Grower Summary

SF/TF 170
CTP_FCR_2017_3

Biocontrol as a key component to manage brown rot disease on cherry

Annual 2018

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Further information

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Project title:	Biocontrol as a key component to manage brown rot disease on cherry
Project number:	SF TF 170/CTP_FCR_2017_3
Project leader:	Xiangming Xu, NIAB EMR Michael Shaw, University of Reading
Report:	Annual report, October 2018
Previous report:	NA
Key staff:	Sophia Bellamy
Location of project:	NIAB EMR
Industry Representative:	NA
Date project commenced:	October 2017
Date project completed (or expected completion date):	

GROWER SUMMARY

Headline

- Two microbial biocontrol agents (BCAs) (*Aureobasidium pullulans* and *Bacillus subtilis*) have been identified and have shown promise as a potential control method for brown rot disease of stone fruits.

Background and expected deliverables

Brown rot, caused by *Monilinia* spp. is one of the most important diseases of stone fruits worldwide. *Monilinia laxa* infections reduce crop yield in the field by causing blossom blight, twig cankers and fruit rot, and they can also cause latent infection on fruits. *Monilinia laxa's* low optimal temperature for conidial growth (5-10 ^{o}C) can lead to the rapid spread of rot within cold storage and reduce fruit shelf life. With the restriction of post-harvest fungicide application, the spread of rot can lead to significant post-harvest crop loss (Martini & Mari, 2014).
The primary source of inoculum is from overwintering on mummified fruits left on the trees and the orchard floor. The main control method relies on fungicide spraying. NIAB EMR recently identified two microbes that significantly reduced sporulation of the brown rot fungus *M. laxa* under laboratory conditions. We are currently investigating how to optimise the use of biocontrol products in practice, regarding suppressing sporulation on overwintered fruit mummies and preventing infection of blossoms and fruit.
A better understanding of the effect of interactions between BCAs and the brown rot pathogen over time is needed. Combined with an understanding of the disease epidemiology, this knowledge will inform the best application time for improved efficacy of the BCAs. We expect that an increased interaction time of a BCA with a pathogen, will lead to increased biocontrol efficacy. The ability of the BCAs to colonise and survive on the fruit or blossom is tantamount to its effectiveness. Therefore, more research into the behaviour of the two new BCAs when applied to the target area of the crop, the trophic networks and overall ecology, are crucial in their effective use (Ruano-Rosa *et al.,* 2016).
The two microbial antagonists initially characterised by Rungjindamai *et al.* (2013) show promise to become commercialised as biocontrol products. Future research to better understand their ecology, such as survival on different plant organs under different conditions, will lead to improved deployment to increase biocontrol efficacy. This knowledge will help to develop new biocontrol based strategies that are needed for more sustainable food production.

Objectives of the project
This CTP studentship project aims to answer the following questions:

- Can biocontrol organisms reduce primary inoculum of *M. laxa*?
- Can biocontrol organisms reduce blossom wilt and subsequent infection of young fruitlets by *M. laxa*?
- What is the effect of biocontrol organisms on the cherry fruit microbiome and to what extent does the microbiome affect post-harvest rots?
- Can *B. subtilis* also reduce the inoculum source of bacterial canker on cherry leaves?

Summary of the project and main conclusions

In the first year of this PhD study, molecular techniques for assessing the living cells on the fruit surface were refined. A dose-response experiment was conducted in the laboratory to identify the optimum BCA concentration to successfully reduce brown rot on cherry. Two field experiments were conducted in the winter and the spring to assess the survival rate of the BCAs on mummified fruits (winter) and blossoms (spring). Once a survival rate is established, it can be cross-referenced with the dose-response experiment to assess if the BCAs can successfully colonise and survive at high enough levels to be effective. The results of these experiments will be completed in December 2018, and reported in the next annual report.

Financial benefits

This is only the first year of a four-year project so there are no results that will have direct effects on commercial fruit production at this stage.

Action points for growers

- There are no grower action points at this early stage of the project.