



Agriculture & Horticulture
DEVELOPMENT BOARD



New Project

FV 405

Carrots: Control of carrot cavity spot through the use of pre-crop green manures/biofumigation

Project Number:	FV 405
Project Title:	Carrots: Control of carrot cavity spot through the use of pre-crop green manures/biofumigation
Project Leader:	Dr John Clarkson
Contractor:	University of Warwick
Industry Representative:	John Kenyon Marsh Farm
Start Date:	1 st September 2012
End Date:	31 st January 2016
Project Cost (Total Project Cost):	£101,073 (£108,773)

Project Summary:

Cavity spot is a major disease problem for carrot growers.

We have already demonstrated that incorporating a pre-carrot green manure of “hot” mustards (which release toxic isothiocyanates) can give effective control of cavity spot disease - but the use of plastic film made this commercially uneconomic.

Our current understanding of the disease suggests that both the use of hot mustards and plastic film may be unnecessary as the most important factor in suppressing the disease is increasing the activity of competing soil microbes.

The proposed project will:

- test whether hot mustards are still effective without a sealing film.
- test whether cold manure crops can also give control
- develop the methodology to make it commercially feasible
- demonstrate control of cavity spot in commercial fields
- test the green manures for effects on the numbers of “free-living” parasitic nematodes and on viability of *Sclerotinia sclerotiorum* sclerotia
- communicate the method developed to the industry

Aims & Objectives:

(i) Project aim(s):

To develop the use of green manures/biofumigation for control of carrot cavity spot in a commercially acceptable way.

(ii) Project objective(s):

1. To test green manures including “hot” mustards and other Brassica and non-Brassica crops for the control of cavity spot disease.
2. To understand the effects of treatments on the level of *P. violae* associated with the disease
3. To assess the effects of the treatments for cavity spot on “free living” plant parasitic nematodes and on *Sclerotinia sclerotiorum* sclerotia.
4. To demonstrate the efficacy of green manures for cavity spot control on commercial farms and assess the economic impact.
5. To communicate the results to the carrot industry.

Benefits to industry

The main benefit to the industry will be the availability of a sustainable control method for cavity spot disease, which is consistently ranked as the most important disease by carrot growers. This new approach will not involve synthetic fungicides and is likely to be acceptable as part of both conventional and organic production systems (although generally organic growers do not suffer from the disease).

Cavity spot is highly variable in occurrence and distribution and, as development of the disease is highly dependent on environmental factors whilst the crop is growing, no pre-crop predictions of disease severity can be made. So, assuming an effective method of control is developed, individual growers will need to make a decision as to whether they want to use a pre-carrot green manure crop as “insurance”. The precise economic benefit will be dependent on which green manure crops are effective and individual grower’s costs.

We anticipate that this control strategy will involve extra production steps/costs which are described below for a main-crop (early crops would need altered timings but are generally less affected by the disease anyway). The cost of operations (and possibly renting the land for longer) would need to be set against the potential for crop loss (up to 100% if the crop is rejected). The following steps assume an autumn planting of the green manure but it is possible a spring crop may also be effective and if so timings would be need to be adjusted.

1. Preparation of the land in Autumn (no beds).
2. Sowing the green manure crop (including seed costs).
3. Appropriate fertiliser additions (some of this will be recouped by incorporating the resulting crop).
4. Crushing the crop and incorporating the residue in the Spring. Beds could

be formed at this point or later. The carrot crop can be drilled after a short interval (approx. 2+ weeks).

There are unlikely to be any regulatory hurdles with this approach – so the decision to use an “insurance” green manure for any grower would be based on the cost of the above extra operations weighed against the perceived risk and costs of crop loss.

An added benefit of the project is that in addition to the potential for cavity spot control, the green manures will also be assessed for their effects on “free-living” nematodes to determine whether a secondary benefit can be gained by reducing “fanging” (or possibly indicate that potential benefits from cavity spot control may be off-set by increased nematode damage) and also for their effect on the resting bodies (sclerotia) of *Sclerotinia*.

It is intended that the method developed here would be tested on commercial sites and should be immediately applicable. However, some further studies on very different soil types or in areas of extreme climate may be necessary.

Disclaimer

AHDB, operating through its HDC division 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.

No part of this publication may be reproduced in any material form (including by photocopy or storage in any medium by electronic means) or any copy or adaptation stored, published or distributed (by physical, electronic or other means) without the 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 HDC is clearly acknowledged as the source, or in accordance with the provisions of the Copyright, Designs and Patents Act 1988. All rights reserved.

AHDB (logo) is a registered trademark of the Agriculture and Horticulture Development Board. HDC is a registered trademark of the Agriculture and Horticulture Development Board, for use by its HDC division. All other trademarks, logos and brand names contained in this publication are the trademarks of their respective holders. No rights are granted without the prior written permission of the relevant owners.

Further information

Email the HDC office (hdc@hdc.ahdb.org.uk), quoting your HDC number, alternatively contact the HDC at the address below:

HDC
AHDB
Stoneleigh Park
Kenilworth
Warwickshire
CV8 2TL

Tel – 0247 669 2051

HDC is a division of the Agriculture and Horticulture Development Board.