

# Integrated Disease Management

is a strategy that aims to control pathogens through a combination of exclusion, avoidance and eradication methods. It involves the use of biological control, change of cultural practices, and mechanical controls to prevent plant diseases in the garden.

## Benefits of an Integrated Disease Management programme:

1. Reduce the occurrence of disease attack in the edible plants
2. Less harmful to the environment
3. Environmentally friendly and affordable

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

- Practising crop rotation
- Using Neem oil and other horticultural oils to create a chemical barrier between plant surfaces and potential pathogens
- Removing infected plant parts promptly and disposing of them properly in sealed bags away from the garden

This includes:

- Avoiding the introduction of diseases into an area

### Avoidance Methods

### Eradication Methods

This includes:

- Destroying weeds that may be reservoirs for pathogens through biological control methods
- Controlling weeds through crop rotation
- Solarising the soil (using the sun's energy to raise soil temperature and kill soil-borne pathogens) before planting the next crop cycle

Removing pathogens before they become prevalent in an area

### Exclusion Methods

This includes:

- Excluding pathogens from an area to prevent them from becoming established
- Checking seeds for fungi before planting
- Using sterilised gardening equipment

# Know 10 Common Diseases of Edible Plants

## 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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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 [florafaunaweb.nparks.gov.sg](http://florafaunaweb.nparks.gov.sg)

This brochure features 10 common plant diseases found in community gardens.

Plant diseases are mostly caused by the following agents: fungi, bacteria and viruses.

We hope that this brochure will encourage you to practise Integrated Disease Management to prevent plant diseases in the garden and promote better plant health.

# Bacterial Wilt



Anthracnose is caused by leaf-borne fungi that develop in warm and humid environments. It can be spread via wind, water, insects and contaminated garden tools.

### Vulnerable Plants

Fruiting vegetables such as brinjal, chilli, cucumber, melon and tomato

### Symptoms

Small irregularly shaped spots with dark brown edges appear on the leaves, and sunken spots with dark margins appear on the fruits.

### Preventive and Control Measures

Remove and dispose of diseased plants immediately in a sealed bag or a bin away from the garden to prevent further spread. Plant seeds or seedlings with adequate spacing to minimise contact between leaves.



Bacterial wilt is caused by a soil bacterium that is spread through root wounds and infected soil.

### Vulnerable Plants

Fruiting vegetables such as brinjal, chilli and tomato

### Symptoms

The leaves start wilting first, followed by the rest of the plant. Affected stems and roots will show bacterial ooze when cut.

### Preventive and Control Measures

Use clean and bacteria-free seeds, or bacterial-resistant varieties of seeds. Ensure your cutting tools are well sterilised, particularly after handling unknown or infected plants.

# Downy Mildew



Downy mildew is an airborne fungus that develops in warm and wet environments. It is typically spread through water and leaf-to-leaf contact.

### Vulnerable Plants

Fruiting vegetables such as cucumber and pumpkin, and leafy vegetables such as spinach

### Symptoms

Patches of yellow discoloration can be seen on the upper side of the leaves, with whitish grey fungal growth on the underside of the leaves.

### Preventive and Control Measures

Avoid watering the plants directly on the leaves. Regularly prune your plants to improve air circulation. Remove and dispose of diseased plant parts immediately in a sealed bag or a bin away from the garden to prevent further spread.

# Damping-off



Damping-off is a fungal disease primarily caused by waterlogged soil, affecting seeds and new seedlings. Overcrowded seedlings are also vulnerable.

### Vulnerable Plants

Most leafy vegetables and fruiting vegetables such as brinjal, chilli, melon and tomato

### Symptoms

Seedlings typically die in patches, with their root collars rotting and collapsing. Seeds will also have poor and uneven germination rates.

### Preventive and Control Measures

Provide well-drained soil and prevent waterlogging. Ensure seeds are planted with adequate space to prevent overcrowding during germination.

# Collar Rot



Collar rot is caused by a soil fungus that is spread through infected underground plant parts and infected soil.

### Vulnerable Plants

Most leafy and fruiting vegetables

### Symptoms

Leaves turn black and begin to rot. Root collars and roots will also rot and collapse.

### Preventive and Control Measures

Provide well-drained soil and prevent waterlogging. Remove and dispose of diseased plant parts immediately in a sealed bag or a bin away from the garden to prevent further spread.

# Anthracnose



Anthracnose is caused by leaf-borne fungi that develop in warm and humid environments. It can be spread via wind, water, insects and contaminated garden tools.

### Vulnerable Plants

Fruiting vegetables such as brinjal, chilli, cucumber, melon and tomato

### Symptoms

Small irregularly shaped spots with dark brown edges appear on the leaves, and sunken spots with dark margins appear on the fruits.

### Preventive and Control Measures

Remove and dispose of diseased plants immediately in a sealed bag or a bin away from the garden to prevent further spread. Plant seeds or seedlings with adequate spacing to minimise contact between leaves.

# Fusarium Wilt



Fusarium Wilt is caused by a fungus that is spread through root wounds and infected soil. It typically develops during hot weather.

### Vulnerable Plants

Most leafy vegetables

### Symptoms

Lower leaves and then younger leaves will turn yellow, and the plant may wilt. The plant's stems will also discolour.

### Preventive and Control Measures

Perform crop rotation with non-Brassica plants such as bayam, kang kong and lettuce. Loosen the soil before planting the next cycle of crops to aerate the soil. Remove and dispose of diseased plant parts immediately in a sealed bag or a bin away from the garden to prevent further spread.

# Mosaic Viruses



Mosaic viruses affect a wide variety of plants and are mostly spread by insects or through infected seeds.

### Vulnerable Plants

Fruiting vegetables such as beans, cucumber, papaya and tomato

### Symptoms

Green or yellow patches will appear on curling leaves. Flowers, fruits, leaves and stems will also distort, with the plant exhibiting stunted growth.

### Preventive and Control Measures

Before planting, ensure that the seeds are disease-free by obtaining them from reputable sources. Remove and dispose of diseased plants immediately in a sealed bag or a bin away from the garden to prevent further spread.

# Powdery Mildew



Powdery mildew is caused by a fungus that develops in humid and overcrowded conditions.

### Vulnerable Plants

Fruiting vegetables such as bitter melon, cucumber and pumpkin

### Symptoms

Powdery white spots will develop on the upper surface of the leaves. Leaves may also curl and break.

### Preventive and Control Measures

Avoid watering the plants directly on the leaves. Remove and dispose of diseased plant parts immediately in a sealed bag or a bin away from the garden to prevent further spread.

# White Rust



White rust is caused by a fungus that favours cool and moist environments, and can be spread via wind, water or insects.

### Vulnerable Plants

Leafy vegetables such as bayam, Chinese cabbage, kang kong and sweet potato

### Symptoms

Yellow discoloration and lesions will form on the upper side of the leaves. White or cream-coloured rust spots with raised centres will be visible on the underside of the leaves.

### Preventive and Control Measures

Avoid watering the plants directly on the leaves. Remove and dispose of diseased plant parts immediately in a sealed bag or a bin away from the garden to prevent further spread.