



Grower Summary

**The epidemiology and management of
Cladosporium on raspberry**

300103

Annual report 2021

Project title: The epidemiology and management of *Cladosporium* on raspberry

Project number: 300103

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Report: Annual report, October, 2021

Previous report: Annual report, October, 2020

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Location of project: NIAB EMR

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Date project commenced: 1st November 2019

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The results and conclusions in this report are based on an investigation conducted over a one-year period. The conditions under which the experiments were carried out and the results have been reported in detail and with accuracy. However, because of the biological nature of the work it must be borne in mind that different circumstances and conditions could produce different results. Therefore, care must be taken with interpretation of the results, especially if they are used as the basis for commercial product recommendations.

AUTHENTICATION

We declare that this work was done under our supervision according to the procedures described herein and that the report represents a true and accurate record of the results obtained.

Lauren Farwell

PhD Student

NIAB EMR/Cranfield University



Signature

Date 12/11/21

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GROWER SUMMARY

Headline

Raspberries appear susceptible to *Cladosporium* skin lesions during the ripening and ripe stages of fruit development, and the stigmata may provide a mechanism for *Cladosporium* to colonise the fruit's surface.

The most frequently isolated species of *Cladosporium* found on raspberries in the UK is *Cladosporium cladosporioides*.

Background

Despite *Cladosporium* being capable of causing considerable crop losses to raspberry growers, little research has investigated the ecology and behaviour of this pathogen to provide potential methods of control. This PhD aims to investigate which environmental and biological factors impact *Cladosporium* growth and presence on fruit. From these studies, we hope to infer husbandry practices and potential methods of control to reduce the risk of *Cladosporium* lesions on raspberries.

Summary

In 2020, a proprietary variety of raspberry was inoculated with either a *Cladosporium* inoculum or a water control inoculum at four different stages of development (flower, green fruit, ripening fruit and ripe fruit). Fruit was assessed for skin lesion development and stigmata infections. It was found that the fruit was susceptible to *Cladosporium* during the ripening and ripe fruit stages. This suggests that agronomists and growers should begin looking for symptoms of *Cladosporium* from the ripening stage onwards.

Samples of raspberries were taken from both supermarkets and directly from growers across the UK, allowed to rot naturally and *Cladosporium* strains were isolated from these fruits. These were then sequenced to provide a molecular identification to the species level. Of 43 isolates collected, the most frequent species was *C. cladosporioides*. As *C. cladosporioides* is one of the most abundant fungal air-borne spores, it indicates that this is probably an important primary inoculum source, and therefore husbandry practices such as venting may impact on the inoculum load of *C. cladosporioides* in the fruit crop canopy.

Financial Benefits

This project on the key windows of opportunity for fruit susceptibility to *Cladosporium* will be beneficial for the development of appropriate management strategies for control. This will

allow more precision in the application of appropriate control measures which will prevent the use of ineffective approaches.

Future work will include the screening of potential biological control agents against *Cladosporium*, with the aim of providing advice to growers for more effective and economic management of *Cladosporium* on raspberries.

Action Points

Agronomists and growers should be more aware of the symptoms and visual assessment of *Cladosporium* skin lesions on raspberries from fruit ripening onwards.

Previous research has also shown that the Spotted Winged Drosophila (SWD) can create entry points in ripening raspberries for *Cladosporium* to become established (Swett *et al.* 2019). Therefore, good management practices against SWD will likely decrease the risk of *Cladosporium* infection on ripening fruit.

More effective hygiene to effectively remove senescent foliage and crop debris would be beneficial in reducing the sources of inoculum of *Cladosporium* in raspberry crops.