predators such as ladybugs and lacewings

### Mechanical Control

The use of traps, screens, barriers, fences and nets to prevent pest activity or to remove pests from an area

This includes:

- Setting up sticky traps to trap flying insect pests
- Setting up pheromone traps
- Wrapping fruits with paper or plastic to prevent insects from laying eggs
- Use of nets or netted structures over planting beds or plants to physically prevent the pests from coming into contact with the plants
- Removal of larger pests such as beetles, caterpillars and snails by hand

This brochure features 10 common pests found in community gardens. Pests are organisms that cause damage or injury to plants. They can be insects, microorganisms or fungi. We hope that this brochure will encourage you to practise Integrated Pest Management to create conditions that are unfavourable for targeted pests, resulting in better plant health.

## About Community In Bloom

Community In Bloom (CIB) is a programme that was launched by the National Parks Board (NParks) in 2005. It aims to nurture a gardening culture among Singaporeans by encouraging and facilitating community gardening efforts. It is also an opportunity to build community bonds and strengthen social resilience.



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Share your love for nature with us at [#nparksbuzz](https://www.instagram.com/nparksbuzz)

For more information, visit our website at [www.nparks.gov.sg/cib](http://www.nparks.gov.sg/cib) or email us at [CommunityInBloom@nparks.gov.sg](mailto:CommunityInBloom@nparks.gov.sg)

For more information on plants in Singapore, visit NParks Flora & Fauna Web at [florafauweb.nparks.gov.sg](http://florafauweb.nparks.gov.sg)

# Know 10 Common Pests of Edible Plants

# Aphids



Aphids are sap-sucking bugs that are small and pear-shaped. They may be green, yellow, brown-red or black.

If left unattended for a certain period of time, aphids may weaken an entire plant, causing stunted growth or even death. They also spread many viral plant diseases.

## Vulnerable Plants

Leafy vegetables and fruiting vegetables such as beans, brinjal, chilli, lady's finger and tomato

## Symptoms

Infested leaves and stems curl downwards, and developing fruits may become distorted.

Leaves, stems and fruits appear sticky, and can become covered in sooty mould.

## Preventive and Control Measures

Regularly check your plants for aphids on the underside of leaves, which may be distorted or curled.

Avoid over-fertilising as this may encourage further aphid outbreak.

# Diamondback Moths



The caterpillars of the Diamondback Moth are common and widespread in hot and dry weather. They are light brown to green. When disturbed, they wriggle rapidly and drop from the leaves on silk threads which they use to climb back.

## Vulnerable Plants

Most leafy Brassicas, such as bai cai, caixin, kailan, watercress and xiao bai cai

## Symptoms

The affected leaves can become skeletonised by the caterpillars, which are voracious feeders in their last stage.

## Preventive and Control Measures

Nets can be used to cover susceptible plants.

Rotating crops with non-Brassica plants, such as bayam, kangkong or onions, may help to break the insect life cycle.

Infested leaves may harbour larvae or eggs. Discard the waste and do not use it for compost to prevent re-introduction to new plants.

# Flea Beetles



Adult flea beetles are small, nocturnal insects that are voracious feeders of young leafy vegetables.

## Vulnerable Plants

Mostly leafy vegetables from the genus Brassica

## Symptoms

Round holes can be found on infested leaves, and plants may display reduced growth.

## Preventive and Control Measures

Remove infested plants from the garden. As the insects may have laid eggs in the soil, it is advisable to replace the top 10 to 15 cm of existing soil as well.

'Trap crops' such as mustard and radish can be planted as buffer plants to attract the flea beetles away from the main leafy vegetables.

Rotating crops with leafy vegetables such as bayam and kangkong may help break the life cycle of flea beetles.

# Leaf Miners



Leaf miner larvae feed on leaves, creating tunnelling mine trails. The most common leaf miners present in Singapore are *Liriomyza sativae* and *L. trifolii*.

## Vulnerable Plants

Most leafy vegetables and fruiting vegetables, including beans, lady's finger and sweet pea

## Symptoms

Infested leaves have translucent leaf mining trails.

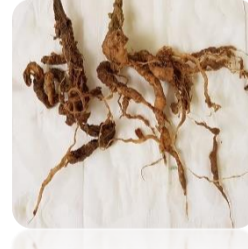
## Preventive and Control Measures

Infected leaves should be physically removed.

Rotate crops with non-susceptible leafy vegetables, such as bayam or kailan.

Yellow sticky traps can be used to trap the adult flies.

# Root-Knot Nematodes



Root-knot nematodes are the most widespread and serious parasitic nematode pest of plants in tropical and subtropical regions. They are infective in their larval stage

## Vulnerable Plants

Brinjal, chilli, cucumber, lady's finger, melons and tomato

## Symptoms

Severe infection can cause the roots to be badly galled, hindering water and nutrient uptake. Root decay and leaf wilting can be observed, and eventually the plant may die.

## Preventive and Control Measures

No single management practice is available to control or eradicate this nematode, but crop rotation with resistant varieties or non-host plants may help to prevent infection.

# Red spider Mites



Red spider mites are found primarily on the underside of affected leaves. They feed by penetrating the plant tissue with their mouthparts.

## Vulnerable Plants

Leafy vegetables such as bayam and kangkong, and fruiting vegetables such as brinjal, chilli, cucumber, lady's finger, melons, radish, sweet potato and tomato

## Symptoms

The leaves may appear bronze or yellow, and may curl. The fruits may show corky tissue.

## Preventive and Control Measures

Use of organic soap or mineral oil can reduce infestation of red spider mites.

Introducing predators such as ladybirds and lacewing larvae can help to regulate spider mite populations.

# Scale Insects



Scale insects attack the underside of young leaves and stems. They are covered with a protective waxy coating which makes them difficult to remove. They excrete honey dew, which attracts both ants and sooty mould fungi.

## Vulnerable Plants

A wide range of leafy vegetables, fruiting vegetables and other plants

## Symptoms

Shell-like humps will be present on plant stems and the underside of leaves.

## Preventive and Control Measures

Prune affected plant parts and dispose of them appropriately.

Horicultural oil such as white summer oil or Neem oil, or a 70% alcohol solution, can be applied to affected areas.

# Whiteflies



Whiteflies are often found on the undersides of the leaves. They excrete honey dew, which attracts both ants and sooty mould fungi.

## Vulnerable Plants

Leafy vegetables such as bayam, and fruiting vegetables such as brinjal, chilli, lady's finger, long bean and tomato

## Symptoms

Infested plants may show a variety of symptoms, including leaf or vein yellowing, yellow mosaic patterns on the leaves, and leaf curling. Sooty mould may also be present.

## Preventive and Control Measures

Removal of heavily infested plants will help to prevent migration of whiteflies onto nearby plants.

Remove weeds regularly to reduce the whitefly population. Yellow sticky traps may be used to trap adult whiteflies.