

## Environmentally friendly pest management options



Use of wood ash

### Traditional

Aphids can be treated by applying wood ash evenly on infested parts of the plant. Spider mites can be disrupted by overhead irrigation or spraying with a strong jet of water to knock them off the plant and destroy their webs.



Commercial neem extract

### Bio-based

Neem oil has a broad spectrum of action and it can reduce caterpillars and cutworms, as well as aphids and spider mites. Fungal pathogens can also be used to manage aphids and spider mites.



Insect-proof netting

### Insect-proof netting

Insect-proof netting creates a barrier that prevent insects from gaining access to crops, often grown inside high tunnels or screen houses.

## Environmentally risky pest management options



Synthetic pesticides used in pest management

### Synthetic pesticides

Aphids are easily managed using products like acetamiprid, pirimicarb and cyfluthrin, while spider mites are managed using abamectin and emamectin benzoate. Follow the pesticide label instructions to avoid pesticide over dosage.

# Nightshade pest management

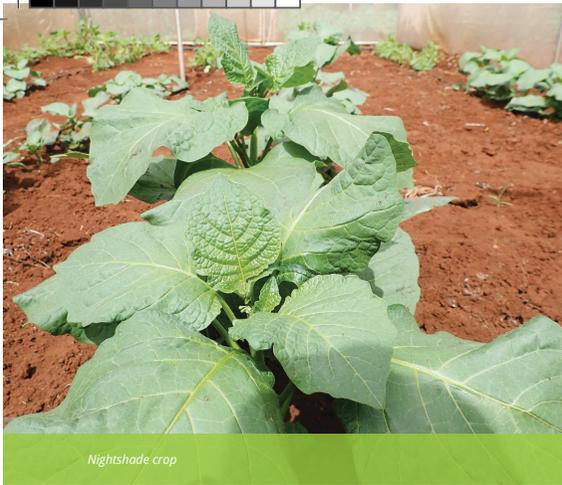
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Nightshade crop

## Nightshade

Nightshade is widely distributed throughout the tropics and can be found throughout the East African region. Nightshade is often preferred and an important part of the diet where leaves are cooked as a vegetable. The raw leaves contain proteins, carbohydrates and are moderately high in vitamin C.

### Common pests and their natural enemies

At early growth stage, nightshade is susceptible to flea beetles feeding on the under sides of leaves causing small round shot holes, crickets chewing on roots and leaves, cutworms that feed by "cutting" and destroying the base of seedlings. During the vegetative and flowering stage, nightshade is also attacked by leafminers that mine inside the leaves and fruits, caterpillars that feed on all plant parts, whiteflies that suck sap causing leaf curl, thrips that pierce and feed on leaves, buds, flowers and fruits causing scarring, but aphids, spider mites are more common and frequently serious pests. Wild birds and domestic fowl can also be serious pests of nightshade, damaging seedlings, chewing on leaves and feeding on seeds. Common natural enemies include ladybird beetles, predatory bugs, parasitic wasps and pathogens.



Bird pests



Caterpillar pests



Whitefly pests



Aphid pests

Ladybird beetle larva predator

### Aphids

Green and black aphids are the most common pests of nightshade. Aphids feed by sucking sap from the under surface of leaves and cause leaves to curl and eventually turn yellow. This increases the chance of leaves drying out or death of the plant. When aphids feed on buds they cause flower malformation. Aphids produce honeydew, which at high densities cause sooty mold and attracts ants that defend aphids against natural enemies. Aphids attract predators such as ladybird beetles, predatory bugs, lacewings and hoverflies. Other natural enemies included parasitic wasps and fungal pathogens.

### Spider mites

Nightshade leaves are often attacked by spider mites, particularly when the weather is hot and dry. Spider mites cause damage by piercing plant tissues to suck sap, particularly on young leaves and shoot tips. Mite symptoms are cluster of yellow spots on the surface of leaves that appear chlorotic and give damaged leaves a speckled or mottled appearance. At high densities, mites produce webbing that is visible on the tips of shoots and leaves, and reduce plant growth, flowering and fruit production. Predatory mites are the main natural enemy of spider mites, but also ladybird beetles, predatory thrips and some predatory bugs.



Spider mites

### Best practices for avoiding pests



Yellow sticky traps for monitoring insects

#### Pest and natural enemies monitoring

Monitor spider mites by randomly selecting 10 nightshade plants per 1000 m<sup>2</sup> following a W shape pattern. Access the level of mite damage on 2 leaves per plant by using a leaf damage index ranking on a scale from 1 to 5 (where 1 is few yellow spots and 5 is a leaf totally covered with spots and dry patches). Once the average damage level exceeds the first scale rank, control measures should begin. It can be very difficult to control spider mites once established, so plan to treat when you count 8 adult mites per leaf.

On the same plants that spider mites are monitored, aphid populations can also be monitored by inspecting buds and the undersides of 2 leaves taken from the top and bottom of the plant for clusters of aphids and counting the number present. Treat if pest populations continue to increase while natural enemies remain static or decline. Yellow sticky trap can be used to monitor winged aphids.

