



# Grower Summary

---

## **CP 104**

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

Final 2017

## **Disclaimer**

While the Agriculture and Horticulture Development Board seeks to ensure that the information contained within this document is accurate at the time of printing, no warranty is given in respect thereof and, to the maximum extent permitted by law the Agriculture and Horticulture Development Board accepts no liability for loss, damage or injury howsoever caused (including that caused by negligence) or suffered directly or indirectly in relation to information and opinions contained in or omitted from this document.

©Agriculture and Horticulture Development Board 2017. No part of this publication may be reproduced in any material form (including by photocopy or storage in any medium by electronic mean) or any copy or adaptation stored, published or distributed (by physical, electronic or other means) without prior permission in writing of the Agriculture and Horticulture Development Board, other than by reproduction in an unmodified form for the sole purpose of use as an information resource when the Agriculture and Horticulture Development Board or AHDB Horticulture is clearly acknowledged as the source, or in accordance with the provisions of the Copyright, Designs and Patents Act 1988. All rights reserved.

The results and conclusions in this report may be based on an investigation conducted over one year. Therefore, care must be taken with the interpretation of the results.

## **Use of pesticides**

Only officially approved pesticides may be used in the UK. Approvals are normally granted only in relation to individual products and for specified uses. It is an offence to use non-approved products or to use approved products in a manner that does not comply with the statutory conditions of use, except where the crop or situation is the subject of an off-label extension of use.

Before using all pesticides check the approval status and conditions of use.

Read the label before use: use pesticides safely.

## **Further information**

If you would like a copy of the full report, please email the AHDB Horticulture office (hort.info.@ahdb.org.uk), quoting your AHDB Horticulture number, alternatively contact AHDB Horticulture at the address below.

AHDB Horticulture,  
AHDB  
Stoneleigh Park  
Kenilworth  
Warwickshire  
CV8 2TL

Tel – 0247 669 2051

AHDB Horticulture is a Division of the Agriculture and Horticulture Development Board.

**Project title:** Novel approaches for the management of leaf and bud nematodes (*Aphelenchoides* spp.) in hardy nursery stock

**Project number:** CP 104

**Project leader:** Andy Evans, SRUC

**Report:** Final Report, June 2017

**Previous report:**

**Key staff:** Idowu Rotifa

**Location of project:** SRUC Edinburgh

**Industry Representative:** Nick Reese, Jackdaws' Field Nursery, Horsham – West Sussex. RH13 6LL

**Date project commenced:** 14<sup>th</sup> October, 2013

**Date project completed** 31 December, 2016

# GROWER SUMMARY

## Headline

Several products, including insecticides and an elicitor of plant defences, reduced foliar nematode multiplication on a range of ornamental plants evaluated using a curative (on plants showing nematode symptoms) and preventative (on plants initially free from nematode infection) approach. These treatments led to improved post-treatment appearance for the plants compared with untreated plants. Treatments applied to the soil were also effective at reducing this route of nematode infection into plants.

## Background

Foliar nematodes, also called leaf and bud nematodes (LBN), *Aphelenchoides* spp. cause serious damage to many ornamental plants grown in greenhouses, nurseries and field throughout the United States, Canada, and Europe. They are a significant foliar pest of hardy nursery stock plants (over 700 host species), 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 long distance movement of plants. A range of alternatives for the control and management of LBN have been evaluated previously (HNS 131 Final Report. Horticultural Development Company), the results suggesting that Dynamec (abamectin) is ineffective against LBN and that Vydate 10 G (oxamyl) was probably the most effective available product (Bennison, 2007)

Vydate 10 G currently has an extension of authorisation for minor use (EAMU) on protected ornamental plants. However, Vydate 10 G is not compatible with IPM programmes. Its use also requires precautions for the operator and environmental protection, with a re-entry time to treated glasshouses and a harvest interval. In addition, the EAMU is uncertain after December 2017, hence the need for alternatives to Vydate 10 G to manage leaf and bud nematodes.

This project therefore developed 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 pesticides to reduce nematode infestation on plants.

The project has also 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 pathogen infection. These studies were carried out in the laboratory, glasshouse and at outdoor conditions in grower's nurseries.

## Summary

After a series of tests conducted in the laboratory and with glasshouse bioassays earlier in the project, which had identified several potential products to be used for foliar nematode management, we proceeded further with field evaluation of foliar treatments and soil application to confirm product's efficacy for foliar nematode management on a range of plants in both glasshouse and outdoor conditions.

These potential products which include HDC 069 (plant extract), Movento (spirotetramat), Dynamec (abamectin) and HDC 071 (plant defence elicitor) were evaluated using robust nematode inoculation and product application methods to develop a novel nematode treatment programme. Products were tested individually and in combination as an integrated management approach to assess their efficacy using curative and preventative approaches.

The curative approach was carried out on a range of naturally infested ornamental plants which include *Gunnera manicata*, *Cistus*, *Bergenia*, *Brunnera macrophylla*, *Dryopteris affinis*, *Astrantia major*, Japanese anemone and *Buddleja davidi*, while the preventative approach programme was used to evaluate treatment efficacy on nematode-free plants of Japanese anemone and *Buddleja davidi*. Furthermore, a soil treatment programme was evaluated to prevent nematode movement from soil to clean plant using Vydate 10 G (standard), HDC 070 (a plant extract), HDC 088 (bionematicide), HDC 084 (biopesticide) and HDC 101 (nematicide) in a glasshouse study.

The field results show that the foliar application programme of Dynamec, Movento, and HDC 071 as single treatments or in combination with HDC 071 as a curative treatment to already infested plants significantly reduced nematode populations by 61–97% when compared with an untreated control. Results on preventative treatments (with nematode-free plants inoculated with nematodes after the first treatment) showed a significant reduction in nematode multiplication on treated plants compared with untreated control. Nematode populations on Japanese anemone range between 157-609 / 5 g leaf from treated plants and 2570-5005 / 5 g leaf from untreated control. Buddleja plants gave 72-540 / 5 g leaf from treated plants while untreated control had 2454 / 5 g leaf.

The overall results show that Movento (spirotetramat), Dynamec (abamectin), HDC 069 (plant extract), HDC 071 (elicitor) in a foliar application programme resulted in effective management of foliar nematodes on a range of ornamental plants. HDC 071 in combination with Spirotetramat, Dynamec and HDC 069 also enhanced the management of foliar nematodes on a range of ornamental plants. The products above can limit nematode multiplication in already infected plants, and on asymptomatic plants. Results from applying treatments to the soil to target nematode infection via this route showed that SC 400, HDC 070, HDC 088 and HDC 084 along with Vydate 10 G (as the standard) significantly reduced nematode movement from infected soil to the plants and subsequent nematode infection compared with the untreated control.

### **Financial Benefits**

Even though we cannot give an accurate financial benefits, plants treated with the products Movento (spirotetramat), Dynamec (abamectin), HDC 069 (plant extract) and HDC 071 (elicitor) were seen to be effective for foliar nematode management. Depending on the plants and size of the nursery, our previous discussions with growers suggest that an average size nursery could save between £2500 to £15,000 per annum, despite the additional cost of using the products mentioned above.

### **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 is a programme of high crop hygiene as foliar nematodes can survive for several years in infested dried leaf debris.

Cultural control programmes should include:

- the removal and destruction of infested plants and debris
- avoiding replanting in contaminated soil
- sterilisation of pots and equipment
- if possible avoid the use of overhead irrigation and misting systems which create ideal conditions for nematode infection
- the use of Vydate 10 G (oxamyl) or the adoption of the products and programmes outlined in this report where necessary

