CONTROL OF Monilinia fructicola IN STONE FRUIT WITH LEMON MYRTLE ESSENTIAL OIL

Thesis submitted in partial fulfilment of the requirements for the Degree of Master of Philosophy (Food Science)

By
Bsc. Thi Song Van Luong

Supervisor
Prof. Ronald Wills
Dr. Suzie Newman
Dr. Shane Hetherington

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School of Environmental and Life Sciences
Faculty of Science and Information Technology
University of Newcastle
Australia
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ABSTRACT

Brown rot caused by *Monilinia fructicola* is a major postharvest fungal disease in stone fruit. The need to control this disease has led to considerable reliance on synthetic fungicides. The use of these products has raised concerns related to pathogen-resistance and chemical residues on food products, creating demand for alternative control methods. Essential oils, which have long been generally recognised as safe for human use, are known for their antifungal properties. This project focuses on the postharvest application of lemon myrtle essential oil vapour to control brown rot on stone fruit. Sets of 20 fruit in 3 replicates were exposed to three different concentrations of lemon myrtle essential oil vapour in air; 25,000ppm; 30,000ppm and 40,000ppm, by placing each set within closed plastic containers with small fans to circulate the vapour during fumigations at 20°C and 25°C. Nectarines which were exposed to lemon myrtle oil vapour from 4 to 16 hours developed phytotoxic symptoms, while the minimum effective treatment times were 2 hour fumigations. Exposing ‘Diamond Bright’ nectarine and ‘Tam Hoa’ plum to lemon myrtle oil vapour concentrations of 25,000ppm, 30,000ppm and 40,000ppm at 20°C and 25°C for 2 hours significantly inhibited the growth of postharvest brown rot on artificially infected fruit. Phytotoxicity generally appeared as a result of concomitant high temperatures during treatment and high vapour concentrations. However, ‘Red Gold’ nectarines were most sensitive to lemon myrtle oil, with higher temperature treatments found to cause phytotoxicity in this variety even at lower vapour concentrations. Thus lower levels of lemon myrtle essential oil vapour are shown to be more active and toxic when treatment temperatures are increased from 20°C to 25°C. The experiment successfully established maximum tolerable oil vapour concentrations, treatment times and temperatures, which if exceeded could cause phytotoxicity. Thus the research usefully expands upon previous *in vitro* studies of essential oils as fungicides by investigating the balance between pathogen treatment and the need to protect fruit from phytotoxic damage, to maximise saleable stone fruit produce. This research further explains the different sensitivities of the diverse varieties tested.
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