



DOVE
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Information

NEMATODES

Nematodes are microscopic roundworms which can feed on all parts of the plant (more usually the roots) and use a needle-like piercing mouthpart called a stylet. This stylet penetrates the plant cell and allows the nematode to withdraw sap. At the same time, bacteria can enter the plant and cause secondary infections (e.g. *Phytophthora* through weakened root systems).



Symptoms of Damage

All nematodes can 'swim' through a film of water and the ones that mainly attack the foliage can travel through the xylem and phloem quite effectively, feeding on leaves and stems. Symptoms include wilting and angular damage (see pictures below) which can be mistaken for a downy mildew infection. New foliage is stunted and weak with fewer leaves being produced.



Root symptoms vary depending on the type of nematode. Symptoms include galls, stunting, root decay and deformation. Prolonged root stress can lead to yellowing of the plant and during dry conditions, the plants react by wilting quickly compared to uninfected plants in the same situation.

Viruses and fungal infections can take hold quickly because of previous nematode damage. Particularly vulnerable plant species include Japanese anemone, *Buddleja*, *Weigela* and *Viburnum*.

Use plant protection products safely. Always read the label and product information before use

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Some soil-borne nematodes that can cause major crop losses in HONS include the following species:

1. *Pratylenchus penetrans* - are commonly known as lesion nematodes because of the necrotic lesions that are left after their entry into the plants' roots. These are endoparasites that are a troublesome pest on a wide range of ornamentals and agricultural crops. They can facilitate diseases such as *Verticillium* wilt (CSL, 2003). *Pratylenchus* nematodes are commonly known as pin nematodes and although they are of minor economic importance, have a wide host range.
2. *Trichodorus* and *Paratrichodorus* species are commonly known as stubby root nematodes and can affect the root system of crops. They can be vectors of diseases such as Pepper Ringspot, Tobacco Rattle Virus and Pea Early-browning Virus (CSL, 2003).
3. *Macroposthonia* species are commonly known as ring nematodes and are distributed widely across the UK. Higher numbers can cause symptoms of direct feeding damage (CSL, 2003).
4. Spiral nematodes such as *Rotylenchus robustus* can affect crops such as lettuce, carrots and nursery trees and produce early yellowing in peas (CSL, 2003).

Nematode spread can occur from infected areas by the following methods:

Spread by:	Nursery hygiene option:
Roots (from the field into the container)	Check plant material before propagating/potting
Soil (through cultivation)	Treat soil with a green manure crop such as Sudan grass (see below)
Untreated recycled water/water running down the nursery from infected sites	Treat water before reusing and cover tanks to prevent organic matter being a food source
Equipment (machinery) and tools	Clean tools before transferring to another crop
Shoes	Make sure staff are aware of any potential contamination issues
Poorly maintained crops	Keep plant stress to a minimum
Lack of knowledge of previous infections	Keep good records
Plant debris	Remove and destroy when seen
Host weeds like groundsel and chickweed	Keep the growing area weed-free

Practicing good nursery hygiene will result in better containment of any nematode infection. The pest can be easily spread during propagation, so check imported/externally UK-sourced crops, make sure mother plants are free from the pest and introduce hot water treatments to susceptible species.

Spread from one plant to another can occur particularly during overhead irrigation so increased plant spacing or watering by capillary action are alternative growing methods.

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Removal Options

1. Fumigation

Chemical fumigants are effective but are highly toxic and require strict safe handling procedures to be in place during use and storage by authorised personnel.

The loss of methyl bromide means we now have dazomet which can be mixed with products containing chloropicrin (emergency approval only). It is recommended that a licenced contractor is used to apply these products.

2. Application of systemic insecticides

Vydate 10G - an organophosphorus product. It is systemic and also requires an Extension of Authorisation for Minor Use (2014-1636) for use in outdoor ornamental plant production.

Movento – A systemic insecticide with basipetally mode of action which requires an Extension of Authorisation for Minor Use (2011-1987) for use in outdoor ornamental plant production.

3. Green manure crops

The use of a green manure crop such as Nemat* (*Eruca sativa*), Caliente* mustards or Sudan grass (*Sorghum bicolor*), which releases a form of hydrogen cyanide when cut or frosted can significantly reduce a nematode infection. It also releases a compound called sorgoleone which is a weed suppressant.

French marigold 'Ground Control' has good nematicidal activity through the roots on a wide range of nematodes that cause a variety of destructive symptoms and reduce crop quality. The level of effectiveness does depend on the intraspecific differences in the plants and nematodes present in the soil. The marigolds also attract natural predators when they are in flower.

Using green manures will also improve soil structure and maintain soil moisture levels and the resulting incorporation at the end of the season results in the breakdown of organic matter, releasing a range of beneficial, disease-fighting micro-organisms.

* available from Plant Solutions Ltd.

4. Biological control

If leaves are kept wet for a few hours then nematodes such as *Steinernema feltiae* may give some control over foliar nematodes. The film of moistures allows the nematodes to penetrate the leaf and seek out the pest. Results from recent HDC projects suggest that this method would need to be used in combination with other control methods.

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