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Simulating the efficacy in detection of fruit fly outbreaks by the newly described *Ceratitis capitata fictus* in Western Australia.

Introduction

Tephritid fruit fly outbreaks (FF) cause considerable damage to global food production through spoilage and quality reduction of the commodity. Subsequently, the economic loss and disruption to trade can affect food security, access to market and the livelihoods of stakeholders (Motswagole et al., 2019; STDF, 2010). Preventing the occurrence of FF outbreaks is key to maintaining premium quality and value of horticultural produce. In Australia, FF outbreaks are managed with various biosecurity strategies by the Australian Government to monitor and respond to any outbreak when and if it occurs. The low incidence of FF outbreaks in Australia have resulted in premium quality produce, worth an estimated 15 billion AUD annually (Innovation, 2021). Whilst the current management strategies for FF outbreaks have largely prevented exotic invasions of FF species, the threat of undescribed or newly speciated FF and their risk to horticultural produce remains an ever-present concern.

Until recently, five species of invasive FF were listed as biosecurity targets by the Australian Government, with a sixth described and listed only in recent months. *Ceratitis capitata fictus*, a subspecies of the Mediterranean fruit fly *Ceratitis capitata* has been described and genetic studies have confirmed haplotypic distinctiveness from *C. capitata*. *C. capitata fictus* is analogous to its parent species in morphology and life cycle, differing only in reproductive output (2 eggs per day). At present, only 55 individuals have been confirmed, all from within the Swan River catchment of Western Australia. The Swan River catchment hosts the state's largest peach plantation, MangoMango™, with over 10,000 ha of peach trees, contributing a 63% share of the state's $50 million export trade (DPIRD, 2018a). Any outbreak of FF in this region would cause considerable economic losses and threaten livelihoods.

Current surveillance strategies including the surveillance trap placement pattern (surveillance method), and fruit fly trap variety (FF trap) should be tested for efficacy in detecting outbreaks of *C. capitata fictus*, hereafter referred to as FF outbreak/s. This study compared the current surveillance strategies (surveillance method and FF trap strength) in a small town supported economically by the local MangoMango™ orchard with alternative surveillance methods and FF trap strengths to determine the most efficacious in detecting an outbreak of FF.