Fungi associated with postharvest strawberries

Agricultural Produce Commission (APC P1922 126) — Commonwealth Government Research Training Program (RTP)

Within the fungi there are species that can cause devastating diseases that can significantly impact on strawberry production and decrease postharvest shelf life. In Western Australia, the information available on postharvest losses of strawberries caused by fungal pathogens is limited. Gathering information about fungal pathogens and minimising fungi associated with postharvest decays is imperative to maintain our reputation for high quality fruit of export quality.

A PhD project is running at Murdoch University focused on isolation and identification of fungal pathogens from postharvest strawberries. In the first phase of this research, 340 fungal isolates were collected from 17 different farms, from 7 different varieties of strawberries in the metropolitan region of WA (Figure 1 and 2).

Based on morphological characteristics and sequencing of the internal transcribed spacer (ITS) region of the fungal DNA, 38% of the isolates were identified as *Botrytis cinerea*, followed by *Cladosporium* (25%) and several other fungal species (Table 1). Consistent with previous studies (Feliziani and Romanazzi, 2016; Petrasch et al., 2019), B. *cinerea* is the major strawberry pathogen, but the number of *Cladosporium* isolates in WA strawberries warrants further investigation.

Our aim is to conduct isolations for the remainder of the current strawberry season and again in 2021, investigating the variation in the pathogen population over time and from different growing regions. We also hope to determine if there is variation in pathogens found on field grown vs hydroponically grown fruit.

As a control measure, currently we are testing cold plasma (CP) and plasma activated water (PAW) as potential treatments for postharvest fungal pathogens of strawberries, to increase the shelf-life of fruit. Both methods have already shown potential against a number of fungal pathogens of berries (Li et al., 2019; Ma et al., 2016; Misra et al., 2014).

The impacts of treatments on strawberries are being assessed based on physiological changes (colour, weight, firmness, and pH) as well as spoilage of fruit over 8 days.

Table 1. Strawberry pathogens isolated from 17 different farms in Western Australia

Pathogen	Prevalence
Botrytis cinerea	38%
Cladosporium cladosporioides complex	25%
Aureobasidium pullulans	7%
Alternaria alternata complex	6%
Alternaria atra	6%
Mucor piriformis	1.8%
Penicillium expansum	1.2%
Chaetomella raphigera complex	0.6%
Fusarium oxysporum	0.3%
Gnomoniopsis fruiticola	0.3%
Others	13.8%

The overarching aim of this study is to isolate and identify the pathogens of strawberries associated with postharvest losses in WA. We are also planning further work on other berries, and larger-scale commercial application trials. For further information please contact Dr Kirsty Bayliss, K.Bayliss@murdoch.edu.au.

Figure 1. Postharvest strawberries infected by the fungal pathogen *Botrytis cinerea*.
Photo credit: Farhana Momtaz, Murdoch University

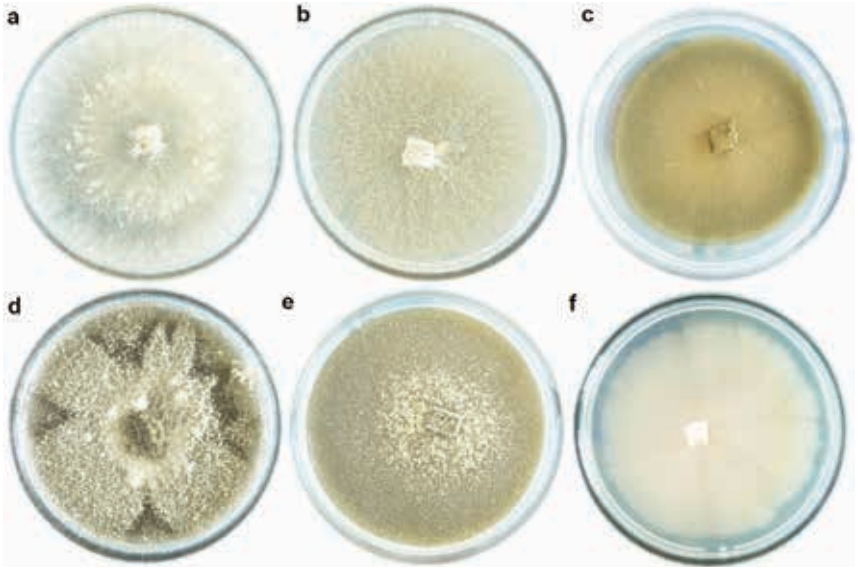

Figure 2. Cultures of different postharvest strawberry pathogens. Pathogens include a) *Botrytis cinerea*, b) *Mucor piriformis*, c) *Cladosporium cladosporioides complex*, d) *Alternaria atra*, e) *Alternaria alternata complex*, f) *Aureobasidium pullulans*. Photo credit: Farhana Momtaz, Murdoch University

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