

Grower Summary

FV 373

Carrots: Incidence of cavity spot
in Commercial Crops

Final 2013

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Further information

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

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Project Leader:	David Martin
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Industry Representative:	Martin Evans, BCGA
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Headline

In the first two years of the project there was a relationship between cavity spot disease incidence and water input at particular stages of root bulking, but these were not confirmed in 2012 which was an extremely wet year throughout.

Background

Cavity spot is a serious and recurring disease of commercial carrots in the UK which is largely unpredictable. Current control systems rely on the use of a single soil applied fungicide treatment which is only partially successful and growers need improved methods of control.

In 2008-09 the British Carrot Growers Association developed a specific R&D strategy for Cavity Spot. This strategy has now been finalised following active and robust discussion from members of the BCGA technical committee and six target categories have been identified in the strategy. This project is intended to cover a gap under general agronomy and aims to document, as far as possible, the conditions relating to the occurrence of cavity spot in 'high risk' commercial sites which together with site history and site conditions will add considerably to the knowledge bank and should help identify situations which should be avoided.

Summary

Thirty commercial carrot production sites provided by members of the BCGA and representative of the main carrot production areas of England and Scotland were monitored for total water input (precipitation and irrigation), soil moisture and soil temperature. At each site the incidence and severity of cavity spot disease was established by sampling prior to harvest and relationships were sought between the recorded site conditions and the incidence of disease.

At each site an automatic soil moisture station was installed in a representative area of the field. This consisted of a Remote Transmission Unit (RTU) and SIM set up to log all data and communicate via GPRS network together with an automatic tipping bucket total water input sensor (resolution 0.2mm per tip) and soil moisture (SM) probe using an SDi12 interface. The SM probe consisted of a sealed tube containing capacitance sensors at 100, 200 and 300mm depths and an integrated temperature sensor at the middle level.

The station recorded the total water input (precipitation plus irrigation), soil temperature (degrees C) and soil moisture (% soil moisture at 3 levels).

Data was collected continuously from all of the RTUs from the time of installation (normally shortly after seeding) to just prior to harvest of the crop or just prior to strawing down. The resultant data file was converted to hourly values and then to daily summaries for analysis.

Periods when the soil was saturated were noted and used in the analysis of correlations. The 10mm crown crop stage was also recorded and for those sites where accurate records were not taken this crop stage was estimated from the sowing date and the observed rate of growth.

Crops were sampled when mature and before harvesting or strawing. At each site samples were collected and washed to reveal any cavity spot lesions. Each sample was recorded for the incidence of disease lesions (% roots affected) and the severity of the disease (scale 1 to 5).

Table 1: Summary of Incidence % and Severity (1 to 5) of Cavity Spot disease in 2012

ID	Site 2012	Crop	10cm crown	% Incidence	1 to 5 Severity
1	Croxton	Early	20-Apr	2	1.7
2	Alderton	Early	18-Apr	19	3
3	Butley	Early	22-Apr	0.7	0.7
4	Friston	Early	21-Apr	1	0.7
5	Methwold	Early	20-Apr	0	0
6	Riddlesworth	Early	20-Apr	2	2
7	Kellington	m/c	01-Jul	0	0
8	Thoresby	m/c	21-Jun	0	0
9	Ravenshead	m/c	22-Jun	0	0
10	Apley Head	m/c	03-Jul	0	0
11	Edenwood	m/c	05-Aug	4.7	1.3
12	Ladybank	m/c	00-Jan	0.7	0.3
13	Dunshalt	m/c	20-Aug	0	0
14	Bilsthorpe	m/c	08-Aug	0.3	0.3
15	Walesby	m/c	06-Aug	0	0
16	Titchwell	m/c	24-Aug	0	0
17	Papplewick	m/c	16-Aug	0	0
18	Babworth	m/c	13-Aug	0.3	0.3
19	Barmby Moor	m/c	13-Aug	0.3	0.3
20	Holme	m/c	13-Aug	12.3	1
21	Halsall Carr Moss	m/c	08-Aug	0.3	0.3
22	Halsall	m/c	13-Aug	1.3	1
23	Elveden	m/c	13-Aug	7	1

24	Sutton	m/c	13-Aug	10.3	1.3
25	Isleham	m/c	07-Aug	16.3	2.3
26	Falkenham	m/c	13-Aug	0	0
27	Hillborough	m/c	13-Aug	15	1.3
28	Marham	m/c	17-Aug	13	2.3
29	S. Pickenham	m/c	07-Aug	1	1.3
30	Kentford	m/c	17-Jun	0	0

2012 started in drought up to the end of March but eventually turned out to be an exceptionally wet year with double the normal precipitation and a reduced temperature and evapotranspiration. It might have been expected to have been a year of higher than average cavity spot but this was not the case. In this study the incidence of disease was around average with 62% of study crops affected but the severity of the infections was low. In commercial crops growers report some unexpected severe infections but losses generally have been low.

In our studies the results for the three years have been as follows:

1. In 2012 cavity spot disease was recorded in 64% of sites. Of those sites which were affected the average score for disease severity was 1.2.
2. In 2011, cavity spot disease was recorded in 67% of sites. Of those sites which were affected the average score for disease severity was 1.1.
3. In 2010 the data showed 53% sites with affected roots and an average severity score of 2.0

The tentative relationships which appeared in the first two years between the incidence of cavity spot and the total water inputs in August for maincrop carrots were not particularly evident in 2012. Although the correlation between total water inputs (precipitation plus irrigation) in August and disease remained positive it dropped below a significant level as there were many anomalies. It has not therefore been possible to conclude with any certainty that excessive water particularly in August accounts for the development of cavity spot in maincrop carrots.

There was no correlation between soil temperature and disease in either year.

Overall during the project span of 3 years we have found the following:

- There are indications that disease is related to water input and there may be a susceptible crop stage. Early water seems to suppress disease and later water increases it. For example in 2010, increasing total water input (precipitation plus

irrigation) from the end of July and throughout August increased the incidence of cavity spot. Whilst in 2011 increased water input in early June had a beneficial effect on reducing disease levels; this effect was more marked in 2011 than in 2010. However this apparent relationship does not occur with certainty and we have observed many anomalies throughout the study.

- We introduced a crop stage marker which is the 10mm crown stage and have used this crop stage to see if we could confirm that this represents onset of any susceptibility to disease. We have been unable to confirm if this is the case.
- We have looked at degree of soil saturation and soil temperature with respect to disease and have not found any relationships.
- Factors of variety, pH, major soil nutrients, cropping history, and use of SL567A have not shown a consistent influence on the level of cavity spot disease in this study.
- This project is now extended (FV 373a) for the 2013/14 season to allow further data collection.

Financial Benefits

We have yet to provide a series of firm guidelines for growers which will lead to defined financial benefits.

Indications of a sensitive period when excessive water inputs could lead to disease have been observed and growers have been urged to manage their irrigation with care during this period in an attempt to reduce the susceptibility of their crops to cavity spot disease. This needs further study over a period of time to fully evaluate and define its financial significance.

Action Points

Growers are urged to review their knowledge of cavity spot disease (see HDC Research update as Factsheet 06/13) and implement the main recommendations which are as follows:

- Apply fungicides early in the season while ensuring total water input is greater than 15mm per week.
- For maincrop carrots, minimise total water input in August.

