Grower Summary

CP 104

Novel approaches for the management of leaf and bud nematodes (Aphelenchoides species) in hardy nursery stock

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Project title:	Novel approaches for the management of leaf and bud nematodes (*Aphelenchoides* species) in hardy nursery stock
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Project leader:	Andy Evans, SRUC
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Date project commenced:	14th October, 2013
Date project completed (or expected completion date):	30th September, 2016

GROWER SUMMARY

Headline

Three applications of HDC 71 significantly reduced nematode multiplication on Japanese anemone and weigela compared with a two application treatment and a control (no HDC 71 applied) treatment.

Background

Foliar nematodes, also called leaf and bud nematodes (LBN), *Aphelenchoides* species cause serious damage on many ornamental plants grown both outdoors and under protection throughout the United States, Canada, and Europe. They are a significant foliar pest of hardy nursery stock plants (over 700 host species have been recorded), whose feeding results in angular-shaped blotches on the leaves which are defined by the veins and often accompanied by leaf distortion. In the UK, *Aphelenchoides ritzemabosi* and *A. fragariae* are the two main foliar nematode species of economic importance.

The infestation usually starts at the base of the lower leaves where humidity is highest, and spreads upwards. LBN cause chlorotic lesions that can become necrotic. The lesions eventually turn blackish-brown and affected parts may shrivel. If buds or young leaves are infested, they may not develop properly and could become deformed. Flower development may also be affected. As ornamentals are sold for their aesthetic value, these plants are often unsaleable, making foliar nematode damage very costly for ornamental growers.

LBN problems have become important because of the withdrawal and subsequent loss of systemic nematicides, increased nursery production of vegetatively propagated plants, and the world-wide trade in plant material. A range of products for the control and management of LBN have been evaluated previously (as part of HNS 131, Horticultural Development Company), the results suggesting that Dynamec (abamectin) is ineffective against LBN and that Vydate 10G (oxamyl) was probably the most effective available product at the time.

Vydate 10G can be used on outdoor ornamental plants and also has an extension of authorisation for minor use (EAMU) on protected ornamental plants (*which expired on 30 June 2015*). However, oxamyl is not compatible with IPM programmes. Its use also requires precautions for operator and environmental protection, with a re-entry time to treated glasshouses and a harvest interval. In addition, its continued future availability is uncertain.

This project therefore aims to develop new approaches for the management of these nematodes in hardy nursery stock by evaluating individually, and in combination, the efficacy

of products derived from plant extracts and currently approved plant protection products to reduce nematode infestation in plants.

The project evaluated the application of products that act as elicitors of plant defences to determine whether they can confer levels of resistance to nematodes. Elicitors are natural and synthetic compounds that induce defence responses in plants triggered by the pathogen infection/pest infestation. These studies were carried out in the laboratory, glasshouse and are ongoing at grower's nurseries.

Summary

As a follow up to the laboratory bioassays experiment conducted earlier in the project, which identified several potential products for use in foliar nematode management studies, we developed a method of nematode inoculation of nematode-free plants. The reason for this was to develop a robust inoculation method which could then be used for screening potential control products. In addition, studies were carried out on two elicitor products coded as HDC 71 and HDC 72 on two plant species, namely weigela and Japanese anemone. The outcome led to a further study whereby HDC 71 alone was investigated within different application programmes.

Results show that leaf inoculation led to significant nematode invasion and subsequent multiplication in the leaf was about 80% higher than multiplication rates under normal growing conditions. Also, the preliminary glasshouse trial with different treatment programmes (carried out to investigate the effect of HDC 71 on *A. fragariae* multiplication in Japanese anemone), showed that HDC 71 significantly reduced the multiplication of the nematode population by up to 60% when compared with a control treatment (no HDC 71) and that a three application programme was better than two. The quality and saleability of plants can therefore be extended by reducing the development of visual symptoms on the plant. However, it is expected that HDC 71 would not be used as a sole treatment but in combination with other treatments.

The promising products previously identified in laboratory bioassays and the elicitor (HDC 71) are currently undergoing preliminary field trials at two grower nurseries. Susceptible host plants being investigated include: *Astrantia*, *Bergenia*, *Brunnera macrophylla*, *Buddleja*, *Cistus*, *Dryopteris affinis*, *Gunnera mannicata* and Japanese anemone.

Products are being tested individually and in combination as an integrated management approach to assess their efficacy under commercial field conditions.

Financial Benefits

Although an accurate estimate of financial benefit cannot be given yet, more than half of the plants treated with HDC 71 were seen to be of commercially viable quality compared with the untreated. Discussions with growers suggest that they could save between £2,500 – £15,000 per annum depending upon the plants grown and size of the nursery, despite the additional cost of HDC 71, if used.

Action Points

Cultural control methods are an important component of the management of LBN within integrated pest management (IPM) programmes. The most effective of these methods is the adoption of high levels of crop hygiene, as foliar nematodes can survive for several years in infested dried leaf debris.

Control programmes should include:

- the removal and destruction of infested plants and debris
- avoidance of replanting in contaminated land
- sterilisation of pots and equipment prior to re-use
- if possible, minimising the use of overhead irrigation and misting systems which create ideal conditions for nematode infection
- use of oxamyl where permitted and appropriate.